Chapter 3. Core countries

3.1 Overview

Chapter 1 has focused on large climate anomalies that sometimes reach the size of continents and beyond. The present section offers a closer look at individual countries, including the 42 countries that together produce and commercialize 80 percent of maize, rice, wheat, and soybean. As evidenced by the data in this section, even countries of minor agricultural or geopolitical relevance are exposed to extreme conditions and deserve mentioning, particularly when they logically fit into larger patterns.

1. Introduction

The global agro-climatic patterns that emerge at the MRU level (chapter 1) are reflected with greater spatial detail at the national and sub-national administrative levels described in this chapter. The "core countries", including major producing and exporting countries are all the object of a specific and detailed narrative in the later sections of this chapter, while China is covered in Chapter 4. Sub-national units and national agro- ecological zones receive due attention in this chapter as well.

In many cases, the situations listed below are also mentioned in the section on disasters (chapter 5.2) although extreme events tend to be limited spatially, so that the statistical abnormality is not necessarily reflected in the climate statistics that include larger areas. No attempts are normally made, in this chapter, to identify global patterns that were already covered in Chapter 1. The focus is on 166 individual countries and sometimes their subdivisions for the largest ones. Some of them are relatively minor agricultural producers at the global scale, but their national production is nevertheless crucial for their population, and conditions may be more extreme than among the large producers.

2. Overview of weather conditions in major agricultural exporting countries

This section provides a short overview of prevailing conditions of maize, rice, wheat and soybeans in a group of just 20 countries, conventionally taken as the major exporters, with each of them exporting at least one million tons of the covered commodities. They include the top 10 exporters in the world, with the United States and Argentina exporting all four crops, and Brazil, Ukraine and Russia exporting three of them each.

Maize: Maize exports are dominated by just 4 countries: USA, Brazil, Argentina and the Ukraine. Together, they supply almost 90% of the maize being traded internationally. During this monitoring period, maize planting had started in late September in southern Brazil. Conditions were generally on the dry side, due to the onset of La Niña conditions, which may further constrain production in southern Brazil and Argentina. In the USA, the largest exporter, conditions were generally favorable. The maize crops benefitted from favorable conditions in the spring and early summer. Good rainfall until July provided enough of a buffer to compensate for the drier conditions that followed, especially in September. The drier-than-usual conditions actually helped harvest activities. A powerful storm, called Derecho, had hit Iowa on August 10, 2020. It flattened about half of Iowa's maize fields and 10% of the maize in that state could not get harvested. However, this is just a minor dent in the total US maize production and close-to-record yields are expected. Maize in the Ukraine, on the other hand, suffered from severe drought conditions, causing considerable yield losses. In Africa, most of the maize is consumed locally. Sufficient rains created generally favorable conditions, in the Horn of Africa, as well as in West Africa. In China, summer rains were above normal, causing a generally favorable environment for maize production.

However, several typhoons and tropical depressions created excessive rainfall and flooding in some areas, especially in the Heilongjiang province, causing yield losses.

Rice: Four out of the 5 top rice exporting countries are located in South and Southeast Asia: India supplies about 1/3 of the rice that is internationally traded, followed by Thailand with 1/5. The USA, number 3, supplies less than 10%. Vietnam contributes about 7% and Pakistan close to 6%.

Southeast Asia, with a combined market share of slightly more than 25%, was suffering from a prolonged drought until the onset of the monsoon rains. This caused some delays in planting. The Mekong delta region had not fully recovered from the low water levels of the Mekong River and production during this monsoon season remained below average. In addition, Central Vietnam was hit by several typhoons right after rice harvest. In Thailand, overall conditions returned to close to normal and an average production was estimated. In India, as well as in Pakistan, conditions for rice production were favorable and above-average production is expected.

Wheat: Wheat production in the southern hemisphere experienced generally favorable conditions. Australia had recovered from a severe drought and the wheat fields in Queensland and southern Australia received sufficient rainfall. Similarly, conditions were favorable in the Cape province of South Africa and in southern Brazil. However, wheat in the Pampas in Argentina suffered from a rainfall deficit. Winter wheat in the northern hemisphere was generally harvested by July and was reported on in the August CropWatch bulletin. Conditions for spring wheat in the northern states of the USA and in Canada were favorable. Spring wheat in Russia generally benefitted from above-average precipitation in the Volga, Southern Caucasus and Siberian production regions. Similarly, conditions were quite favorable in Kazakhstan. Hence, favorable spring wheat production will more than compensate for the winter wheat yield losses caused by droughts in France, Germany, Romania and the Ukraine. Wheat supply is likely to surpass last year's level.

Soybean: Similar to maize, the soybean market is dominated by few countries: Brazil, the USA and Argentina account for more than 80% of total production. Brazil's share is more than half of the soybean traded on the international market, followed by the USA (30%), Argentina (5%), Paraguay (4%) and Canada (3%). Soybean planting for the coming growing season was off to a slow start in Brazil, due to prolonged winter drought conditions. Southern Brazil, Argentina and Paraguay may continue to be negatively impacted by La Niña in the coming months, which tends to cause drought conditions in that region. Soybean production in the USA and Canada benefitted from generally favorable conditions persisting throughout the entire production cycle from sowing to harvest. In China, the province of Heilongjiang, the most important soybean production province of the country, was negatively impacted by excessive rainfall and flood events caused by typhoons.

3. Weather anomalies and biomass production potential changes

3.1 Rainfall

Rainfall anomalies depict the average departure of rainfall from the 15YA. They do not show short term water deficits. Nevertheless, they indicate where rainfall was generally favorable or not for crop production. Fig 3.1 shows that the Western USA was impacted by severe drought conditions, which led to massive forest fires in California, Oregon and Colorado. This was the dry season for the Maghreb and the Levant. Nevertheless, drier-than-normal conditions persisted in these regions. The Caucasus and Western Volga region of Russia also received below-average rainfall. Positive departures were observed for eastern Siberia, most of China and the wheat production regions in South-East Australia.

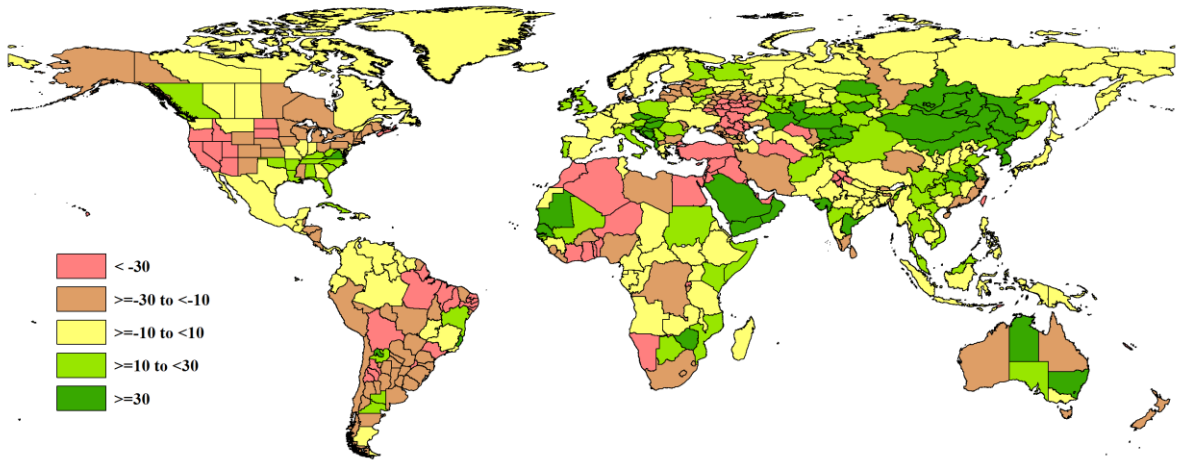


Figure 3.1 National and subnational rainfall anomaly (as indicated by the RAIN indicator) of July to October 2020 total relative to the 2005-2019 average (15YA), in percent

3.2 Temperatures

Warmer-than-average temperatures were observed for most of Brazil and the Western USA. Eastern Europe, including the Ukraine also experienced above-average temperatures, which deviated by more than 1.5ºC from the 15YA. Large negative departures were observed for the Middle Asia and Tianshan mountain region.

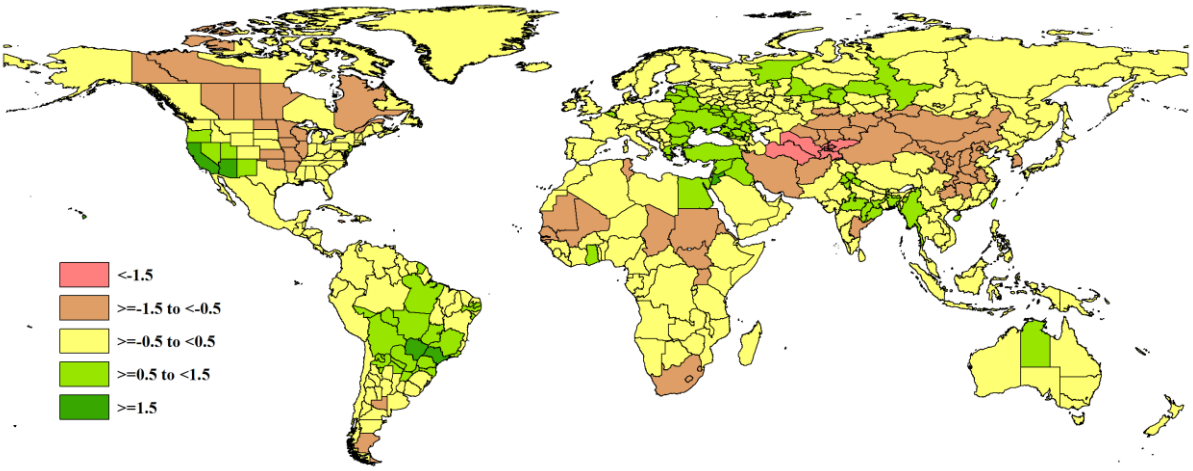


Figure 3.2 National and subnational temperature anomaly (as indicated by the TEMP indicator) of July to October 2020 average relative to the 2005-2019 average (15YA), in °C

3.3 Solar radiation

Most of the Americas experienced average or above-average solar radiation. Only the South-East of the USA, which also received above-average rainfall due to several hurricanes, experienced below-average solar radiation. Northern Europe and northwestern Russia and most of Asia from Iran to Japan experienced below-average solar radiation. The only exception was the Gangetic Plain and Central India, which received above-average solar radiation, i.e., a positive departure by more than 3% from the 15YA. Turkey and the northern Caucasus region, which had suffered from below-average rainfall, also experienced more sunshine than usual.

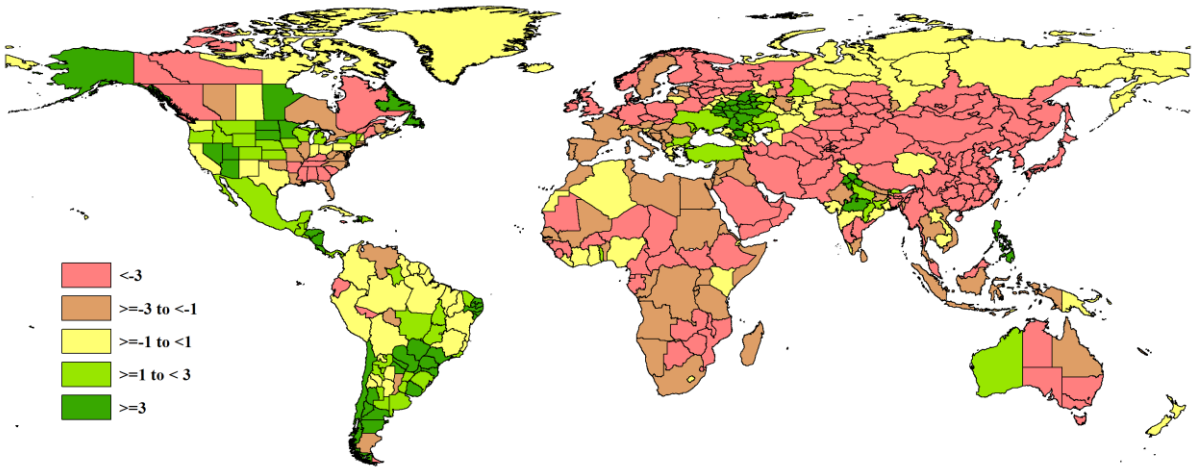


Figure 3.3 National and subnational sunshine anomaly (as indicated by the RADPAR indicator) of July to October 2020 total relative to the 2005-2019 average (15YA), in percent

3.4 Biomass production

Biomass production estimates are the product of rainfall, temperature, and solar radiation. They integrate the three indicators discussed above. Positive departures by more than 5% were calculated for the wheat production regions in Brazil, as well as for the northern Pampas and Chaco region in Argentina. The corn belt in the USA and the North-East also had positive departures. The other key food production regions that experienced large positive departures were the north-west and central part of India and Victoria in Australia. Key production regions that were negatively impacted were California, the Levant and Korea.

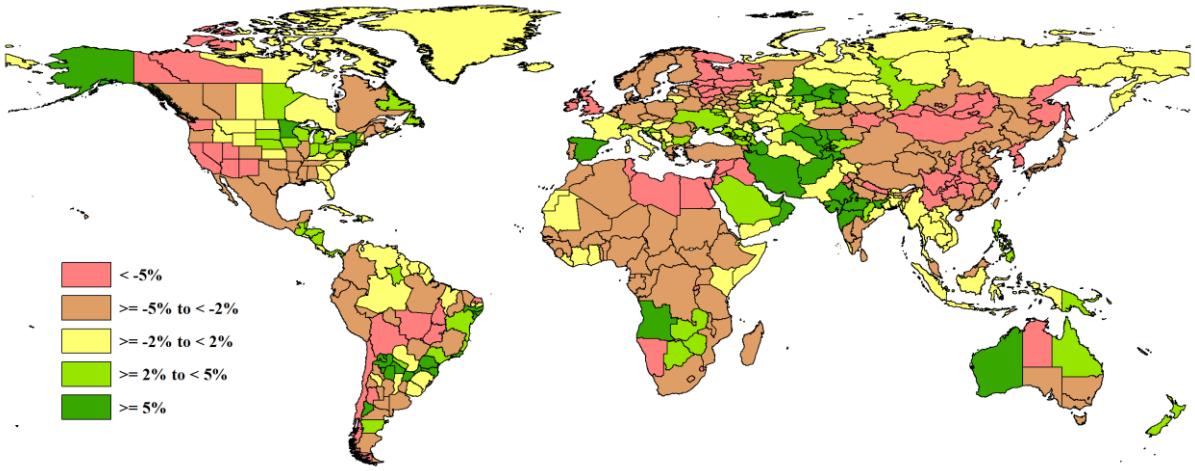


Figure 3.4 National and subnational biomass production potential anomaly (as indicated by the BIOMSS indicator) of July to October 2020 total relative to the 2005-2019 average (15YA), in percent

Table 3.1 July- October 2020 agro-climatic and Agronomic indicators by country, current value and departure from average.

Code	Country	Agro-climatic indicators				Agronomic indicators	
		Departure from 15YA (2005-2019)				Departure from 5YA (2015-2019)	Current
		RAIN (%)	TEMP(°C)	PAR(%)	BIOMSS (%)	CALF (%)	VCIx
AFG	Afghanistan	29	-1.2	-3	17	46	0.64
AGO	Angola	-8	0.0	-2	7	16	0.85
ARG	Argentina	-20	0.1	2	0	-12	0.62
AUS	Australia	12	0.2	-5	-1	4	0.86
BGD	Bangladesh	8	0.5	-3	-2	-1	0.91
BLR	Belarus	-7	1.0	-3	-3	0	0.97
BRA	Brazil	-21	0.7	2	-7	2	0.87
KHM	Cambodia	-2	0.2	1	1	1	0.93
CAN	Canada	-4	-0.6	-1	-1	1	0.96
CHN	China	10	-0.4	-10	-9	1	0.95
EGY	Egypt	-62	0.8	-2	-19	7	0.79
ETH	Ethiopia	6	-0.5	-7	-9	1	0.97
FRA	France	6	0.4	-2	1	0	0.89
DEU	Germany	-1	0.4	-4	-3	0	0.95
HUN	Hungary	39	0.3	-2	0	0	0.95
IND	India	5	0.3	0	1	3	0.97
IDN	Indonesia	10	0.1	-2	-1	0	0.96
IRN	Iran	-13	-0.6	-4	18	26	0.84
ITA	Italy	15	0.0	-1	-2	0	0.86
KAZ	Kazakhstan	23	-0.7	-4	1	-7	0.72
KEN	Kenya	21	-0.2	0	0	11	0.88
MEX	Mexico	55	-1.6	-7	4	0	0.84
MNG	Mongolia	-6	0.3	1	-5	-6	0.84
MAR	Morocco	67	-1.2	-8	-14	2	0.94
MOZ	Mozambique	-39	0.4	-1	-3	6	0.52
MMR	Myanmar	15	-0.4	-7	-4	-3	0.74
NGA	Nigeria	-4	0.6	-3	-2	-1	0.92
PAK	Pakistan	-27	0.0	-1	-5	1	0.94
PHL	Philippines	-2	-0.3	-3	-1	12	0.96
POL	Poland	-2	0.4	3	3	0	0.97
ROU	Romania	13	0.5	-3	-5	0	0.99
RUS	Russia	16	0.7	-1	-2	-2	0.86
ZAF	South Africa	0	0.3	-2	-3	-1	0.86
LKA	Sri_Lanka	-20	-0.6	-1	-4	2	0.72
THA	Thailand	-23	0.2	-3	-3	0	0.95
TUR	Turkey	12	0.1	-2	-1	0	0.97
UKR	Ukraine	-54	1.1	2	-6	3	0.78
GBR	United Kingdom	-3	1.1	2	2	-1	0.88
USA	United States	12	-0.4	-12	-13	0	0.95
UZB	Uzbekistan	-6	-0.1	0	-3	-1	0.87
VNM	Vietnam	4	-1.5	-5	27	19	0.96
ZMB	Zambia	13	0.2	-1	0	0	0.94

3.2 Country analysis

This section presents CropWatch analyses for each of 42 key countries (China is addressed in Chapter 4). The maps refer to crop growing areas only and include several graphs: (a) Phenology of major crops; (b) Crop condition development based on NDVI over crop areas at national scale, comparing the July - October 2019 period to the previous season and the five-year average (5YA) and maximum; (c) Maximum VCI (over arable land) for July - October 2019 by pixel; (d) Spatial NDVI patterns up to July - October 2019 according to local cropping patterns and compared to the 5YA; and (e) NDVI profiles associated with the spatial pattern under (d). Next, separate graphs (labeled as figures (f), (g), and subsequent letters) are included to illustrate crop condition development graphs based on NDVI average over crop areas for different regions within the country, again comparing the July - October 2019 period to the previous season and the five-year average (5YA) and maximum.

Refer to Annexes A for additional information about indicator values by country. Country agricultural profiles are posted on **www.cropwatch.com.cn**.

Figures 3.5 - 3.45 are Crop condition for individual countries ([AFG] Afghanistan - [ZMB] Zambia) including sub-national regions during July – October 2020.

[AFG] Afghanistan

Wheat, maize, and rice are the main cereals that are grown in Afghanistan. The sowing of spring wheat starts in March and April and harvest is in August and September. Maize sowing starts in May and harvest is in August. Likewise, rice sowing starts in May/June and harvest is in October/November.

During this reporting period, the total precipitation in Afghanistan was lower than the 15Y maximum and 2019-2020's rainfall but it still was 29% above the 15YA. However, there was some unseasonal rainfall in mid July (12 mm) and in late August (15mm). Temperature trended slightly below the 15YA. Biomass was estimated to be 17% higher than the 15YA.

Based on the NDVI crop condition development graph, crop conditions were above average and almost equal to the 5-year maximum in all major regions. The cropped arable land was mainly located in Badghis, Faryab, Jawzjan, Sari Pul, Balkh, Samangan, Kunduz, Takhar, Badakhshan, Baghalan and Nuristan. The cropped arable land fraction (CALF) increased by 46% over the 5YA. According to the maximum vegetation condition index (VCIx) map, the vegetation in the south was better than in the north. As to the spatial distribution of NDVI profiles, crop conditions in most of the area (62%) were above average or close to average from July to October. The most favorable crop conditions, 11.9% of the area, were identified mainly in the north of Afghanistan (Kunduz and Samangan provinces) and South-East (Khost, Paktya, Kunar provinces). About 37.9% the crop conditions were below average, mainly in the northern part of Jawzjan.

Overall, the conditions for wheat and maize were favorable in the study area.

Regional analysis

CropWatch subdivides Afghanistan into four zones based on cropping systems, climatic zones, and topography. They are described below as Dry region, Central region with sparse vegetation, Mixed dry farming and irrigated cultivation region, and Mixed dry farming and grazing region.

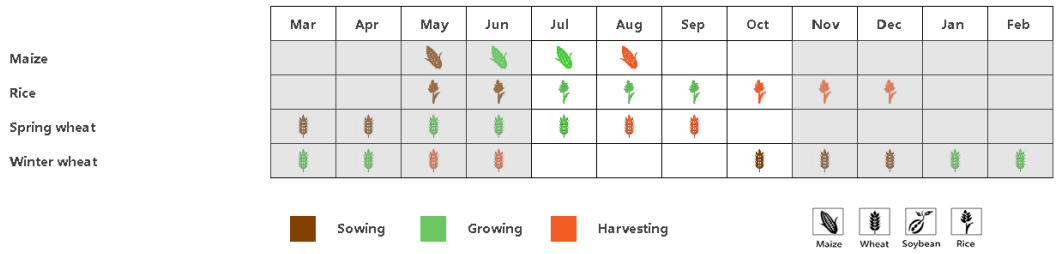
The RAIN in the Central region with sparse vegetation was 28 mm (+14%). The TEMP was 14.3°C (-0.6°C), and RADPAR was 1410 MJ/m^2 (+3%). According to the NDVI-based crop condition development graph, the NDVI was higher than the average level and almost equal to the 5-year maximum. Potential biomass increased by 12%, CALF had increased substantially (+72%) and VCIx was 0.91. Crop production is expected to be favorable.

The Dry region recorded 27 mm of RAIN (+19%). TEMP was 20.8°C (-0.7°C) and RADPAR was 1449 MJ/m^2 (-3%). CALF was 122% higher than the 5YA. VCIx was 0.57 and the potential biomass increased by 23%. According to the crop condition development graph, the NDVI was higher than the maximum level recorded over the past 5 years.

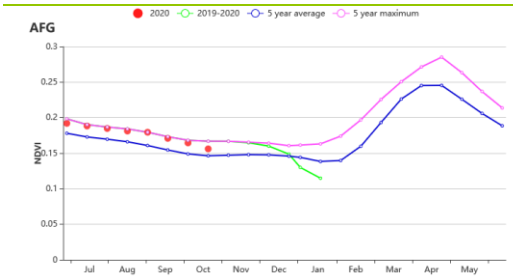
In the Mixed dry farming and irrigated cultivation region, the following indicator values were observed: RAIN 91 mm (+41%); TEMP 16.4°C (-1.3°C); RADPAR 1369 MJ/m^2 (-4%). Potential biomass was 262 gDM/m^2 (+27%) and CALF was 27% above the average. According to the NDVI-based crop condition development graph, NDVI was higher than the average level, but lower than the 5-year maximum. In this reason VCIx reached 0.84. Crop production is expected to be favorable.

The Mixed dry farming and grazing region recorded 0.54 mm of RAIN (-94%), TEMP was lower than average at 18.8°C (1.6°C), and RADPAR was 1440 MJ/m^2 (-3%). According to the NDVI-based development graph, crop conditions were better than the five-year average but lower than the 5-year maximum. CALF in this region increased by 159% and VCIx reached 0.62.

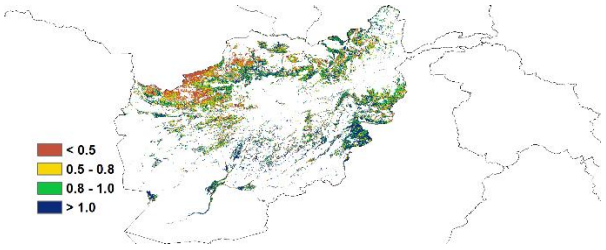
Figure 3.5 Afghanistan's crop condition, July - October 2020



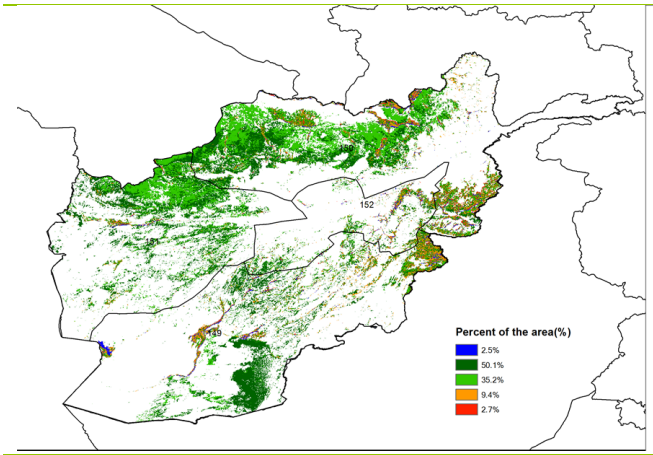
(a). Phenology of major crops



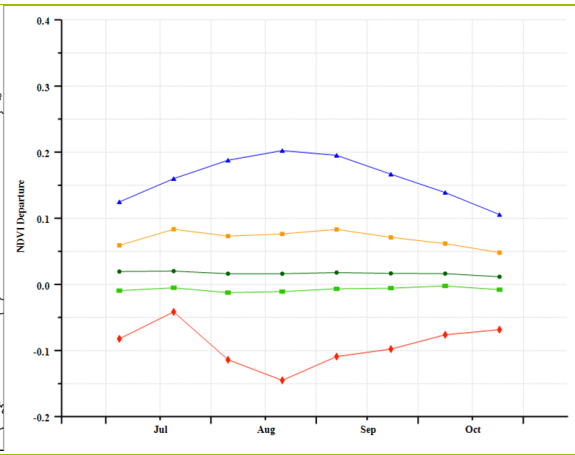
(b) Crop condition development graph based on NDVI



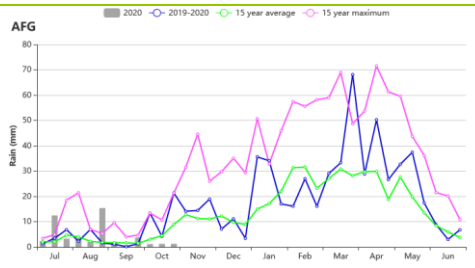
(c) Maximum VCI



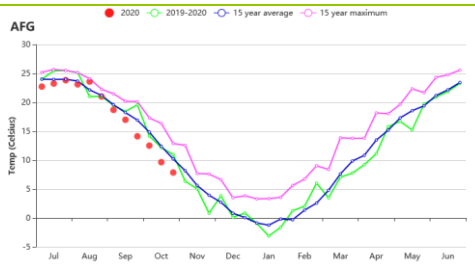
(d) Spatial NDVI patterns compared to 5YA



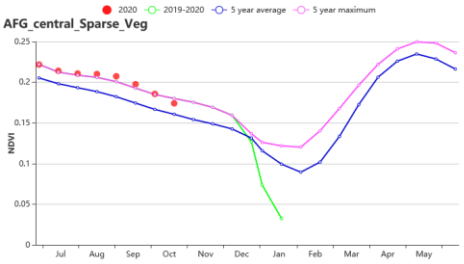
(e) NDVI profiles

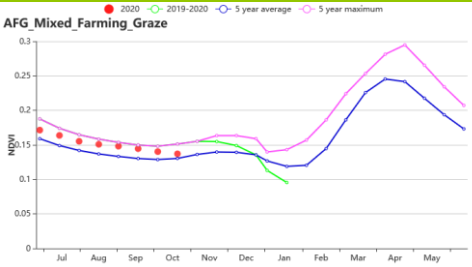


(f) Rainfall profiles

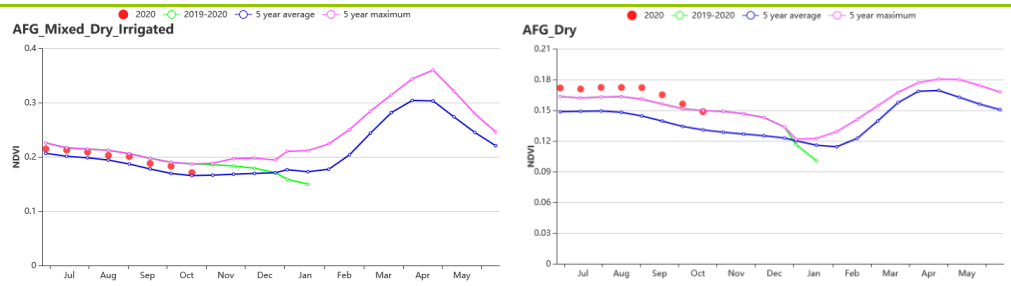


(g) Temperature profiles





(h) Crop condition development graph based on NDVI (central_Sparse_Veg Region (left) and Mixed_Farming_Graze Region (right))



(i) Crop condition development graph based on NDVI (Mixed_Dry_Irrigated Region (left) and Dry (right))

Table 3.2 Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central region	29	14	14.4	-0.6	1411	-4	221	12
Dry region	27	19	20.8	-0.7	1449	-3	171	13
Dry and irrigated cultivation region	91	41	16.4	-1.3	1369	-4	262	27
Dry and grazing region	1	-94	18.8	-1.6	1440	-3	77	0

Table 3.3 Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central region	10	72	108	4	0.91
Dry region	6	122	110	-2	0.57
Dry and irrigated cultivation region	13	27	107	0	0.66
Dry and grazing region	1	159	101	-2	0.62

[AGO] Angola

Wheat is the major cereal crop that was grown in Angola during this monitoring period. Its harvest started in October. Planting of maize and rice also started in October. Agroclimatic indicators revealed a below-average rainfall (RAIN -8%), while there was no departure from the average temperature. Nationwide, the radiation decreased by 2%. Altogether, these conditions led to an increase in biomass by 7%.

The crop condition development graph based on NDVI for Angola presents close-to-average crop conditions throughout the monitoring period compared to the previous 5YA. These conditions were mostly influenced by the adequate rainfall recorded in the country, especially during the early wheat growing stages. The spatial patterns of NDVI departures indicate above-average NDVI in 50.3% of the arable land during the entire monitoring period, while 43.9% of arable land remained below average. At the same time, 5.8% of this area experienced a drop in crop conditions in late October. Nationwide, the maximum VCIx reached 0.85. Best VCIx values were recorded in Cuando Cubango, Cuanza Norte and Cuanza Sul. With the cropped arable land fraction increasing by 16%, the general crop conditions during July-October 2020 in Angola were normal.

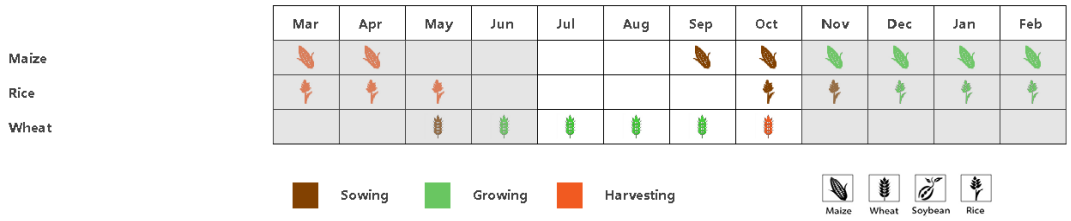
Regional analysis

Considering the cropping systems, climatic zones and topographic conditions, Angola is divided into five agro – ecological zones (AEZs): The Arid Zone, Central Plateau, Humid zone, Semi-Arid zone, and Sub-humid zone.

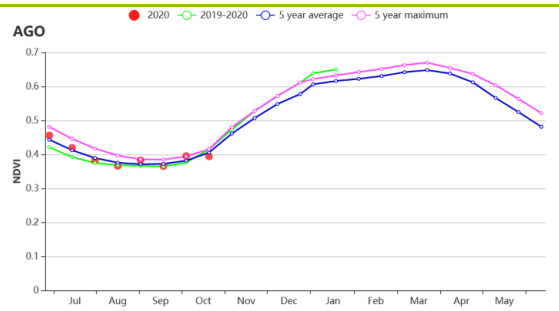
Recorded rainfall was below average in all agroecological zones. The highest departure was observed for in the Central Plateau and Semi-arid zone (about -39% and -32%), respectively. In other zones such as the Arid, Humid and Sub-humid zones, the recorded decreases in rainfall were about 8%, 5% and 6% respectively. The temperature recorded a slight decrease of 0.2 ºC in Central plateau and Humid zone. Except for the Humid zone (RADPAR +1%), all agro-ecological regions recorded decreases in the radiation by about 2%. Even though rainfall was below average, the Central plateau and Semi-arid zones stood out with a higher estimated increase in biomass by about 18% and 13%, respectively. A decrease of about 3% in biomass was recorded for the Humid zone.

The crop conditions development graph based on NDVI reveals below-average crop conditions in the arid zone and sub-humid zone during most of the monitoring period. Above crop conditions were recorded in the Central plateau and Semi-arid zone. The Humid zone presented mixed crop conditions: Crops were in below-average conditions from July to mid-August and recovered in early September. CALF increased by about 58% in Semi-arid zone, while the Arid zone recorded a decrease by about 19% and maximum VCIx was 0.58. In the remaining zones, the recorded maximum VCIx ranged from 0.80 to 0.90.

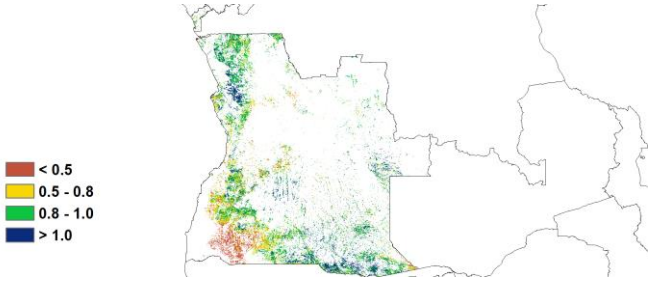
Figure 3.6 Angola's crop condition, July-October 2020



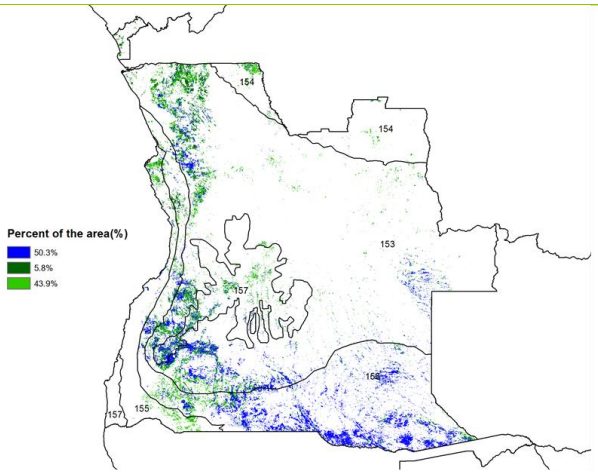
(a). Phenology of major crops



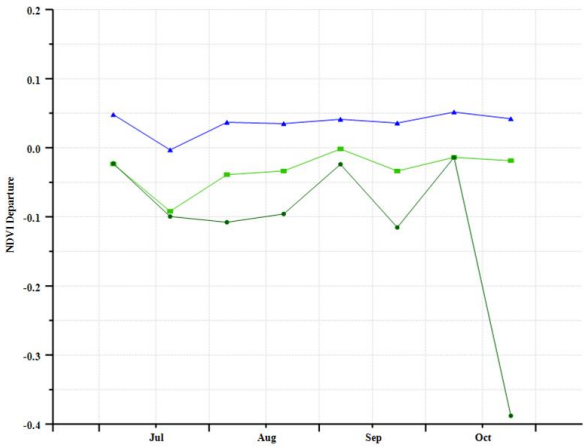
(b) Crop condition development graph based on NDVI



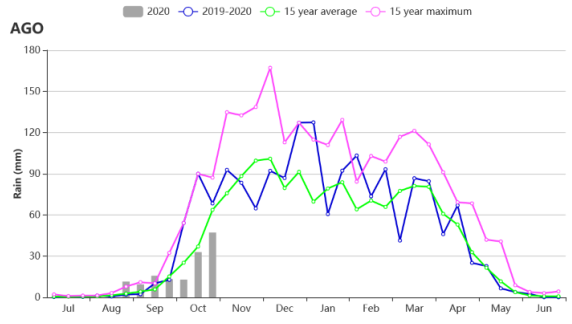
(c) Maximum VCI



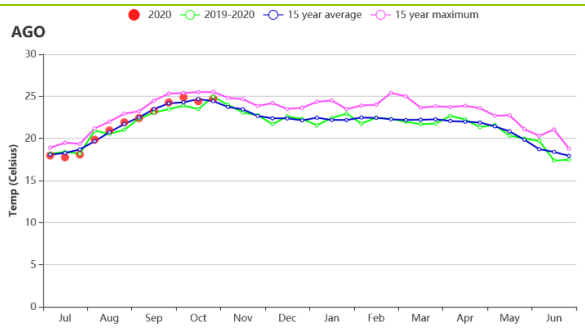
(d) Spatial NDVI patterns compared to 5YA



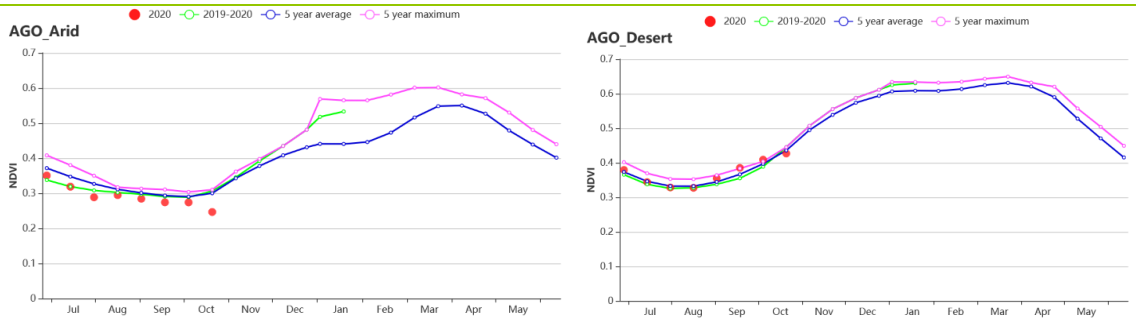
(e) NDVI profiles



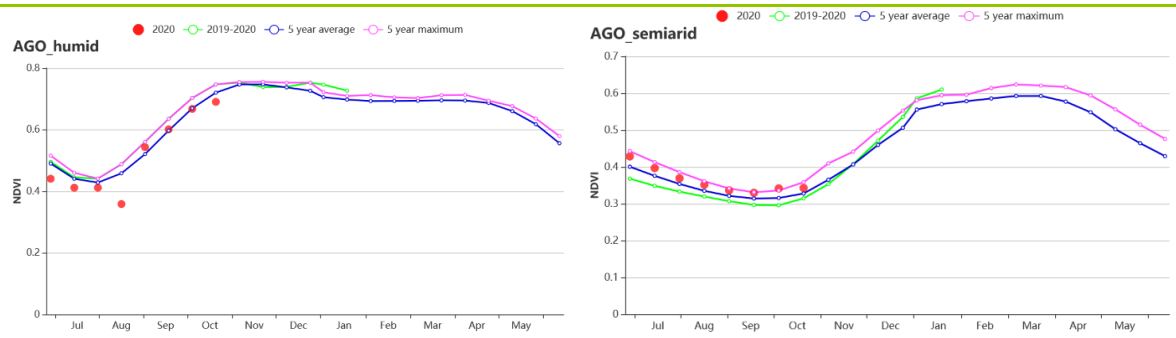
(f) Rainfall profiles



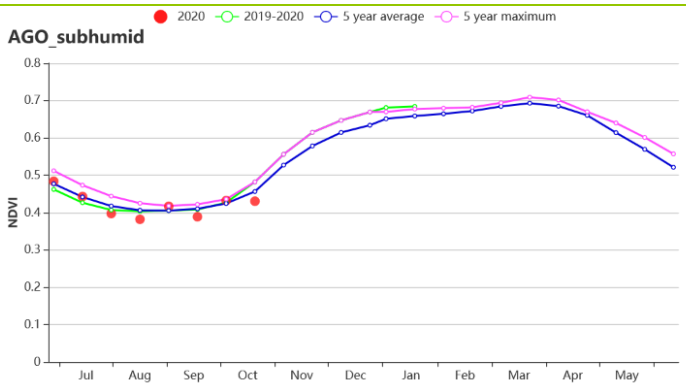
(g) Temperature profiles



(h) Crop condition development graph based on NDVI-Arid zone (left), and Central Plateau (right)



(i) Crop condition development graph based on NDVI-Humid zone (left), and Semi-arid zone (right)



(j) Crop condition development graph based on NDVI-Subhumid zone

Table 3.4 Angola's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Arid Zone	145	-8	21.7	0.0	1305	-2	448	
Central Plateau	93	-39	19.0	-0.2	1335	-2	387	
Humid Zone	508	-5	23.9	-0.2	1266	1	646	
Semi-Arid Zone	28	-32	21.3	0.0	1359	-2	373	
Sub-humid Zone	185	-6	21.8	0.0	1278	-2	490	

Table 3.5 Angola's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Arid Zone	19	-19	102	-3	0.58
Central Plateau	42	-3	100	0	0.85
Humid Zone	100	0	108	-15	0.9
Semi-Arid Zone	42	58	100	-2	0.87
Sub-humid Zone	63	5	101	-3	0.86

[ARG] Argentina

The reporting period covers the main growing stage for wheat and the beginning of planting for maize, soybean and rice. For the whole country, rainfall showed a -20 % negative anomaly, TEMP showed a slight negative anomaly of -0.1°C, RADPAR showed a positive anomaly of +2 %, while BIOMSS showed no anomaly. CALF showed a 12% reduction and maximum VCI value was 0.62. Low rainfall was the cause for the poor performances of several agronomic indices.

The reporting period covers the main growing stage for wheat and the beginning of planting for maize, soybean and rice. For the whole country, rainfall showed a -20 % negative anomaly, TEMP showed a slight negative anomaly of -0.1°C, RADPAR showed a positive anomaly of +2 %, while BIOMSS showed no anomaly. CALF showed a 12% reduction and maximum VCI value was 0.62. Low rainfall was the cause for the poor performances of several agronomic indices.

The rainfall temporal profile showed in general lower-than-average values, except for late October, when it was above average. The NDVI profile showed quite lower-than-average values during the entire period. This could be a result of delayed planting and emergence of summer crops. TEMP profile showed variations between positive and negative anomalies following a near-average trend.

Spatial distribution of NDVI profiles showed negative anomalies in most of the Argentine agricultural areas. Stronger negative anomalies (blue and red areas) were observed in the main agricultural belt in Pampas as well as in Chaco and Subtropical Highlands. Profiles with positive anomalies (yellow and dark green areas) were much less representative and were observed in South Pampas. At the beginning more than 24 % of the area experienced average or above-average conditions. However, crops condition over 16% of the cropland deteroriated to below-average conditions at the end of the period mainly due to the water deficit. The weekly proportions of different drought categories showed better conditions at the beginning than at the end, changing from near 20 % of area with minor to severe drought conditions, to near 40 % of area with minor to severe drought conditions mainly due to the below average rainfall.

Regional analysis

CropWatch subdivides Argentina into eight agro-ecological zones (AEZ) based on cropping systems, climatic zones, and topography; they are identified by numbers on the NDVI departure cluster map. During this monitoring period, most crops were grown in the following four agro-ecological zones: Chaco, Mesopotamia, Humid Pampas, and Subtropical highlands. The other four agro-ecological zones were less relevant for this period.

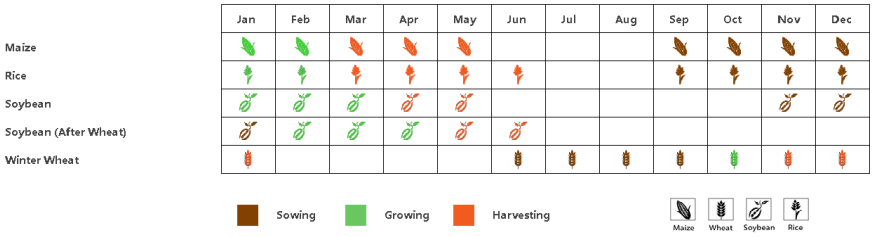
Mean values of rainfall showed negative anomalies for Chaco (-19 %), Mesopotamia (-29 %) and Pampas (-20 %), while Subtropical highlands showed a positive anomaly of +9 %. TEMP showed positive anomalies in Chaco (+0.7° C), Mesopotamia (+0.4° C) and Subtropical highlands (+0.5° C). Pampas showed a negative TEMP anomaly of -0.2° C. RADPAR showed slight positive anomalies in the four zones: Chaco (+1 %), Mesopotamia (+2 %), Subtropical highlands (+2 %) and Humid Pampas (+2 %). BIOMSS showed positive anomalies in Chaco (+6 %), Mesopotamia (+2 %) and Subtropical highlands (+8 %) and negative anomaly in Humid Pampas (-5 %). CALF was far from complete showing negative anomalies in Chaco (-18 %), Humid Pampas (-12 %) and Subtropical highlands (-24 %). In contrast, Mesopotamia showed no anomaly with almost complete CALF. VCIx showed quite low values for all of these regions: Chaco (0.45), followed by Mesopotamia (0.67), Pampas (0.64) and the Subtropical highlands (0.57).

NDVI profiles for Chaco and Subtropical highlands showed lower-than-average values during all the reporting period. Pampas showed slight negative anomalies during August and September, with no or positive anomalies at the beginning and end of this period. Mesopotamia showed lower-than-average NDVI values, except for early July.

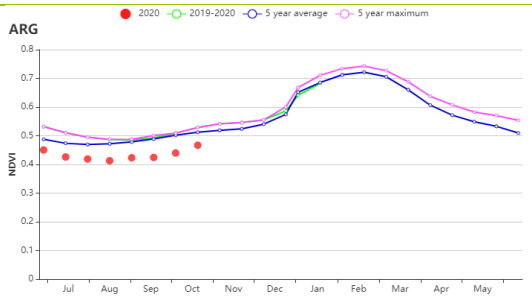
VCIx showed also a poor generalized pattern with values lower than 0.5 in Pampas agricultural belt, Chaco and Subtropical Highlands. Better conditions were observed in Mesopotamia and South Pampas.

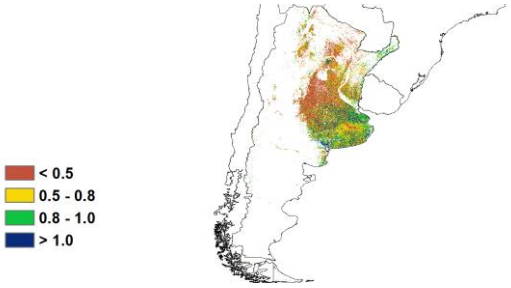
In summary, several indices showed poor growing and planting conditions in relevant agricultural areas, like rainfall and NDVI anomalies and very low VCIx values in northwestern Pampas agricultural belt and Chaco. In addition, quite low CALF values were observed in these regions. They reflect poor conditions also for the planting of summer crops.

Figure 3.7 Argentina´s crop condition, July - October 2020.

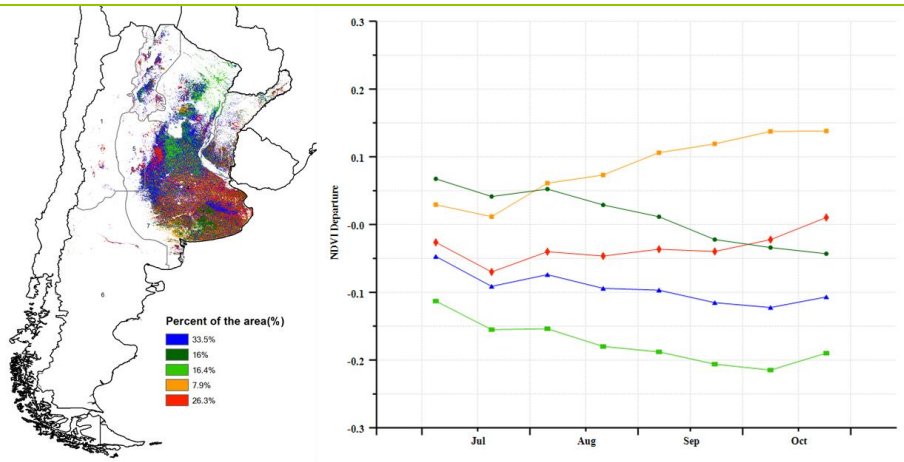


(a) Phenology of major crops

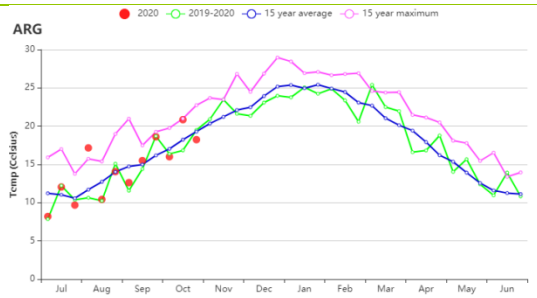


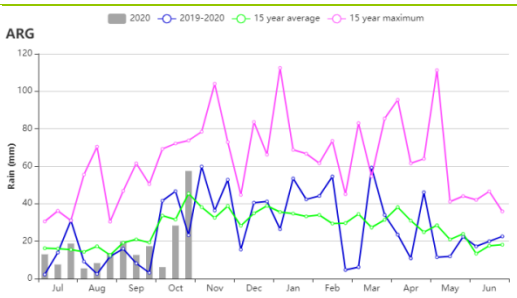


(b) Crop condition development graph based on NDVI (c) Maximum VCI

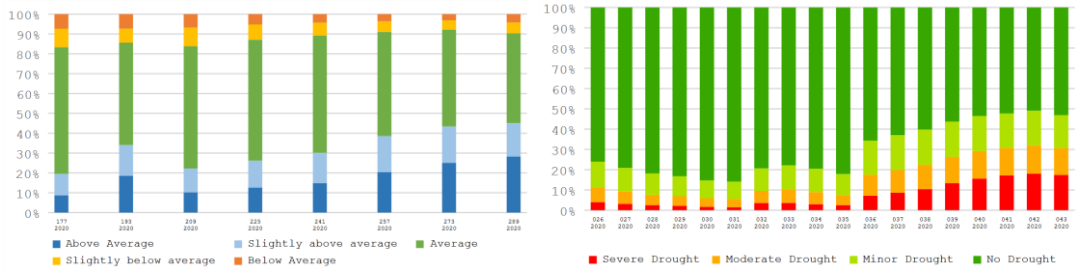


(d) Spatial NDVI patterns compared to 5YA (left) and NDVI profiles (right)

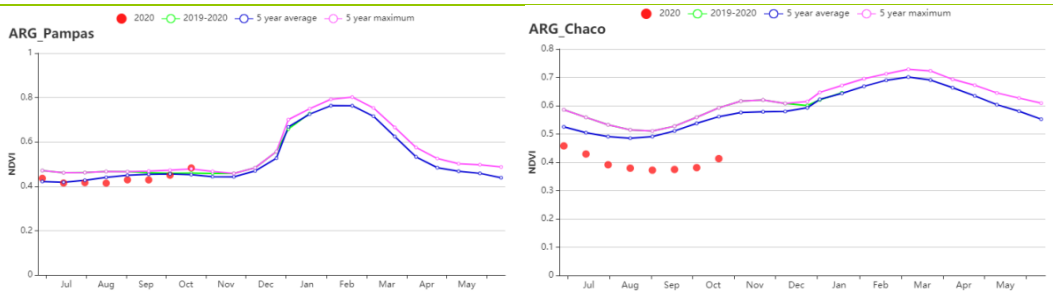




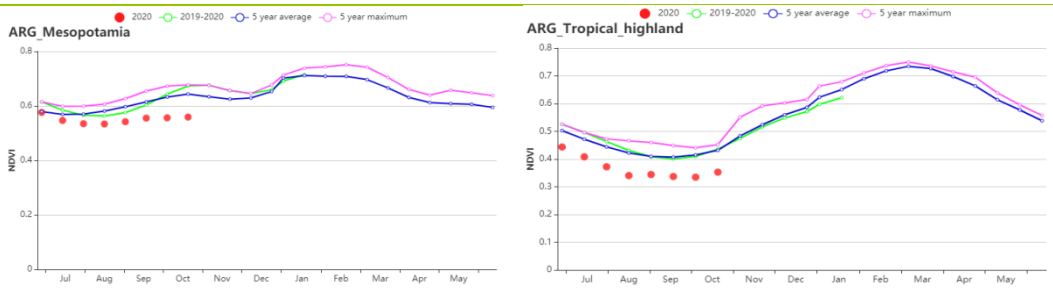
(e) Time series of rainfall profile (f) Time series of temperature profile



(g) Proportion of NDVI anomaly categories compared with 5YA (h) Proportion of VHIm categories compared with 5YA



(i) Crop condition development graph based on NDVI in Humid Pampas (left) and Chaco (right)



(j) Crop condition development graph based on NDVI in Mesopotamia (left) and Subtropical highlands (right)

Table 3.6 Argentina's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m²)	Departure (%)	Current (gDM/m²)	Departure (%)
Chaco	196	-19	18.5	0.7	949	1	453	6
Mesopotamia	320	-29	16.2	0.4	880	2	371	2
Humid Pampas	176	-20	12.4	-0.3	903	2	291	-5
Subtropical highlands	143	9	16.3	0.5	1145	2	441	8

Table 3.7 Argentina's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	CALF		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Chaco	74	-18	105	-4	0.45
Mesopotamia	98	0	106	-8	0.67
Humid Pampas	71	-12	104	-6	0.64
Subtropical highlands	57	-24	103	-1	0.57

[AUS] Australia

The current period covers the main growth period and the early harvest of wheat and barley, the main cereal crops of Australia. The national NDVI profiles are much better than the average of the last 5 years, nearly reaching the peak.

In the JASO period, Australia experienced above-average rainfall (RAIN +12%). The average temperature was 12°C, which was slightly above the 15YA (+0.2°C). The rainy weather led to below average sunshine (-5%). Though the higher rain was beneficial for crop growth, below-average solar radiation led to a decrease of the potential biomass estimate (-1%). The agronomic indicators were positive, with a VCIx of 0.86, an increased CALF (+4%) and an average CI (-1%).

Spatially, the conditions in three (New South Wales, South Australia, and Victoria) out of four main wheat production states were similar. They featured above-average rain, cool temperatures and slightly less sunshine, which led to a below average estimate of potential biomass. In the remaining state, Western Australia, an increase in biomass production was estimated. The VCIx map shows that the overall conditions in Australia were favorable considering the generally water limiting conditions for cereal production in Australia. The highest and lowest VCI were both found in New South Wales. The spatial NDVI profiles show above-average conditions in 45.2% of the cropland, below-average conditions on 20.6%, while the remaining 34.2% were near average. Overall, the crop conditions for Australia were very favorable.

Regional analysis

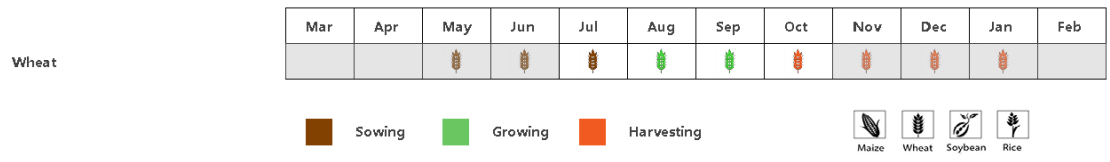
This analysis adopts five agro-ecological regions for Australia, namely the Arid and Semi-arid Zone, Southeastern Wheat Zone, Subhumid Subtropical Zone, Southwestern Wheat Zone, Wet Temperate and Subtropical Zone. The Arid and Semi-arid Zone, in which hardly any crop production takes place, was not analyzed.

The NDVI profiles in the three southeast zones, including the Southeastern Wheat Zone, Subhumid Subtropical Zone, Wet Temperate and Subtropical Zone, show that the crop conditions were good, reaching the 5-year maximum. Rainfall in these zones was above average (Southeast wheat area +28%, Subhumid subtropical zone +15%, Wet temperate and subtropical zone +16%). The temperatures were around the average (-0.1°C, 0.2°C, 0.1°C), while the solar radiation was below (-8%, -5%, -6%). The potential biomass was below average in the Southeast wheat area (-7%) and Wet Temperate and Subtropical Zone (-3%), but above average in the Subhumid subtropical zone (+3%). CALF departures were as follows: Southeast wheat area +3%, Subhumid subtropical zone +17%, Wet temperate and subtropical zone -2%. The cropping intensities were nearly no changes. The production of wheat and barley in these zones is estimated as above average.

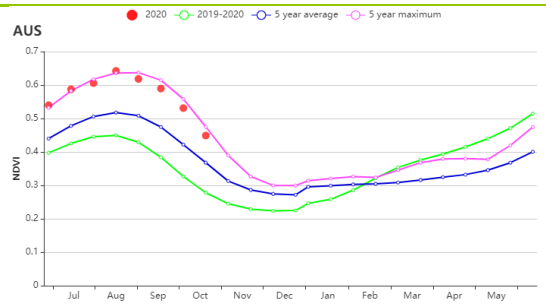
The Southwestern wheat area experienced below-average rainfall (-21%), warm temperatures (+0.5°C), and slightly above-average sunshine (+2%). With a CALF of 92%, the potential biomass increased by +8%, and cropping intensity was not change. As a result, the production of this zone is generally favorable.

Overall, combining the agro-climatic and agronomic indicators, the crop conditions in the JASO period were favorable, and an above-average production is estimated.

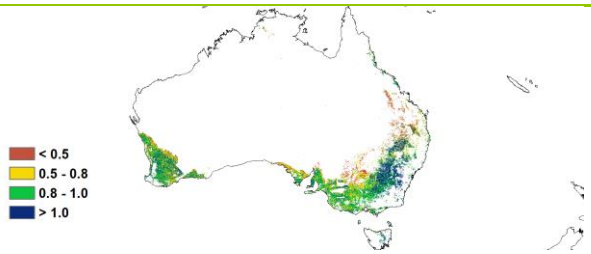
Figure 3.8 Australia's crop condition, July - October 2020



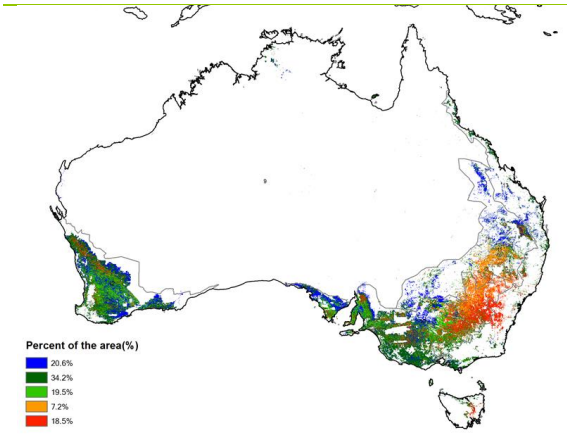
(a). Phenology of major crops



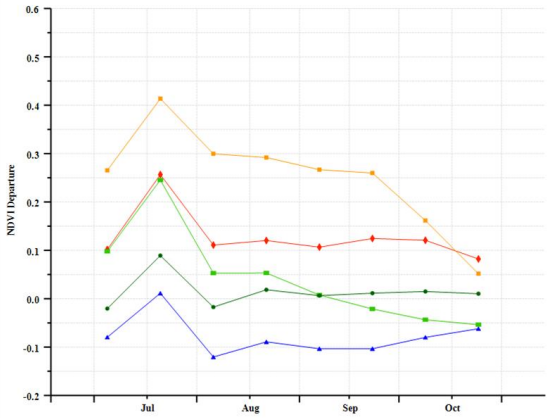
(b) Crop condition development graph based on NDVI



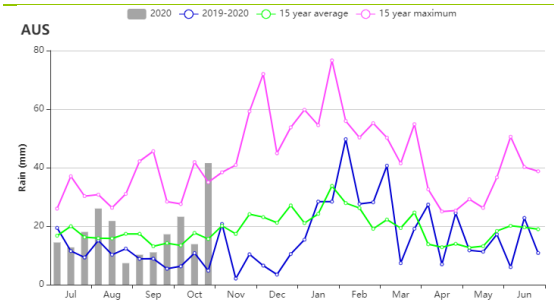
(c) Maximum VCI



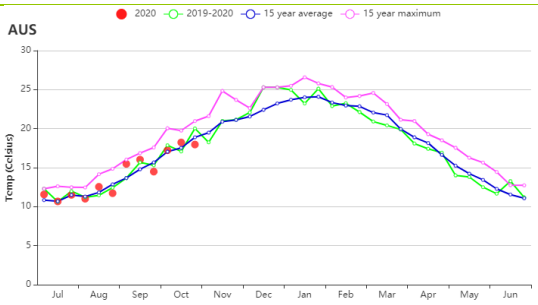
(d) Spatial NDVI patterns compared to 5YA



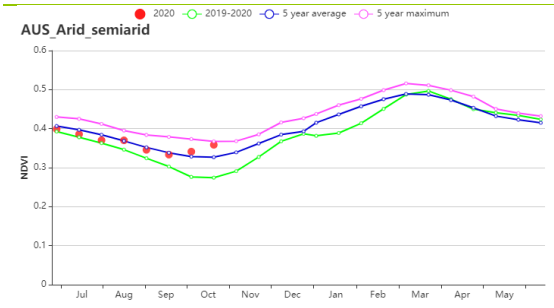
(e) NDVI profiles

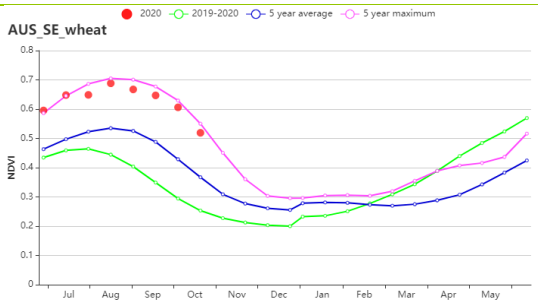


(f) Rainfall profiles

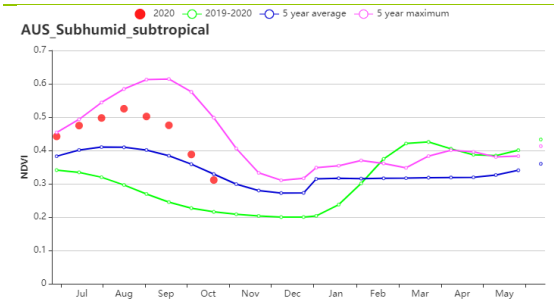


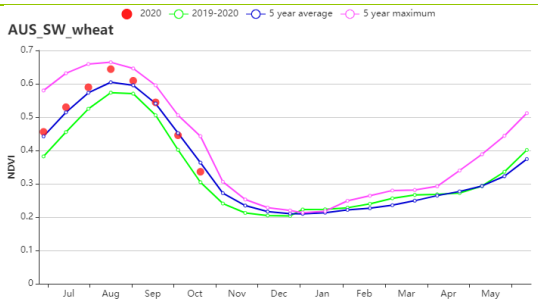
(g) Temperature profiles



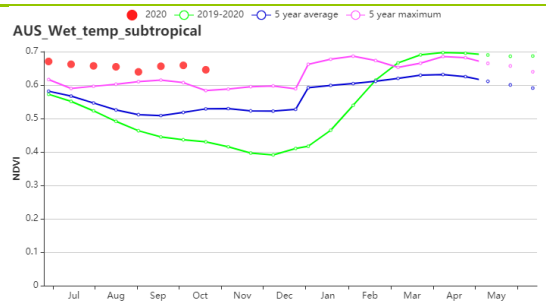


(h) Crop condition development graph based on NDVI (Arid and semiarid zone (left) and Southeastern wheat area (right))





(i) Crop condition development graph based on NDVI (Subhumid subtropical zone (left) and Southwestern wheat area (right))



(j) Crop condition development graph based on NDVI (Wet temperate and subtropical zone)

Table 3.8 Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Arid and semiarid zone	87	32	22.9	0.5	1199	-3	362	-7
Southeastern wheat area	263	28	12.0	-0.1	780	-8	280	-7
Subhumid subtropical zone	167	15	15.5	0.2	1016	-5	418	3
Southwestern wheat area	186	-21	13.5	0.5	873	2	343	8
Wet temperate and subtropical zone	259	16	13.1	0.1	885	-6	329	-3

Table 3.9 Australia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Arid and semiarid zone	53	5	100	-1	0.76
Southeastern wheat area	95	3	100	-1	0.88
Subhumid subtropical zone	66	17	103	-2	0.76
Southwestern wheat area	92	3	100	0	0.86
Wet temperate and subtropical zone	93	-2	102	-5	0.93

[BGD] Bangladesh

This monitoring period covers the planting and growth of Aman rice and the harvest of Aus rice. Rainfall was above average by 5%. The average temperature was a bit higher (+0.5°C) and the photosynthetically active radiation was 1055 MJ/m2 (3% lower than average). BIOMSS was below average by 2%. The national NDVI development curve shows that crop conditions across the country were significantly lower than the 5-year average from July to September, due to floods, and reached average levels by October. The spatial NDVI pattern shows that 33.1% of the crops were above the 5-year average throughout the season, mainly dispersed in Coastal region and Hills. 22.3% of the crops were below average during the whole monitoring period. The best Vegetation Condition Index (VCIx) ranged from 0.8 to 1 and the national VCIx value was 0.91, with most areas higher than 0.8. However, the flood in July and August caused wide-spread crop damage and made it difficult to harvest Aus rice, which also delayed the planting of the Aman rice. According to the last report, the NDVI curve was close to average from April to May and then rapidly dropped to below average in June, and returned to normal levels by the end of October, which was consistent with the flood events. They caused local crop damage and a general delay of the Aman rice production. The fact that the crops recovered to close to normal crop conditions in October indicates that production prospects are only slightly below average.

Regional analysis

Bangladesh can be divided into four Agro-Ecological Zones (AEZ): Coastal region, the Gangetic plain, the Hills, and the Sylhet basin.

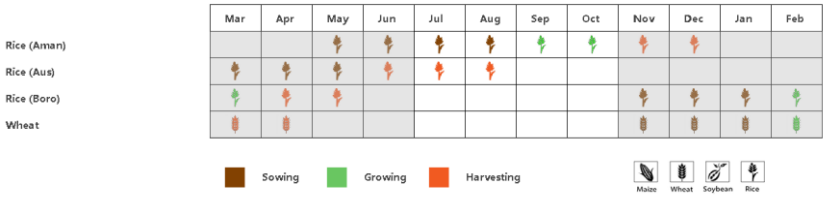
In the Coastal region, both RAIN and TEMP were above average (+15% and +0.6°C, respectively). BIOMSS and RADPAR were below average (-1% and -2%). The crop condition development graph based on NDVI shows that crop conditions were significantly lower than the 5-year average from July to September, and then reached average levels. CALF was at 92% and VCIx at 0.95 and BIOMSS was -1%. These parameters indicate average conditions.

The Gangetic plains received the largest precipitation amount (+18% above average). Temperature was above average (+0.5°C) and RADPAR was 3% below. The crop condition development graph based on NDVI shows that crop conditions were significantly lower than the 5-year average during the whole monitoring period, and BIOMSS decreased by 3%. CALF (95%) and VCIx at 0.92 indicate unsatisfactory prospects.

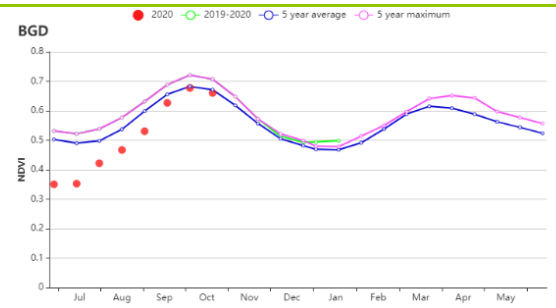
In the Hills, rainfall was 2% below the average, TEMP was above average (+0.5°C) but with poor sunshine (RADPAR -5%). The crop condition development graph based on NDVI shows that crop conditions were close to average in August and October, but slightly below average in the other months. BIOMSS was below average (-3%), CALF was 98% and VCIx was 0.99, indicating satisfactory crop conditions.

In the Sylhet Basin, rainfall was close to average. TEMP was 0.6°C above the average and RADPAR was 4% below. The NDVI development was similar to the Coastal region, starting below average and exceeding the average in October. The BIOMSS potential of 699 gDM/m^2 (the lowest for all regions) was also 4% below the 5YA, with low CALF at 86% and VCIx of 0.87. Widespread flooding in August caused unfavorable crop conditions.

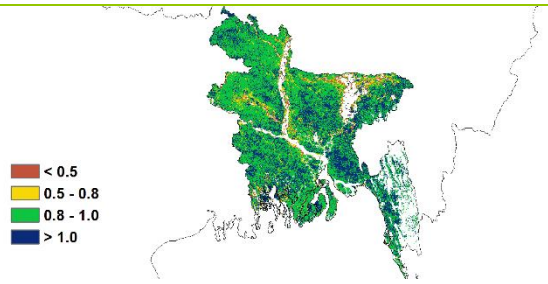
Figure 3.9 Bangladesh's crop condition, July - October 2020



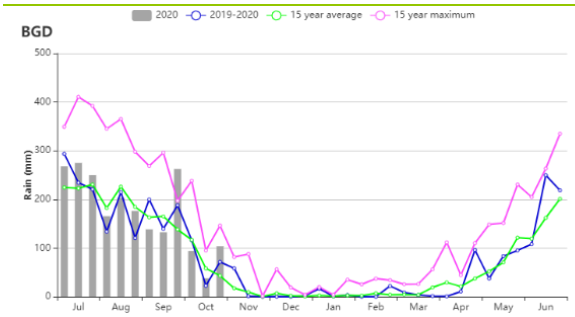
(a). Phenology of major crops



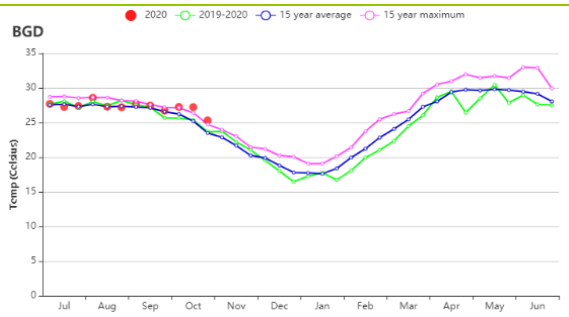
(b) Crop condition development graph based on NDVI



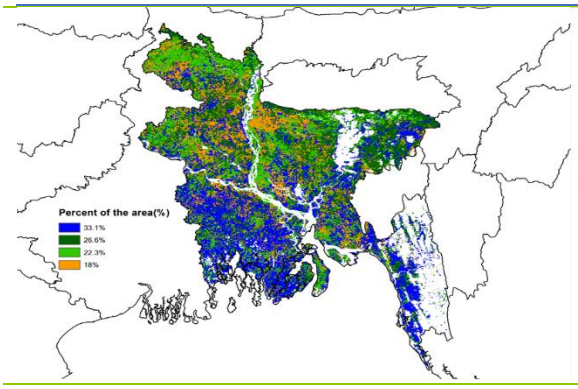
(c) Maximum VCI



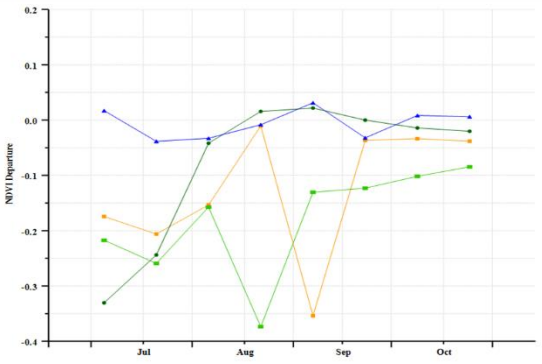
(d) Rainfall Index



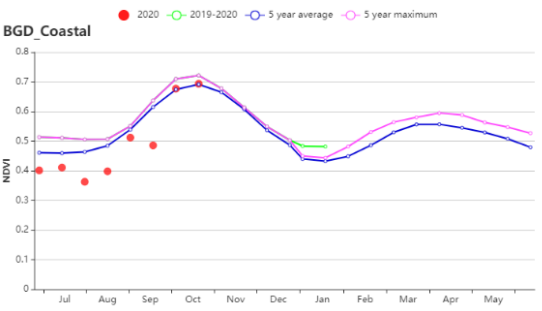
(e) Temperature Index

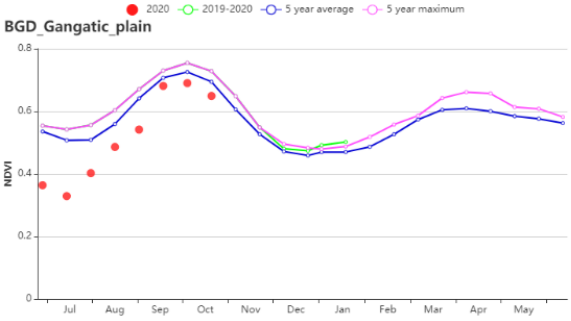


(f) Spatial NDVI patterns compared to 5YA

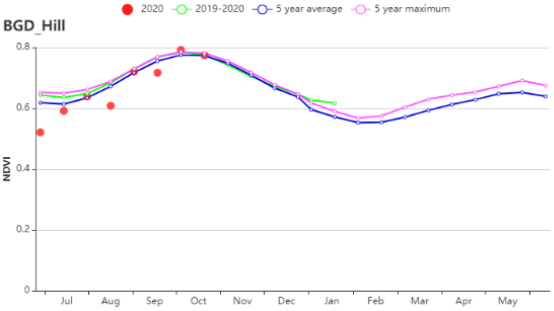


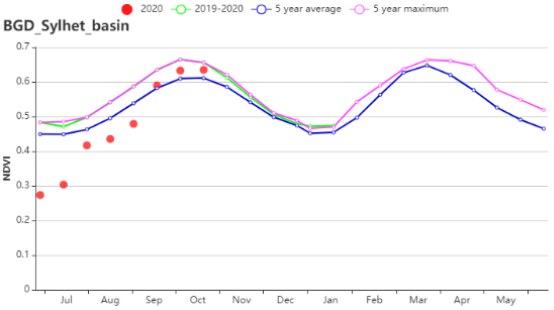
(g) NDVI profiles





(h) Crop condition development graph based on NDVI (Coastal Region (left) and Gangetic Region (right))





(l) Crop condition development graph based on NDVI(Hill Region (left) and Sylhet Basin (right))

Table 3.10 Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Coastal region	1524	8	28.8	-0.6	1340	2	902	4
Gangetic plain	1725	38	28.7	-0.9	1227	-2	791	-4
Hills	1700	-12	27	-0.4	1303	1	830	-3
Sylhet basin	1671	11	27.8	-0.5	1207	-2	817	-2

Table 3.11 Bangladesh's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	CALF		Cropping intensity		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current(%)	Departure from 5YA(%)	Current
Coastal region	90	6	159	1	0.97
Gangetic plain	98	1	181	-3	0.97
Hills	97	1	109	-21	0.95
Sylhet basin	99	2	160	-5	0.97

[BLR] Belarus

The reporting period includes the harvesting of spring wheat from August to September and the planting of winter wheat from August to October. The nationwide rainfall amount was 254 mm, 6% below the 15YA average. Temperature increased slightly (16°C, 1.0°C) while radiation was somewhat below average (RADPAR, 780MJ/m², -3%). The potential biomass was below average (-2%). Agronomic conditions were generally favorable: very good values of VCIx (0.97) and cropped arable land fraction (CALF, 100%) were observed. However, due to the decrease of rainfall in center and north Belarus during the period of winter wheat sowing, crop prospects for the 2020/21 season in these areas could be affected.

The NDVI development graph indicates that crop condition had gradually recovered to the level of the 5-year average starting in August. Crop condition in about 71.2% cropped area was close to or above the 5-year average, in agreement with the national VCIx map. There was an apparent drop in NDVI profiles in most of the areas from July to August, the reason for this might be the gradual decrease of rainfall during this period. According to the VCIx distribution map, VCIx was satisfactory in most cropped areas of the country (above 0.8), indicating fair crop prospects, while most low values were scattered in the southern area.

Although agronomic indicators were generally favorable starting in August, below average rainfall in the central and northern area caused low soil moisture conditions and may have negatively impacted germination of winter wheat. Crop conditions in most areas of the country during the past months were generally close to the 5-year average, indicating favorable crop prospects.

Regional analysis

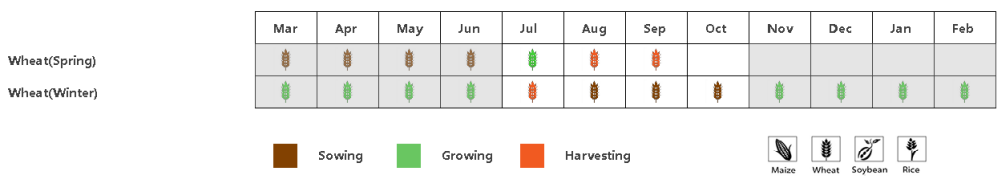
Regional analyses are provided for three agro-ecological zones (AEZ) defined by their cropping systems, climatic zones, and topographic conditions, including Northern Belarus (028, Vitebsk, the northern area of Grodno, Minsk and Mogilev), Central Belarus (027, Grodno, Minsk and Mogilev and Southern Belarus (029) which includes the southern halves of Brest and Gomel regions.

North Belarus recorded a minor radiation deficit (-4%) combined with lower rainfall (-9%) and slightly higher temperatures (+0.8°C). Potential biomass decreased by 6% below average. The VCIx had reached 0.99, and CALF had reached 100%. The NDVI development curve was generally above average. Winter wheat may grow normally based on agro-climatic indicators in this area but the impact of lower soil mositure in this period on winter wheat germination and early establishment requires close attention.

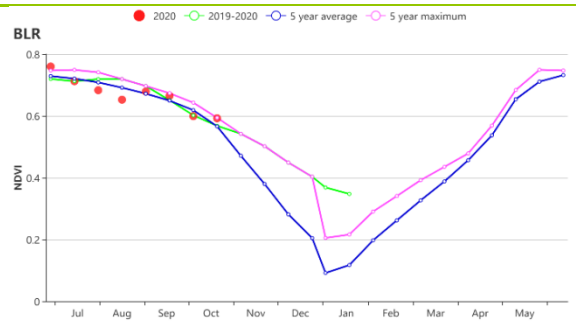
Central Belarus also experienced lower rainfall (-9%) and slightly higher temperature (1.0°C), and less sunshine (-3%). Similar to northern Belarus, high CALF (100%) and VCIx (0.97) were also recorded. The NDVI growth curve was generally above the average trend from July to October. But potential biomass decreased by about 2%, therefore winter wheat conditions in this area might also need close monitoring.

Precipitation in **Southern Belarus** was almost the same as the 15YA average level, while the temperature was slightly higher by 1.1°C and radiation was lower by 2%. Potential biomass was expected to increase by 1%. The CALF and the VCIx were 100% and 0.95 respectively. The water shortage in the previous period of spring did not cause a negative impact on the production of spring wheat. The sufficient soil moisture will be beneficial for the winter wheat.

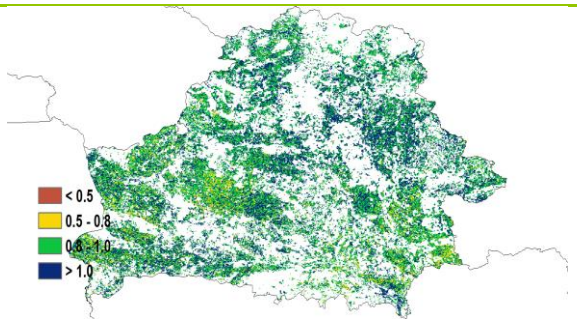
Figure 3.10 Belarus's crop condition, July - October 2020.



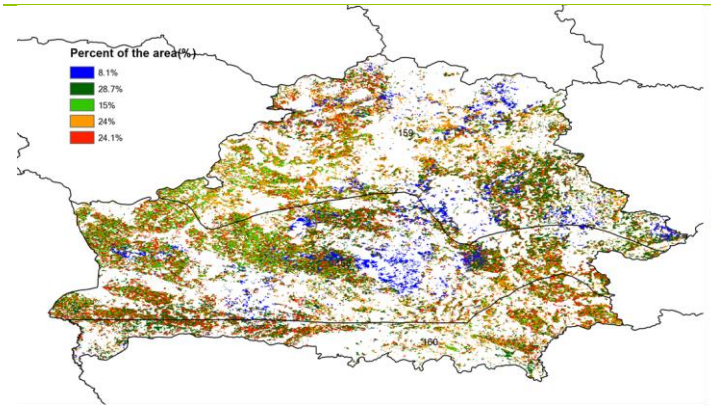
(a). Phenology of major crops



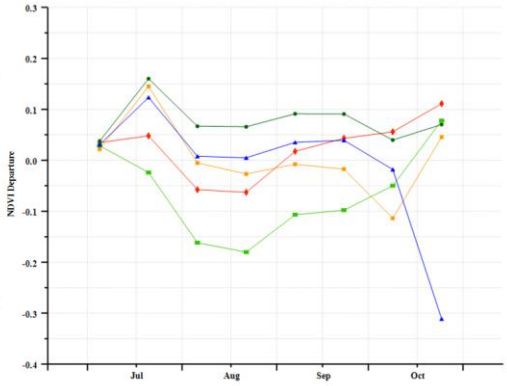
(b) Crop condition development graph based on NDVI



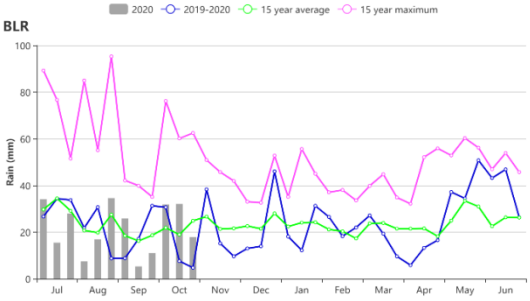
(c) Maximum VCI



(d) Spatial NDVI patterns compared to 5YA

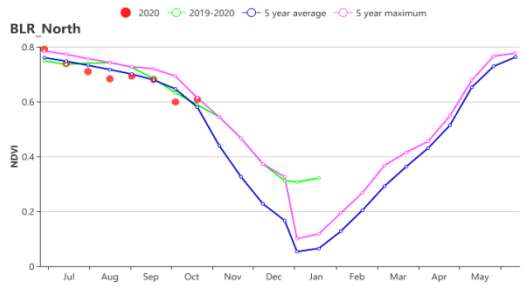


(e) NDVI profiles

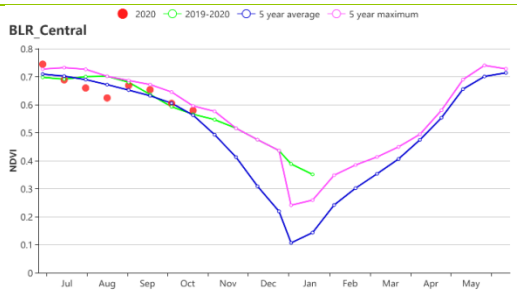


(f)Rainfall time series

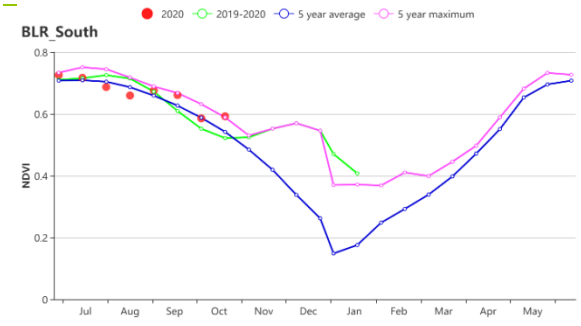
(g) Temperature time series



(h) Crop condition development graph based on NDVI (North Belarus)



(i) Crop condition development graph based on NDVI (Central Belarus)



(j) Crop condition development graph based on NDVI (South-west Belarus)

Table 3.12 Belarus's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020.

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Center	254	-6	16	1.0	780	-3	350	-2
North	274	-9	14	0.8	728	-4	301	-6
South-west	245	0	16	1.1	824	-2	388	1

Table 3.13 Belarus's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020.

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Center	100	0	101	1	0.97
North	100	0	100	0	0.99
South-west	100	0	102	2	0.95

[BRA] Brazil

This reporting period covers the main growing period of wheat. Its harvest concluded by the end of October. The harvest of maize in North-east is also ongoing while the harvest of rice in north and northeast and second maize in central and southern Brazil has concluded. The sowing of summer crops (maize, soybean, and rice) in Central and Southern Brazil started in October and will last until the end of December.

Overall dry and warmer-than-usual weather dominated the reporting period which was unfavorable for crops in Brazil. CropWatch Agro-climatic Indicators (CWAIs) present below-average conditions with 21% lower rainfall, 0.7°C higher temperature and 2% above average radiation compared with the 15YA. Significant below-average rainfall resulted in a 7% reduction of potential biomass. Dry weather conditions were wide-spread across all of Brazil with only four states receiving an above-average rainfall, including Distrito Federal (+41%), Espirito Santo (+33%), Bahia (+18%), and Rio De Janeiro (+2%). Some major agricultural producing states such as Sao Paulo, Mato Grosso Do Sul, Parana, Santa Catarina, Rio Grande Do Sul, and Mato Grosso suffered from water shortages with negative anomalies ranging from 33% to 22%. Similarly, temperatures in all states presented above-average conditions except for Ceará where temperatures remained at the 15YA level. The largest temperature anomalies were observed in Sao Paulo, Mato Grosso Do Sul, Parana, and Rondonia where temperatures were more than 1.0 ºC above average. Negative and positive anomalies of radiation were observed in different states with the largest positive departure in Alagoas at 10% above average and the largest negative departure in Acre, 3% below average. Low rainfall and high temperature resulted in water stress in central Brazil as indicated by the below average BIOMSS on the BIOMSS departure map.

According to the national rainfall profiles, the main rainy season usually starts in late September. This year's start was in mid-October only. As indicated by the 10-day accumulations of rainfall, precipitation was significantly below average from mid-July to mid-October except for mid-August. The low rainfall might exacerbate the sowing, emergence, and early development of summer crops. For more detailed information, it is recommended to visit CropWatch Explore (http://cropwatch.com.cn/newcropwatch/main.htm).

The crop condition development graph based on NDVI for Brazil presents average values during July to August while it deteriorated to below average starting in September mainly due to the water stress. The chart showing proportions of different drought categories from July to October 2020 also indicates that the drought in Brazil got more severe as the proportion of drought affected areas increased from 17% in early September to 30% in late October. The adverse dry and hot weather hampered crop establishment as shown by the NDVI departure clustering maps and profiles. Most crops in Central Brazil stayed in below-average conditions throughout the growing season while southern Brazil presented close-to-average conditions. The drought condition in Mato Grosso, Parana, Sao Paulo, and northwestern Rio Grande Do Sul adversely affected the crops as shown by significant decreasing trends of the NDVI departures (Red color in figure e). Accordingly, the VCIx map also presents low values (< 0.5) in central Brazil covering vast areas from Mato Grosso, Goias, Minus Gerias, to Sao Paulo (figure f). It is also noteworthy that crops in northeastern coast showed above-average conditions during the monitoring period as they benefited from the normal or above-average rainfall. At the national level, VCIx was 0.87 and CALF was 2% above the 5YA. Cropping intensity increased by 1% indicating that the total cultivated crop area was at an above-average level.

All in all, crop conditions in Brazil were below average and the establishment of the summer crops was delayed due to the drought conditions. However, wheat production in Parana and Rio Grande do Sul benefitted from rather favorable conditions. The map depicting the spatial distribution of NDVI profiles shows an above-average departure for the wheat production zones in those two states and an above-average wheat production is estimated. The establishment of the summer crops will mainly depend on sufficient rainfall in the coming months, as the season is starting with a considerable soil moisture deficit.

Regional analysis

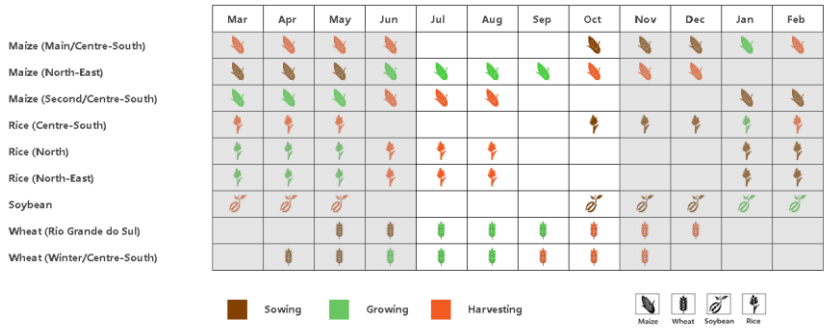
Considering the differences of cropping systems, climatic zones, and topographic conditions, eight agro-ecological zones (AEZ) are identified for Brazil. These include the Central Savanna, the east coast, Parana river, Amazon zone, Mato Grosso zone, Southern subtropical rangelands, mixed forest, and farmland, and the Nordeste. Similar to the dry weather pattern observed at the national level during the monitoring period, five zones including Amazonas, Northeastern mixed forest and farmland, Mato Grosso, Parana basin and Southern subtropical rangelands received significantly below-average rainfall (-19% to -37%). Temperature in each zone was higher than average with the largest temperature departure in Parana by 1.2 degree. Radiation in each zone was generally close to average ranging from average to 3% above average. As a result of the combined effects from rainfall, temperature, and radiation, below average BIOMSS was observed in most zones except for Coast zone (+5% above average) and southern subtropical rangelands (no change).

Diversified agro-climatic conditions together with the human activities (farm managements, irrigation, etc) resulted in great differences of crop condition among AEZs. As indicated by the NDVI development profiles, below-average crop growth conditions were observed in Amazonas, Northeastern mixed forest and farmland, Mato Grosso, and Parana basin. Among the four zones with below-average conditions, Mato Grosso, and Parana basin are the two zones which showed the worst crop conditions mainly due to the prolonged dry conditions which was identified since October of last year. Accordingly, CALF in the two zones also presented below-average values that were 4% and 1% lower than 5YA while cropping intensity was 4% and 2% above average. The lowest two values of Maximum Vegetation Condition Index (VCIx) were observed in the two zones, Mato Grosso, and Parana.

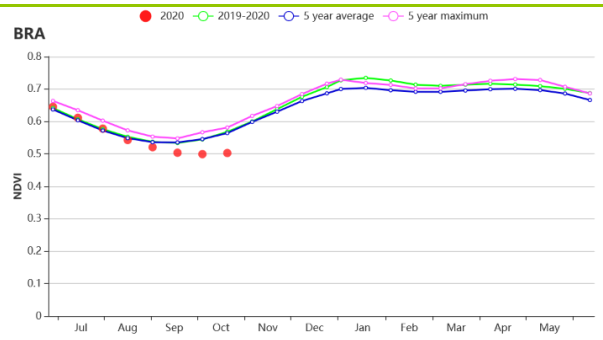
Favorable agro-climatic conditions in Nordeste benefitted crops and resulted in above-average crop conditions as indicated by the NDVI-based crop development profiles. The Nordeste is the only zone that presented above-average NDVI throughout the growing season. Similar to that in the previous bulletin, the VCIx of Nordeste was the highest among the zones. It reached 1.22 indicating that crop conditions were better than during the last five years. Maize yield in the region is expected to be at record levels compared with the last 5 years. Thanks to favorable climatic conditions, cropped arable land fraction (CALF) in this zone was 43% above the 5YA. Nordeste presented the lowest cropping intensity among all the AEZs at 103%, with 4% lower than 5YA.

Average or close-to-average crop conditions were observed in the Central Savanna, and southern subtropical rangelands. However, weather conditions in the two zones greatly differed from each other. Central Savanna experienced above-average rainfall and close-to-average temperature and radiation. The rainfall was beneficial for crops as indicated by the significantly above-average CALF and high VCIx at 1.02. The above average rainfall will also be favorable for the sowing and early development of summer crops. In Southern subtropical rangelands, crops remained at average levels although rainfall was 28% below the 15YA. The main reason is that the zone still received 440 mm water during the monitoring period while winter crops already reached maturity stage by September and the rainfall was sufficient for the crop demand. BIOMSS and CALF were close to average and VCIx was 0.90 confirming the average conditions in the zone. Also, cropping intensity for the two AEZs were 4% and 13% above average.

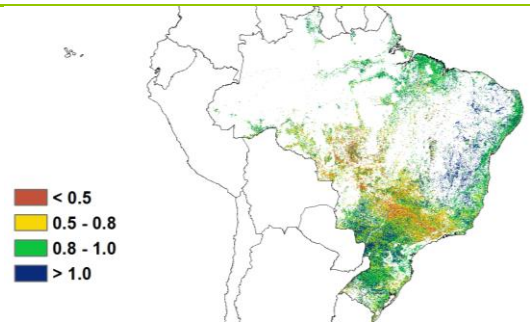
Figure 3.11 Brazil's crop condition, July - October 2020



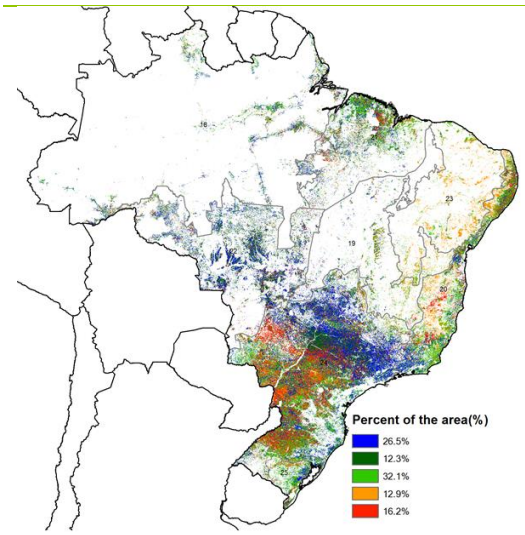
(a). Phenology of major crops



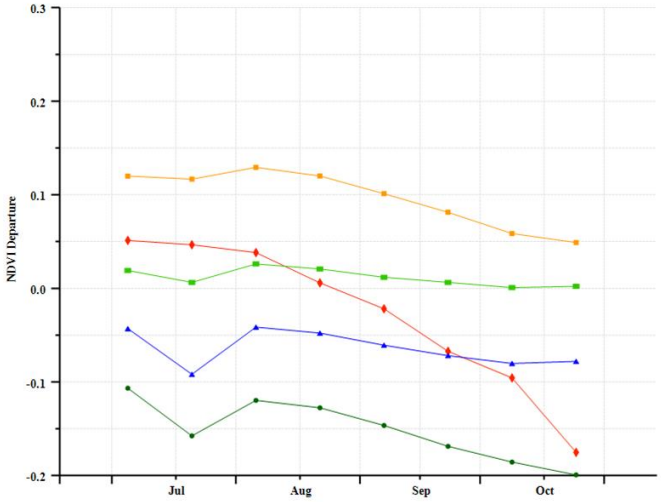
(b) Crop condition development graph based on NDVI



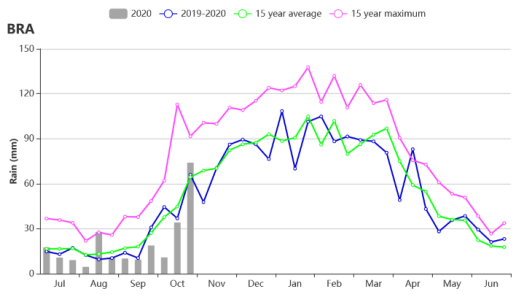
(c) Maximum VCI



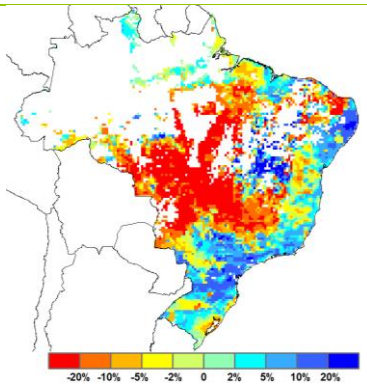
(d) Spatial NDVI patterns compared to 5YA



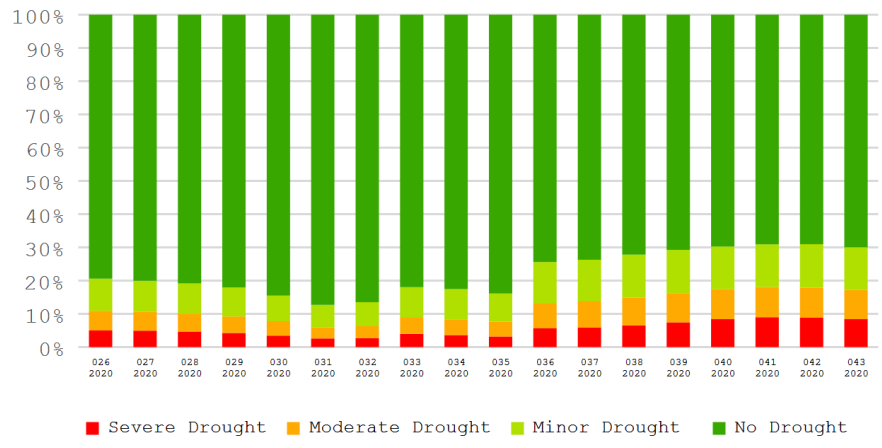
(e) NDVI profiles



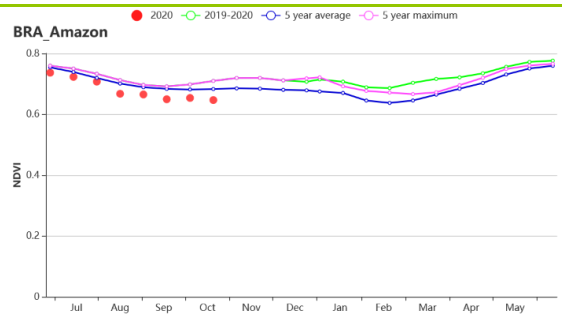
(f) Rainfall profiles

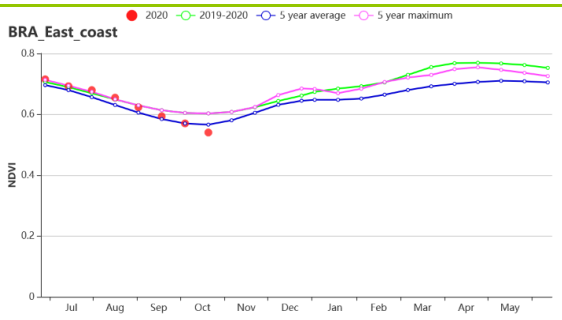


(g) Biomass departure map compared with 15YA

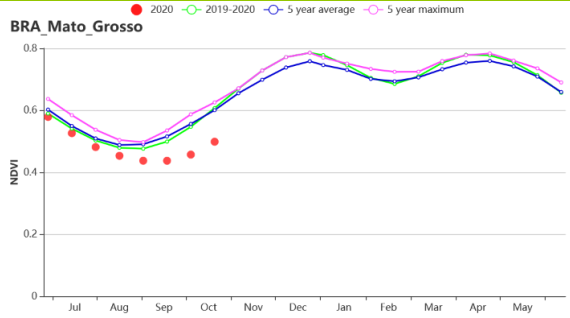


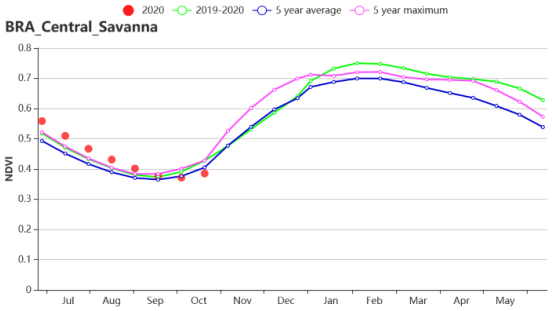
(h) Proportion of different drought categories from July to October 2020



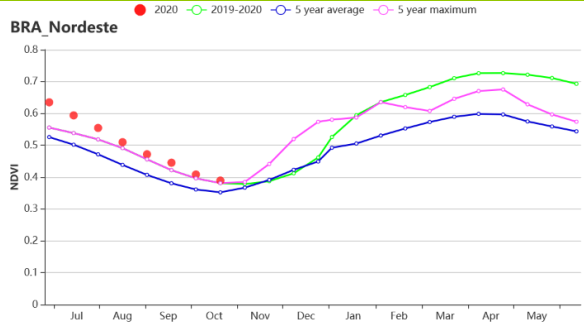


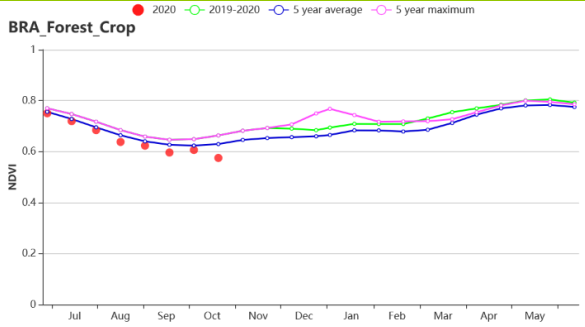
(i) Crop condition development graph based on NDVI (Amazon (left) and East Coast (right))



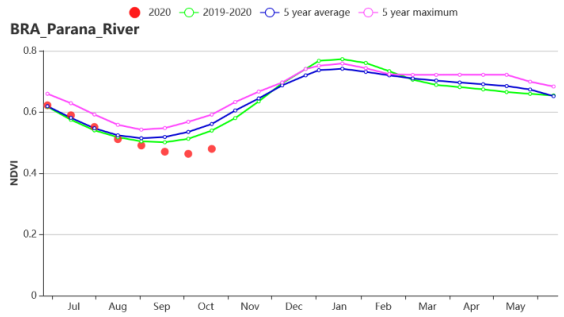


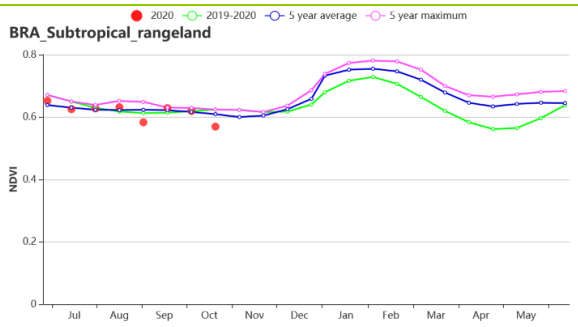
(j) Crop condition development graph based on NDVI (Mato Grosso zone (left) and Central Savanna (right))





(k) Crop condition development graph based on NDVI (Nordeste (left) and Northeastern mixed forest and farmland (right))





(L) Crop condition development graph based on NDVI (Parana Basin (left) and Southern subtropical rangelands (right))

Table 3.14 Brazil's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Amazonas	324	-19	27.2	0.5	1231	0	739	
Central Savanna	196	18	24.5	0.1	1232	0	442	
East Coast	286	3	21.2	0.5	1020	2	592	
Northeastern mixed forest and farmland	125	-37	27.7	0.6	1275	0	671	
Mato Grosso	183	-23	27.0	0.9	1178	2	410	
Nordeste	82	4	24.7	0.2	1259	1	633	
Parana basin	293	-26	21.4	1.2	1079	3	462	
Southern subtropical rangelands	440	-28	15.2	0.0	827	0	339	

Table 3.15 Brazil's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Amazonas	100	0	121	2	0.92
Central Savanna	87	35	118	4	1.02
East Coast	100	2	109	-3	0.94
Northeastern mixed forest and farmland	99	0	110	-7	0.92
Mato Grosso	88	-4	154	4	0.69
Nordeste	90	43	103	-4	1.22
Parana basin	96	-1	130	2	0.82
Southern subtropical rangelands	98	1	136	13	0.90

[CAN] Canada

This reporting period covers the harvest of winter wheat in July, followed by spring wheat in August. The sowing of winter wheat takes places in September and October. This monitoring period also covers the main growing periods of maize and soybean. According to agroclimatic indicators, Canada experienced close-to-normal weather in this period. The overall conditions in this region were above average until the end of August. However, in the Saint Lawrence basin and Prairies, they dropped to below-average levels thereafter. Overall, crop conditions were favorable.

Compared with the 15-year average, the rainfall, temperature, and radiation were 4%, 0.6°C, and 1% below the average respectively, which resulted in a slight decrease in potential biomass (BIOMSS, -1%). The rainfall profile indicates that the precipitation was significantly below average between mid-August and mid-September, and the temperature were above average between early July and early October. The drier conditions in mid-August and September were favorable for harvest. The NDVI profile map shows that the crop conditions were above average until the end of August but deteriorated to below average after August. The crop condition in the Northeast of British Columbia and North of Alberta (accounted for 23.3% of cropped land) was always above average during this monitoring period. In the other regions, crop conditions were below average after August, which may be caused by the shortage of rainfall in August. The national maximum VCI value was 0.96, while CALF was slightly above average (CALF, +1%). The overall conditions of the summer crops in Canada are assessed as favorable.

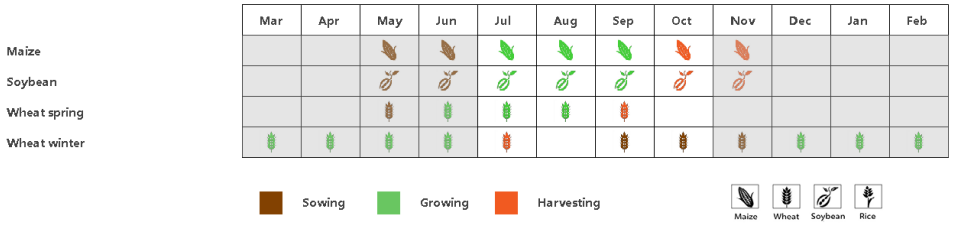
Regional analysis

The Prairies (area identified as 53 in the crop condition clusters map) and Saint Lawrence basin (49) are the major agricultural regions in Canada.

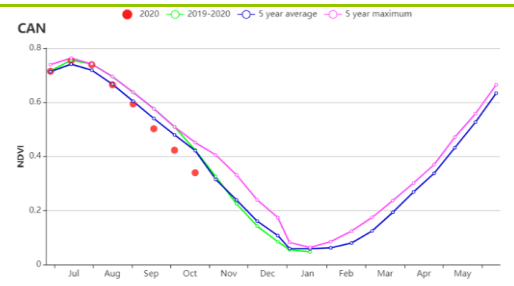
The Prairies is the main food production area in Canada. In this reporting period, the rainfall (RAIN 223mm -11%) and temperature (TEMP, -0.8℃) were below average, while the radiation was slightly above average (RADPAR, +1%), leading to an average potential production (BIOMSS, 0%). The major crops in this region are winter wheat and spring wheat. According to the NDVI development graph and NDVI profile, crop conditions were above average before September, however deteriorated to below average after September. The negative departures may have been caused by a rainfall deficit. However, they did not affect wheat yields, because wheat had reached maturity by then.

The condition in the Saint Lawrence basin was the same as the situation in the whole country, as rainfall (RAIN, -7%), temperature (TEMP, -0.3°C) and radiation (RADPAR, -2%) were below average. This had led to a slight decrease in potential biomass (BIOMSS, -1%). According to the NDVI development graph, crop conditions were above average before September and worsened to below-average subsequently. As in the Prairies, this was due to the shortage of rainfall. Crop conditions during the main growing season were favorable, as NDVI reached the 5-year maximum at its peak.

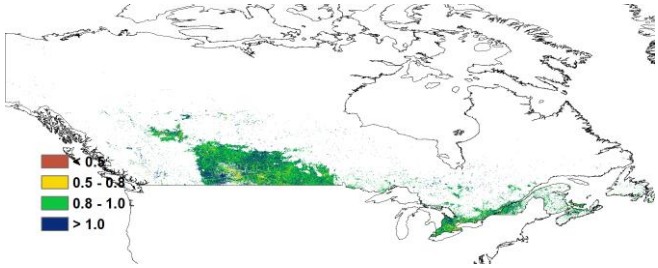
Figure 3.12 Canada's crop condition, July - October 2020



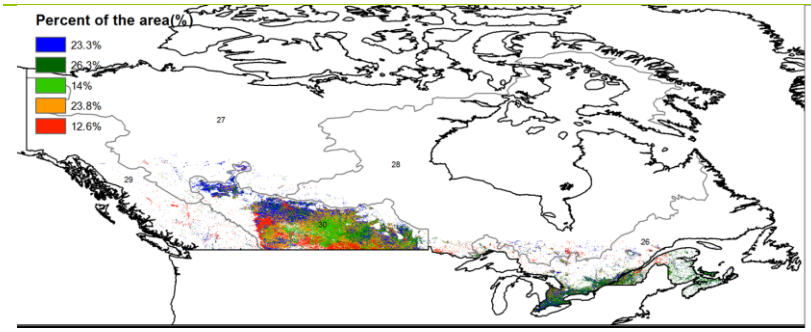
(a). Phenology of major crops



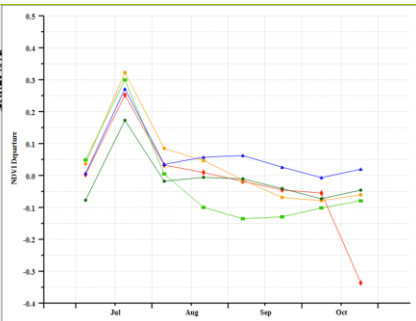
(b) Crop condition development graph based on NDVI



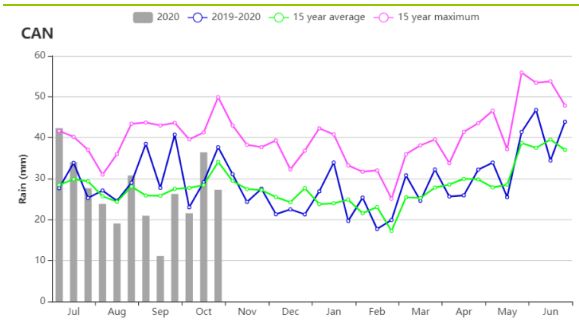
(c) Maximum VCI



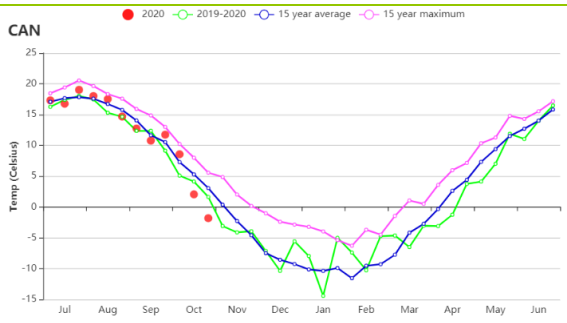
(d) Spatial NDVI patterns compared to 5YA



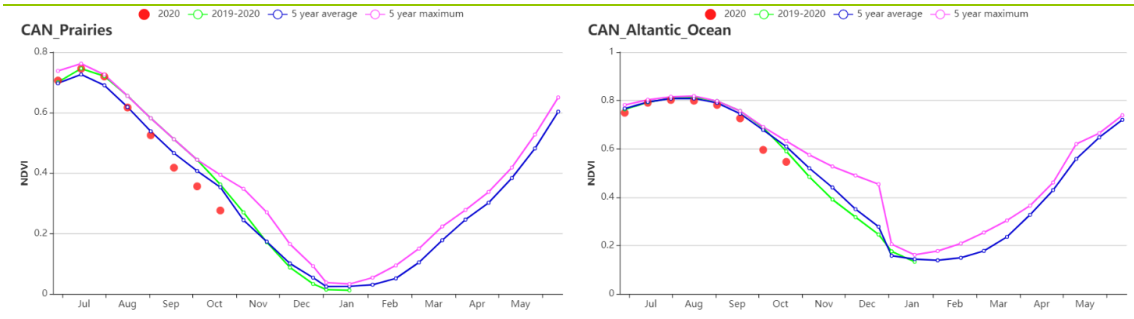
(e) NDVI profiles



(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Canadian Prairies region (left) and Saint Lawrence basin region (right))

Table 3.16 Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Saint Lawrence basin	400	-7	14	-0.3	886	-2	371	-1
Prairies	223	-11	12.4	-0.8	973	1	402	0

Table 3.17 Canada's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Saint Lawrence basin	100	0	100	0	0.96
Prairies	99	2	100	0	0.96

[DEU] Germany

The conditions of crops in Germany were generally worse than last year's and below the 5YA, mainly due to lingering effects of a drought that had started in the spring. Harvest of the summer crops was mostly completed by the end of October, whereas sowing of canola and winter wheat had started in September.

At the national level, total precipitation of the monitoring period was slightly below average (RAIN, -1%), temperature was slightly above average (TEMP, +0.4°C) and radiation was below average (RADPAR, -4%). It can be seen from the time series rainfall profile for Germany that precipitation was significantly below average from mid-July to mid-September. Rainfall in October was above average, which helped replenish soil moisture, which is critical for the establishment of the winter crops. Germany experienced warmer-than-usual conditions during this reporting period, except in early July, mid-July, and mid-October. Due to cloudier conditions, the biomass production potential (BIOMSS) decreased by 4% as compared to the 15YA.

As shown by the NDVI development graph at the national scale, NDVI values were below average during most of the monitoring period, except in July and early September when they were close to the average. These observations are confirmed by the spatial NDVI profiles. Crop conditions were below average on 78.7% of the cropland during the entire monitoring period due to a persistent rainfall deficit coupled with cooler-than-usual conditions in July. The most favorable conditions were observed for Schleswig-Holstein and the North of Lower Saxony as well as in Baden-Württemberg and Bavaria in the south. Overall, the above-mentioned pattern of crop growth is also reflected by VCIx, the value of which reached 0.95 country-wide. CALF was at the same level as the recent five-year average.

Generally, the values of agronomic indicators show unfavorable conditions for most summer crops; above-average precipitation in October helped with the establishment of the winter crops.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, six sub-national agro-ecological regions are adopted for Germany. They include: the Wheat zone of Schleswig-Holstein and the Baltic coast, Mixed wheat and sugar beets zone of the North-west, Central wheat zone of Saxony and Thuringia, Sparse crop area of the east-German lake and Heathland area, Western sparse crop area of the Rhenish massif, and the Bavarian Plateau.

Schleswig-Holstein and the Baltic coast is among the major winter wheat zones of Germany. It recorded significantly below-average rainfall (RAIN, -14%), slightly above-average temperature (TEMP, 0.3°C), and below-average radiation (RADPAR, -2%). BIOMSS is expected to decrease by 4% compared to the average. A heat wave affected this region in late July and early August, and the average for that period was above the historical maximum. As shown in the crop condition development graph based on NDVI, the values were close to or below average during the whole reporting period. Cropping Intensity (CI) was below the 5YA (-4%). The area had a high CALF (100%) as well as a favorable VCIx (0.95), indicating a high cropping intensity.

The **Mixed wheat and sugar-beets zone of the North-west** experienced a precipitation deficit (RAIN -8%), somewhat above-average temperature (TEMP, +0.5°C) and below-average radiation (RADPAR, -6%), which led to a decrease (-6%) of BIOMSS. Due to the persistent rainfall deficit during the wheat growing period, the NDVI values and crop condition were close to or below average during the monitoring period. The area had a high CALF (100%) and a high VCIx (0.95). Cropping Intensity (CI) was slightly below the 5YA (-1%).

The **Central wheat zone of Saxony and Thuringia** is another major winter wheat zone. Compared to the average, the rainfall (+10%) and temperature (+0.4°C) for this area were above average, but the radiation was below average (RADPAR, -3%). Due to the persistent rainfall deficit in July monitoring period, the biomass potential (BIOMSS) fell 3% below average. NDVI values were below average during this monitoring period except in late August based on the crop condition development graph. Cropping Intensity (CI) was below the 5YA (-3%). The area had a high CALF (100%) and VCIx was at 0.95.

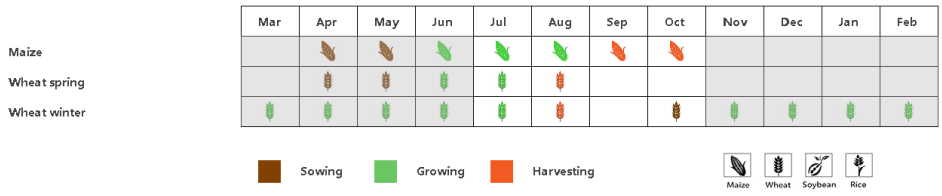
The **East-German lake and Heathland sparse crop area** experienced above-average rainfall (RAIN, +7%) with above-average temperature (TEMP, +0.5°C), but low radiation (RADPAR, -3%) and below-average

BIOMSS (-5%). NDVI values were below average during the early monitoring period and close to average towards the end. Cropping Intensity (CI) was below the 5YA (-6%). The area had a high CALF (100%) and a high VCIx (0.92).

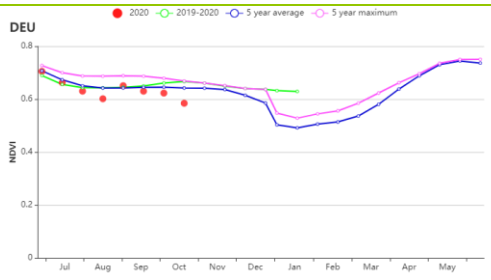
In the **Western sparse crop area of the Rhenish massif** agro-climatic indicators showed a precipitation deficit (RAIN, -13%) and below-average RADPAR (-5%) and BIOMSS (-3%), but above-average TEMP (+0.7°C). Significant precipitation deficit affected this region from early July to early August. NDVI values were below average during the whole monitoring period except for early July. Cropping Intensity (CI) was slightly above the 5YA (+1%). The area had a high CALF (100%) and a high VCIx (0.92).

Next to wheat, two summer crops (maize and potato), are the major crops on the **Bavarian Plateau**. The CropWatch agro-climatic indicators showed a rainfall increase (RAIN, +6%) with above-average temperature (TEMP, +0.3°C), but low radiation (RADPAR, -2%). BIOMSS is expected to slightly increase by 2%. NDVI fluctuated around the 5YA. Cropping Intensity (CI) was slightly above the 5YA (+1%). The area had a high CALF (100%) as well as a favorable VCIx (0.97) with equally favorable crop prospects for the two crops.

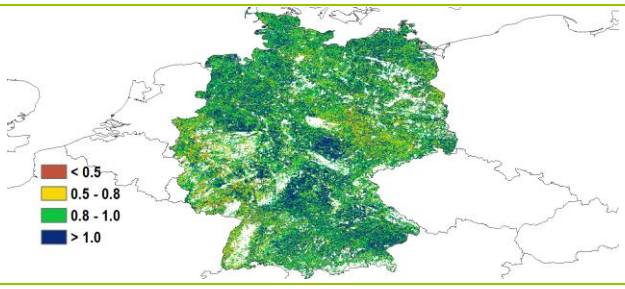
Figure 3.13 Germany's crop condition, July-October 2020



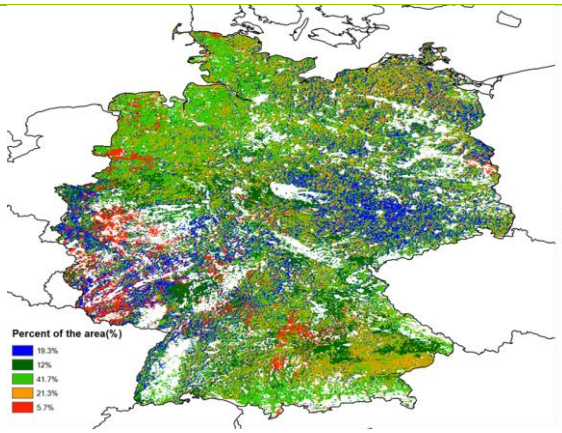
(a). Phenology of major crops



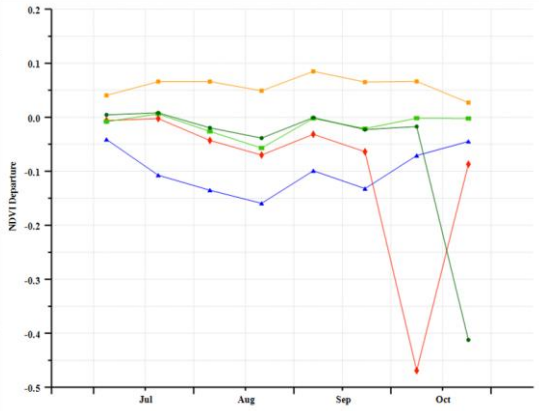
(b) Crop condition development graph based on NDVI



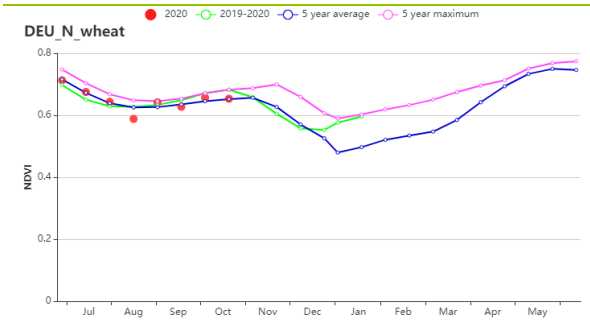
(c) Maximum VCI

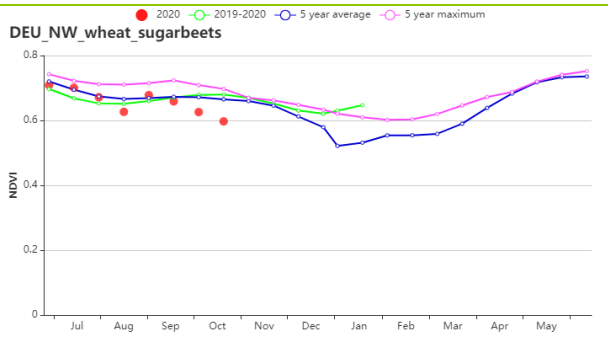


(d) Spatial NDVI patterns compared to 5YA

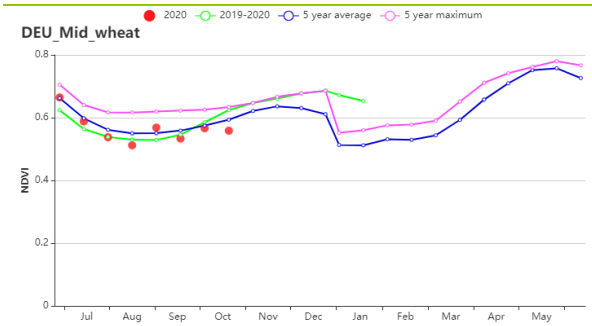


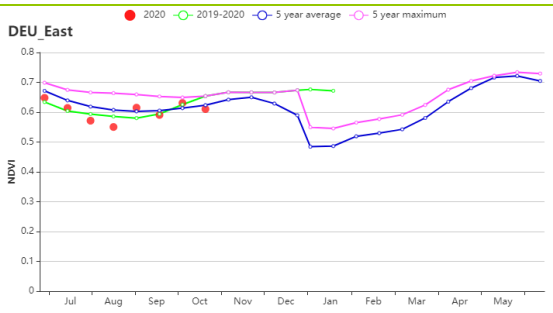
(e) NDVI profiles



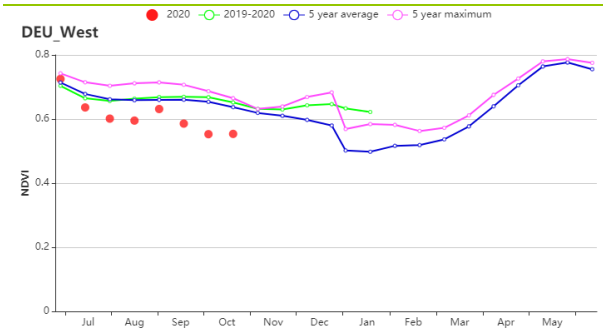


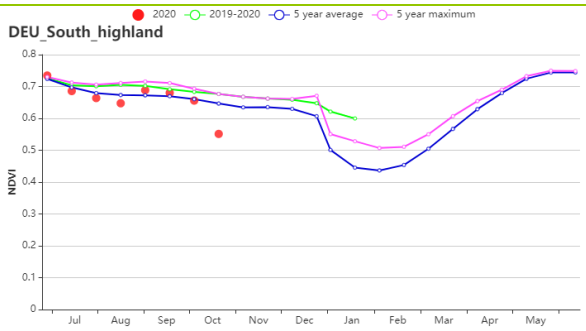
(f) Crop condition development graph based on NDVI (Wheat zone of Schleswig-Holstein and the Baltic coast (left) and Mixed wheat and sugar beets zone of the north-west(right))



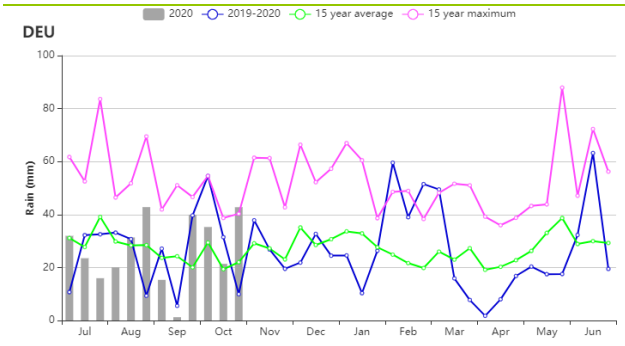


(g) Crop condition development graph based on NDVI (Central wheat zone of Saxony and Thuringia(left) and Sparse crop area of the east-German lake and Heathland (right))

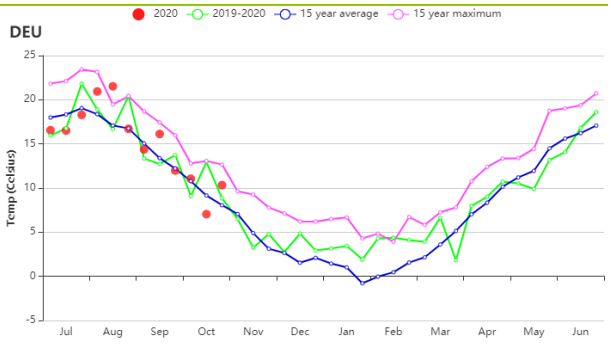




(h) Crop condition development graph based on NDVI (Western sparse crop area of the Rhenish massif (left) and Bavarian Plateau (right))



(f)Time series profile of rainfall



(g)Time series profile of temperature

Table 3.18 Germany agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Wheat zone of Schleswig-Holstein and the Baltic coast	284	-14	15.6	0.3	765	-4	345	-4
Mixed wheat and sugarbeets zone of the north-west	274	-8	15.4	0.5	768	-6	334	-6
Central wheat zone of Saxony and Thuringia	293	10	15.3	0.4	837	-3	366	-3
East-German lake and Heathland sparse crop area	308	7	15.7	0.5	833	-3	366	-5
Western sparse crop area of the Rhenish massif	231	-13	15.1	0.7	838	-5	359	-3
Bavarian Plateau	408	6	14.3	0.3	920	-2	388	2

Table 3.19 Germany's agronomic indicators by sub-national regions, current season's value and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Maximum VCI	Cropping Intensity	
	Current (%)	Departure from 5YA (%)	Current	Current	Departure from 5YA (%)
Wheat zone of Schleswig-Holstein and the Baltic coast	100	0	0.95	104	-4
Mixed wheat and sugarbeets zone of the north-west	100	0	0.95	109	-1
Central wheat zone of Saxony and Thuringia	100	0	0.95	108	-3
East-German lake and Heathland sparse crop area	100	0	0.92	107	-6
Western sparse crop area of the Rhenish massif	100	0	0.92	105	1
Bavarian Plateau	100	0	0.97	107	1

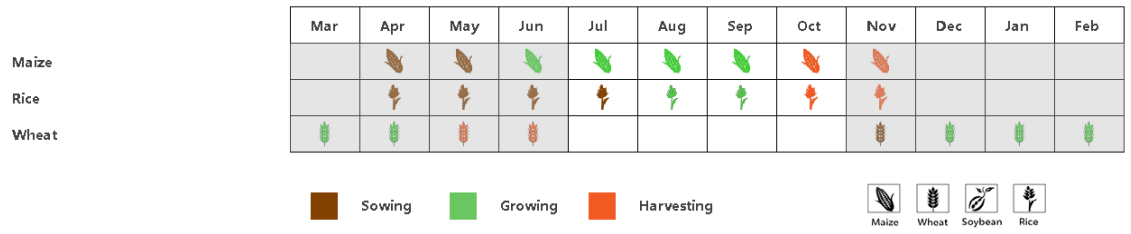
[EGY] Egypt

This monitoring period covers the growth and harvest of the main summer crops, which are maize, rice and cotton. Winter wheat sowing is about to start in early November. The current monitoring period is the dry season in Egypt and the average rainfall was just 3 mm, lower than the 15-years average (15YA) by 62%. However, the rainfall profile showed an unusually high amount that fell late in the reporting period in the Nile Delta and the southern coast of the Mediterranean. The average temperature was 26.3 °C (+0.8 °C). The temperature profile fluctuated around the 15YA. Both RADPAR (-1.8%) and BIOMSS (-19%) were below the 15YA. The regional analysis revealed that the decrease in BIOMSS was mainly in the Nile Delta and the southern coast of the Mediterranean. The nationwide NDVI profile started below the 5-years average (5YA) then it rose above the 5YA until the end of September, and subsequently dropped below the 5YA by the end of this monitoring period. The NDVI spatial pattern shows that 49.9% of the cultivated area was above the 5YA, 20.5 % fluctuated around the 5YA, and 29.7% was below. The Vegetation Condition Index (VCIx) map shows that the condition of the current crops is satisfactory where the dominant VCIx values range between 0.80 and 1. This finding agrees with the whole country VCIx value at 0.79. CALF exceeded the 5YA by 7%. In general, the crop conditions were favourable.

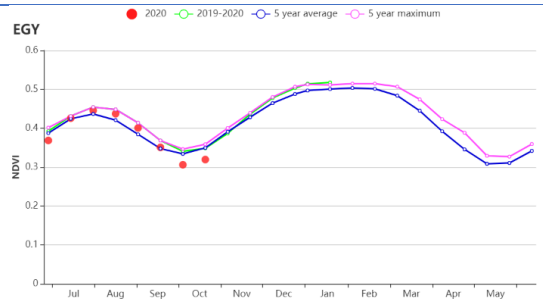
Regional Analysis

Based on crop planting systems, climate zones and topographical conditions, Egypt can be divided into three agro-ecological zones (AEZs), two of which are suitable for crop cultivation, namely the **Nile Delta and the southern coast of the Mediterranean** and the **Nile Valley**. In the **Nile Delta and Mediterranean coast**, the average rainfall was 3 mm, while the **Nile Valley** recorded zero rainfall. Consequently, the rainfall in both zones was below the 15YA by 63% and 96% respectively. Since virtually all crops in Egypt are irrigated, the impact of precipitation on crop yield is limited, but additional precipitation is nevertheless always useful. In both regions, the temperature was higher than the 15YA by just 1 °C while the RADPAR was lower than the 15YA by 2%. BIOMSS fell by 21% in the Nile Delta, while it increased by only 1% for the Nile Valley. The NDVI development graph shows that crop conditions fluctuated around the average in both zones, with below-average values in October when the harvesting stage was reached. In both zones, CALF exceeded the 5YA by 7%. They also registered good VCIx values at 0.78 and 0.88 for the **Nile Delta** and **Nile Valley** respectively, confirming favourable crop conditions. Cropping Intensity estimates indicate that both of the two regions had a mixture of single and double-cropping during the investigation period.

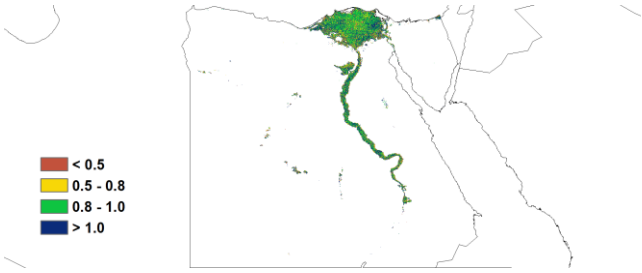
Figure 3.14 Egypt's crop condition, July- October 2020



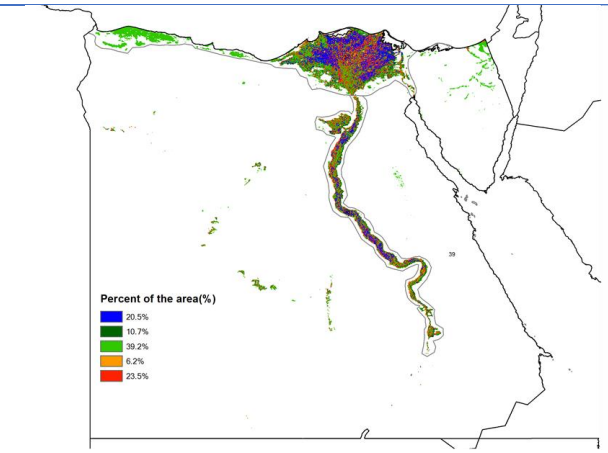
(a). Phenology of major crops



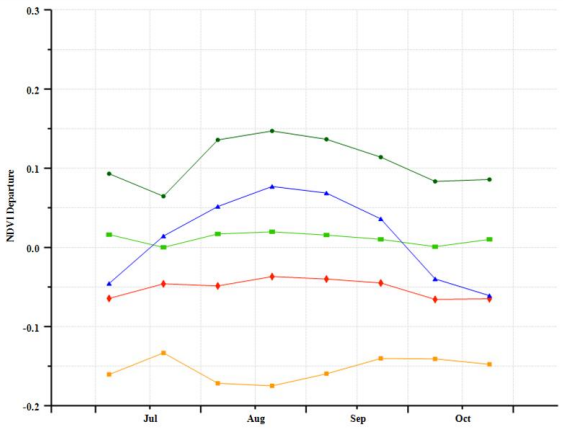
(b) Crop condition development graph based on NDVI



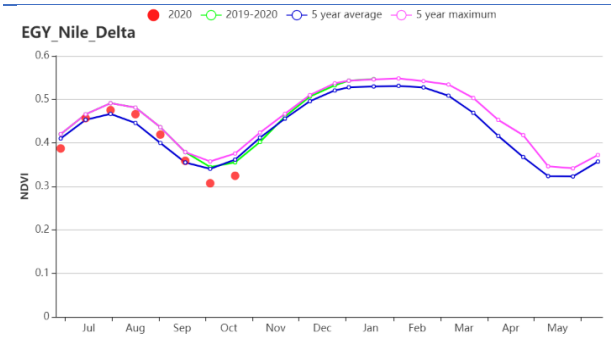
(c) Maximum VCI

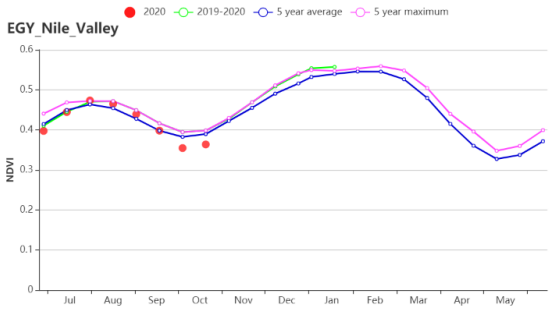


(d) Spatial NDVI patterns compared to 5YA

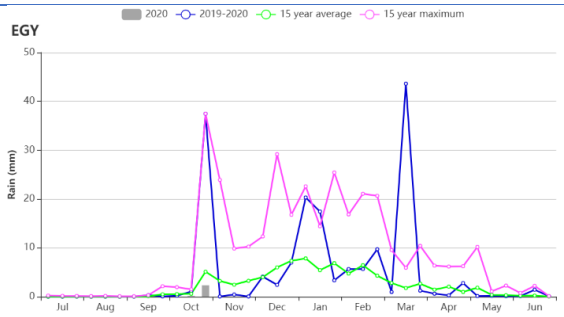


(e) NDVI profiles

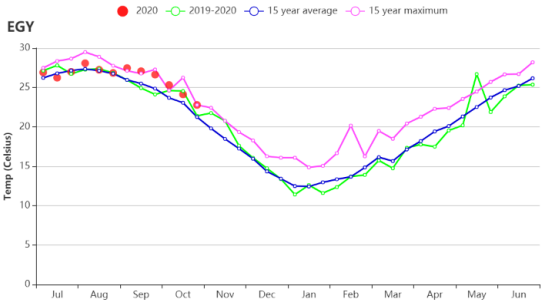




(f) Crop condition development graph based on NDVI (Nile Delta (left) and Nile Valley (right))



(g) Time series profile of rainfall



(h) Time series profile of temperature

Table 3.20 Egypt's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July- October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Nile Delta and Mediterranean coastal strip	3	-63	26	1	1363	-2	210	-21
Nile Valley	0	-96	29	1	1406	-2	60	1

Table 3.21 Egypt's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Nile Delta and Mediterranean coastal strip	66	7	157	2	0.78
Nile Valley	72	7	148	6	0.88

[ETH] Ethiopia

This report for the July to October period covers a large proportion of the Meher rainy season (June to September). Rains decrease in October, when the harvesting period starts for maize, wheat, barley and teff. At the national scale, slightly more humid and cooler weather was observed in this monitoring period with rainfall 6% above average, temperature 0.5℃ below average and RADPAR 7% lower as compared to the 15YA. Due to lower RADPAR, biomass was calculated to be 9% lower than the 5YA. The NDVI crop condition development graph indicates a slow crop development in July and August. However, it recovered in September and reached average levels by October. The NDVI cluster map indicates that NDVI was slightly above average on 44.5% of the arable land, mainly in the central northern and eastern regions. In the southwestern Oromia and Southern nations region, NDVI was initially below average, probably due to excessive rainfall causing local flooding. But its values had fully recovered by October. This variation was in accordance with maximum VCI graph which shows VCIx in most zones between 0.8-1.0. At the end of October, 99% of arable land was cropped, which was 1% above the 5YA.

Although some regions' agroclimatic indicators initially were unsatisfactory, crop conditions in most major crop producing areas in Ethiopia were favorable and CropWatch estimates average to above-average production levels for the major cereal crops.

Regional analysis

Based on agroclimatic patterns and cropping practices, CropWatch divided the country in the following regions: The Semi-arid pastoral zone, Southeastern Mendebo highlands, Southeastern mixed-maize zone, Western mixed maize regions, and Central-northern maize teff highlands.

Semi-arid pastoral areas

In the Semi-arid pastoral areas, a typical livestock production zone, precipitation was above average (+17%). The temperature and sunshine were slightly lower than average (TEMP -0.1℃, RADPAR -4%), resulting in a BIOMSS drop by -4%. However, NDVI values were higher than average and the VCI value of 0.94 also indicates favorable crop growth in this region. CALF increased greatly by 44% compared to the 5YA. Cropping intensity increased 18% compared to the average. The outlook for livestock production is favorable.

South-eastern Mendebo highlands

The southeastern Mendebo highlands are a major maize and teff producing area. During the reported period, it received above-average rainfall (+25%). Temperature (-0.5 ºC) , RADPAR (-5%) and BIOMSS (-8%) were below the 15YA. The cropped arable land fraction (CALF) remained unchanged and the maximum VCIx was at 0.95. The NDVI crop condition development curve remained below the 5YA. Cropping intensity was close to the average. The production of maize and teff will be slightly down in the southeastern Mendebo highlands.

South-eastern mixed maize zone

In this zone, the average rainfall was 538 mm, which was 54% above average. Slightly lower temperatures (-0.3℃) and RADPAR (-3%) resulted in below-average BIOMSS (-7%) as compared to the 15YA. The NDVI-based Crop condition development curve was close to the 5YA. The maximum VCI value was 0.95 and the CALF increased by 4%. Cropping intensity increased 11% compares to the average. The crop conditions in this zone are favorable and slightly above average yields are expected.

Western mixed maize zone

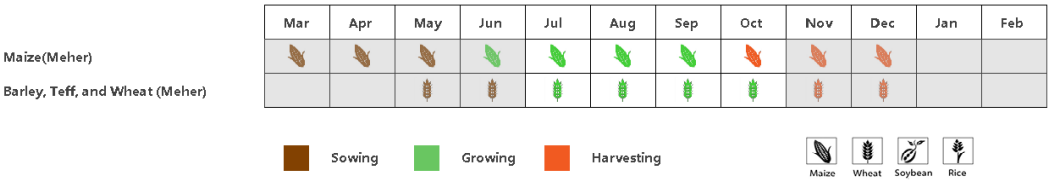
In the western mixed maize zone, maize is the most important crop grown during the Meher season. Rainfall (+6%) was slightly above the 15YA, whereas lower temperature (TEMP -0.7℃) and sunshine (RADPAR- 8%) resulted in a BIOMSS estimate that was 12% below the 15YA. NDVI recovered to average levels by September. VCIx was at 1.00 and the cropped arable land fraction (CALF) stayed unchanged. Cropping intensity increased 12% compares to the average. According to the CorpWatch indicators, conditions were rather favorable.

Central-northern maize-teff highlands

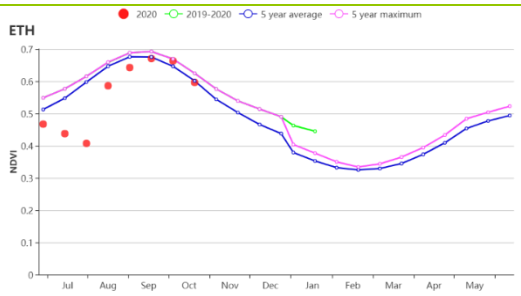
This is an important corn and teff producing area in Ethiopia. Precipitation was close to the 15YA, while

temperature and PAR were 0.4 ºC and 7% below average respectively. The crops developed more slowly than usual, which explains the slightly below-average NDVI values in July. However, they recovered to average levels by August. The BIOMSS was down by 10% and VCIx was at 0.97. Cropping intensity increased 9% compares to the average. All in all, the outlook for the teff and maize crops is near average.

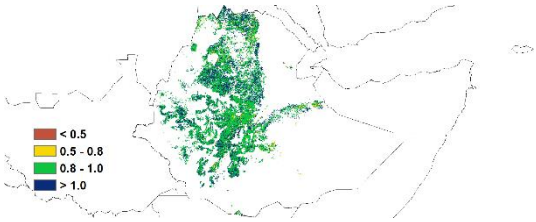
Figure 3.15 Ethiopia's crop condition, July-October 2020



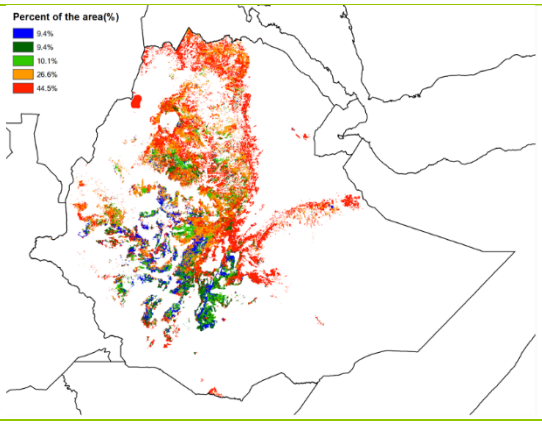
(a) Phenology of major crops



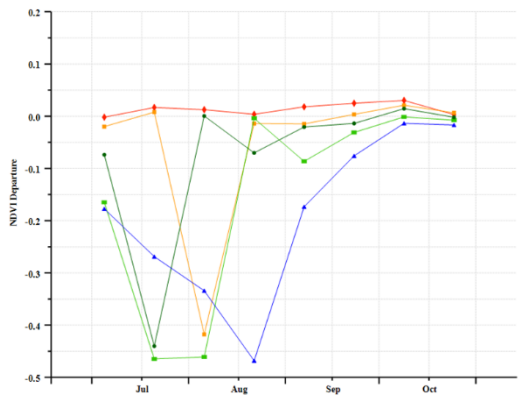
(b) Crop condition development graph based on NDVI



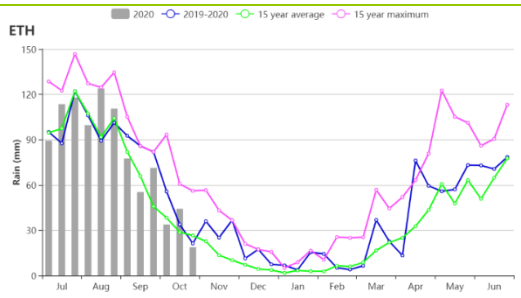
(c) Maximum VCI



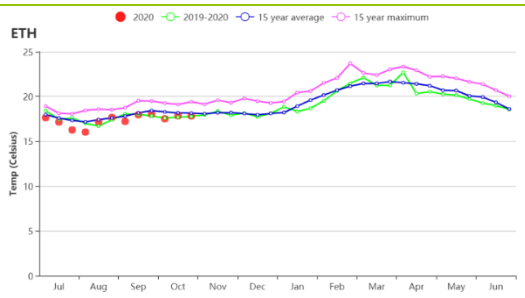
(d) Spatial NDVI patterns compared to 5YA



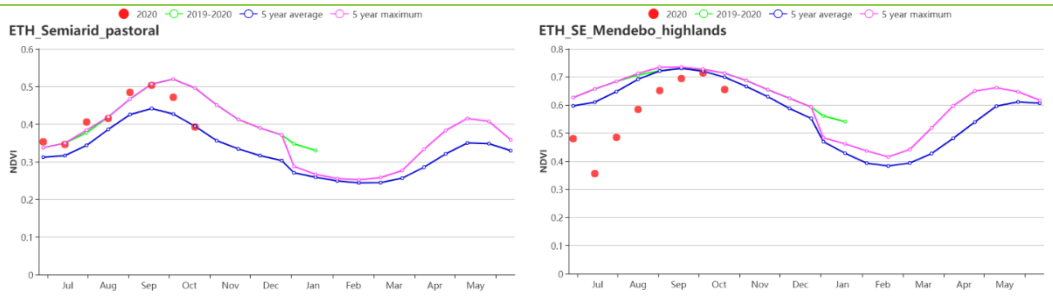
(e) NDVI profiles



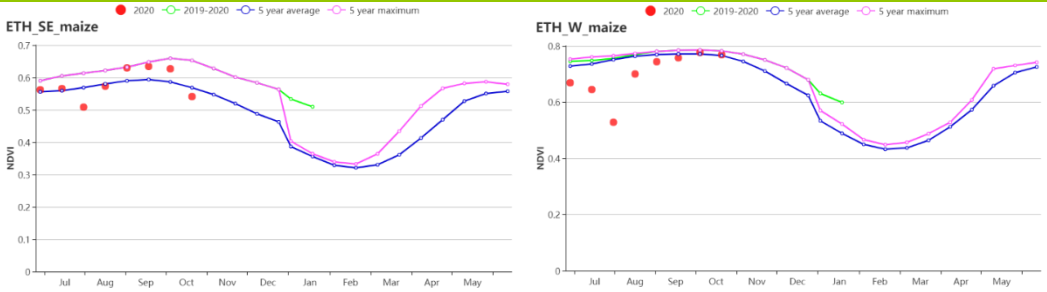
(f) Time series rainfall



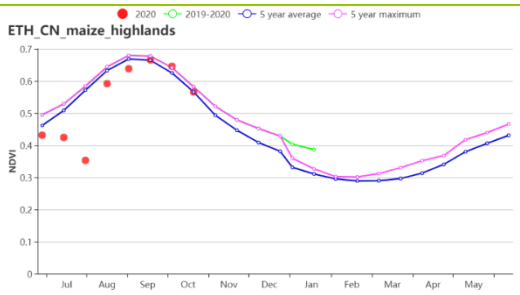
(g) Time series temperature



(h) Crop condition development graph based on NDVI (Semi-arid pastoral (left) South-eastern Mendebo highlands (right)



(i) Crop condition development graph based on NDVI (South-eastern mixed maize zone (left) and South-eastern mixed maize zone (right))



(j) Crop condition development graph based on NDVI (Central-northern maize-teff highlands

Table 3.22 Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July- October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
Semi-arid pastoral areas	195	17	23.0	0.1	1301	-4	599	
South-eastern Mendebo highlands	593	25	14.5	-0.5	1075	-5	393	
South-eastern mixed maize zone	538	54	18.1	-0.3	1153	-3	519	
Western mixed maize zone	1376	6	19.2	-0.7	1012	-8	511	
Central-northern maize-teff	966	-1	16.7	-0.4	1157	-7	429	

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
highlands								

Table 3.23 Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July- October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Semi-arid pastoral areas	84	44	127	18	0.94
South-eastern Mendebo highlands	100	0	126	1	0.95
South-eastern mixed maize zone	99	4	131	11	0.97
Western mixed maize zone	100	0	128	12	1.00
Central-northern maize-teff highlands	99	1	116	9	0.97

[FRA] France

This monitoring period covers the final stages of maize and spring wheat cultivation and their harvest, as well as the sowing of winter wheat in October, expected to be completed in November.

CropWatch agro-climatic indicators show slightly above-average temperatures over the period (TEMP, +0.3°C). During the summer months, the temperatures nearly reached the maximum values of the past 15 years. RAIN was significantly higher than the average (RAIN, +7%), especially in late September and October. Sunshine was lower than the average (RADPAR, -3%). Due to the generally favorable temperature, rainfall and sunshine conditions, the biomass accumulation was slightly above the 15-year average (BIOMSS, +1%). Cropping intensity was at the average level.

Overall, the national-scale NDVI development graph shows that NDVI trended below last year's and the 5-year average, due to below-average rainfall from July to early September. However, NDVI recovered to close to average in October. All regions were similarly affected, with the exception of the Mediterranean zone. This pattern is confirmed by VCIx, ranging from 0.85 to 0.95 across the regions. Overall, dry weather during the summer months caused unfavorable growth conditions for most of France.

Regional analysis

Considering cropping systems, climatic zones and topographic conditions, additional sub-national details are provided for eight agro-ecological zones. They are identified on the maps by the following numbers: (78) **Northern barley region**, (82) **Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean**, (79) **Maize-barley and livestock zone along the English Channel**, (80) **Rapeseed zone of eastern France**, (75) **Massif Central dry zone**, (81) **Southwestern maize zone**, (76) **Eastern Alpes region** and (77) the **Mediterranean zone**.

In the Northern barley region, slightly warmer weather was observed (TEMP, +0.8°C) while RAIN and RADPAR were below the average (both -5%) over the monitoring period. The BIOMSS increased by 3% when compared to the past 15-year average. The CALF was lower than the average (-1%), and VCIx was 0.85. Cropping intensity decreased by 1%. Crop condition development based on NDVI for this region was below the past 5-year average.

In the Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean, slightly warmer (TEMP +0.5°C) and wetter (RAIN, +9%) conditions were observed and RADPAR was about 2% below the average. BIOMSS was near average while the regional crop conditions were at average levels except for a drop in September and early October. Cropping intensity was at the average level. The CALF was lower than the average by 2%, and VCIx was 0.91.

In the Maize-barley and livestock zone along the English Channel, RAIN and TEMP were above average by 20% and 0.3°C. RADPAR was lower than the average (-1%). BIOMSS increased by 2%. Cropping intensity increased by 3%. CALF was average and VCIx was recorded relatively high at 0.95, all indicating normal crop conditions.

Overall, in the Rapeseed zone of eastern France, RAIN in this period was 12% lower than the 15-year average, while TEMP increased by 0.9°C and RADPAR was reduced by 2%, indicating relatively dry conditions. Cropping intensity was lower than average level 6%. BIOMSS was about 3% higher than average with a moderate VCIx level (0.86). However, the NDVI profile indicated that the crop conditions were significantly below the 5-year average after July.

In the Massif Central dry zone, RAIN and RADPAR were 2% and 3% lower than the average, respectively, while TEMP increased slightly by 0.2 °C. The VCIx was 0.86 and BIOMSS decreased by 4% which is indicating a below-average cropping season in the region. Cropping intensity also decreased by 6%. Crop conditions based on the NDVI profile were also showing below-average levels after July.

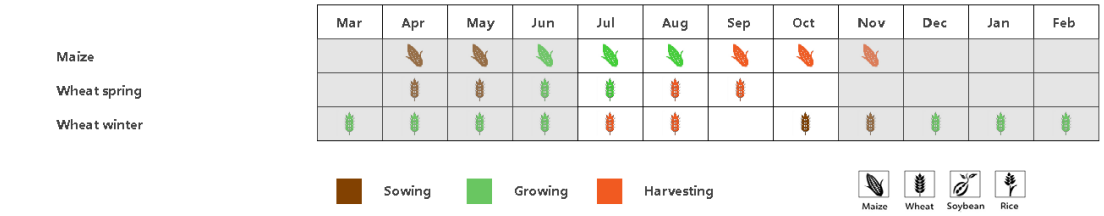
The Southwestern maize zone is one of the major irrigated regions in France. The regional NDVI profile presented a below-average trend, the VCIx was recorded at a moderate level (0.87) and BIOMASS was 1% lower than average, all indicating below-average crop conditions. Cropping intensity was below the average 1%. RAIN in the period was 24% higher than average, while TEMP was 0.1°C higher. RADPAR dropped by 3%.

In the Eastern Alpes region, crop conditions also presented an overall below-average trend. RAIN and

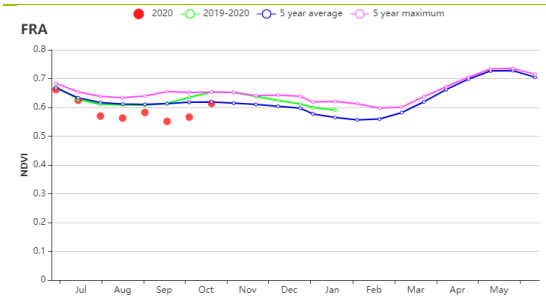
TEMP in the region were 17% and 0.1°C higher than average, while RADPAR was 1% lower than the averages. BIOMSS was slightly higher than the 15-year average (+1%). Cropping intensity was higher than average 3%. VCIx for the region was recorded at 0.87.

The Mediterranean zone is the only region which recorded overall close to average levels. The region also recorded a high VCIx level (0.92). RAIN was 4% higher than average, while TEMP and RADPAR were slightly lower than average (-0.3°C and -2%, respectively). Cropping intensity and BIOMSS increased by 5% and 3%. This region is showing average crop conditions.

Figure 3.16 France's crop condition, July - October 2020

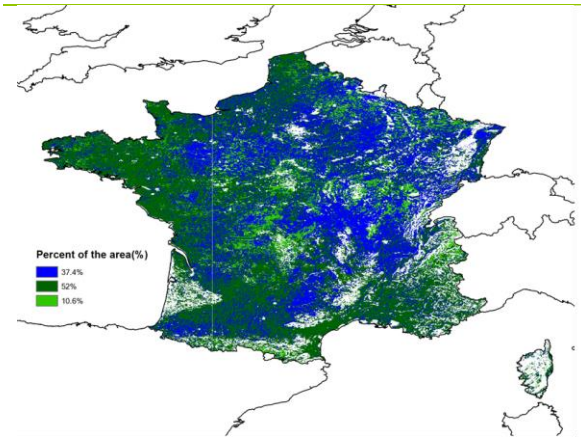


(a). Phenology of major crops

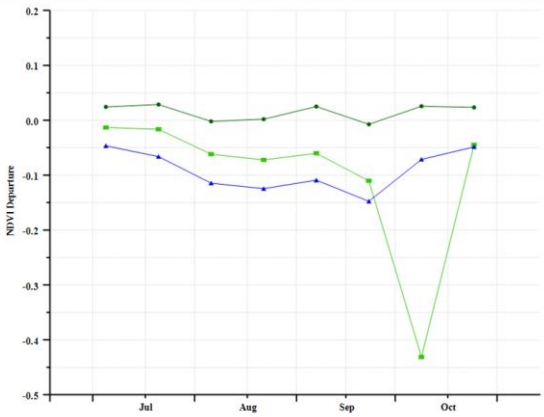


(b) Crop condition development graph based on NDVI

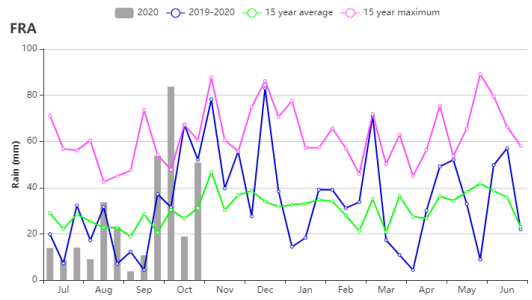
(c) Maximum VCI



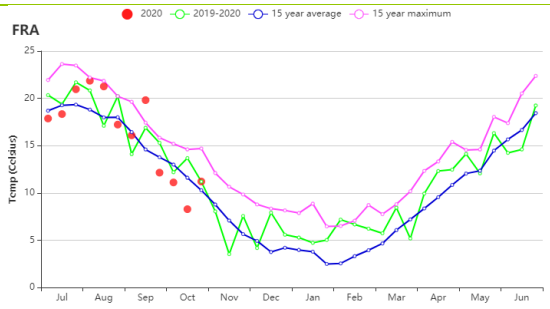
(d) Spatial NDVI patterns compared to 5YA



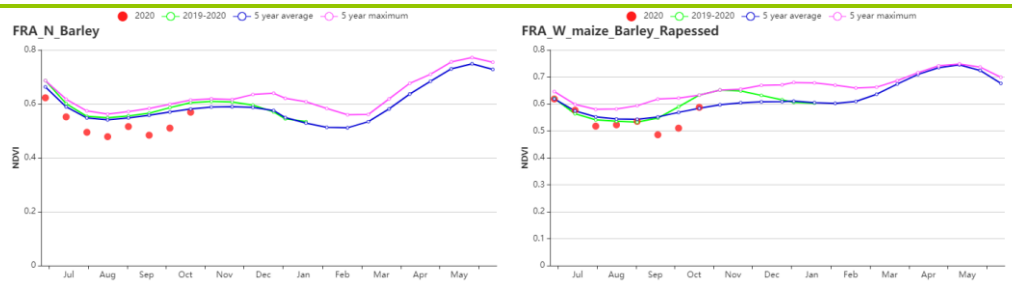
(e) NDVI profiles



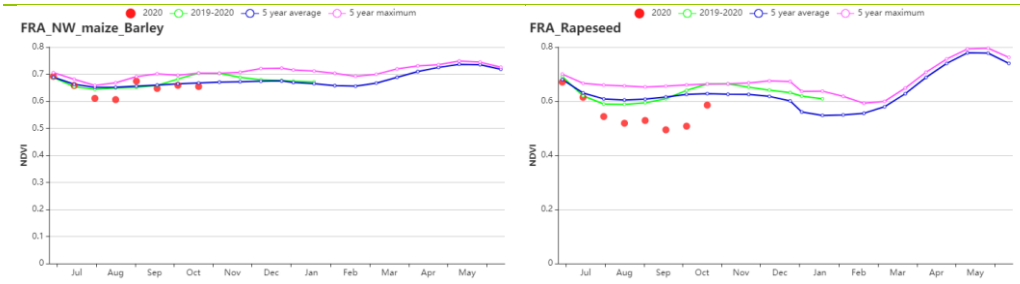
(f) Rainfall profiles



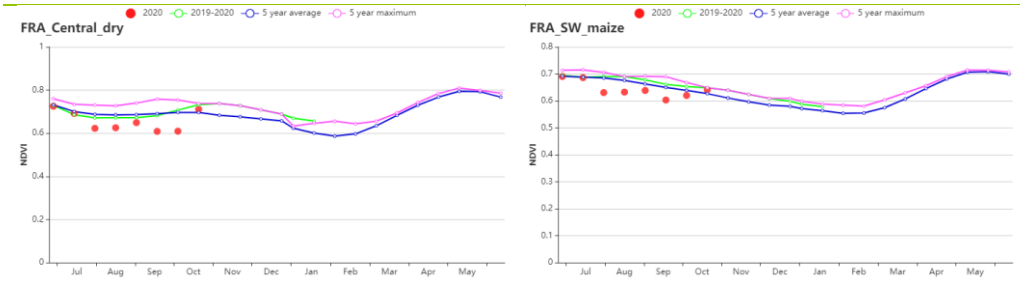
(g) Temperature profiles



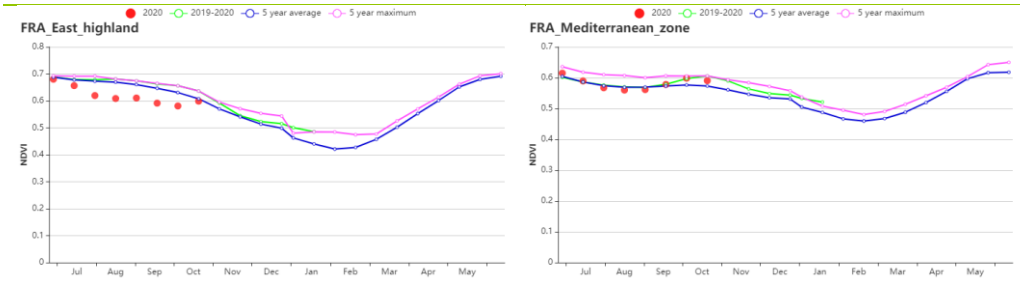
(h) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))



(i) Crop condition development graph based on NDVI (Maize, barley and livestock zone (left) and Rapeseed zone (right))



(j) Crop condition development graph based on NDVI (Dry Massif Central zone (left) and Southwest maize zone (right))



(k) Crop condition development graph based on NDVI (Eastern Alpes region (left) and Mediterranean zone (right))

Table 3.24 France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July- October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Northern Barley zone	271	-5	16.5	0.8	811	-5	385	3
Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean	275	9	17.3	0.5	928	-2	440	0
Maize barley and livestock zone along the English Channel	319	20	15.8	0.3	849	-1	377	2

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Rapeseed zone of eastern France	313	-12	16.2	0.9	910	-2	419	3
Massif Central Dry zone	308	-2	15.4	0.2	993	-3	423	-4
Southwest maize zone	366	24	17.0	0.1	1037	-3	496	-1
Alpes region	483	17	14.7	0.1	1062	-1	444	1
Mediterranean zone	306	4	16.4	-0.3	1142	-2	539	3

Table 3.25 France's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Northern Barley zone	99	-1	109	-1	0.85
Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean	97	-2	105	0	0.91
Maize barley and livestock zone along the English Channel	100	0	115	3	0.95
Rapeseed zone of eastern France	99	-1	104	-6	0.86
Massif Central Dry zone	100	0	110	-6	0.86
Southwest maize zone	100	0	107	-1	0.87
Alpes region	98	1	108	3	0.87
Mediterranean zone	97	4	117	5	0.92

[GBR] Kingdom

By the end of this monitoring period, summer crops had been harvested and winter wheat sowing was completed as well. According to the crop condition development graph, crops experienced slighly unfavorable conditions. NDVI values were close to average from July to September, and below average in October. Agro-climatic indicators show that rainfall was above average (RAIN, +12%), temperature and radiation were below average (TEMP -0.4℃, RADPAR -12%). The below-average radiation and temperature resulted in below-average BIOMSS. The seasonal RAIN profile shows that the rainfall in early July, mid-August, late August, early October, late October were above average, and above the 15 year maximum in October. The temperature was close to the 15YA.

The national average VCIx was 0.95. CALF (100%) was unchanged compared to its five-year average. The NDVI departure cluster profiles indicate that: (1) 46% of arable land experienced slightly above-average crop conditions, mainly in East Midlands, West Midlands, East of England, South West England and East of Scotland. (2) 33.2% of arable land experienced slightly below-average or average crop conditions, mainly in South East England. (3) 5.8% of arable land, scattered around Northern Ireland, Scotland and North West England, had slightly below-average crop conditions before a marked drop in mid-July, and recovered to average crop conditions from late July to mid-October. (4) 7.1% of arable land experienced average crop conditions from July to September before a marked drop in early October, and subsequently recovered to slighly below-average in late October, mainly in East of England. (5) 8% of arable land, scattered around East of England, East Midlands and Wales, experienced average crop conditions from July to September. Most likely, the large drops can be attributed to cloud cover in the satellite images. Altogether, the conditions for winter wheat in the UK are assessed as below average, mainly because the crops had suffered from drought conditions in spring and early summer.

Regional analysis

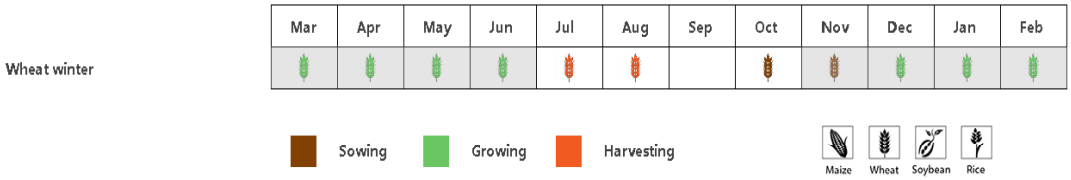
Based on cropping systems, climatic zones, and topographic conditions, three sub-national regions are described below: **Northern barley region**, **Central sparse crop region** and **Southern mixed wheat and barley region**. All three sub-regions are characterized by an unchanged fraction of arable land (CALF) compared to the 5YA.

In the **northern barley region**, NDVI was below average or close to average. Rainfall was above average (RAIN +4%), radiation (RADPAR -12%) and temperature (TEMP -0.6℃) were below average. Biomass was down 16% compared to average. This region is cultivated with a single system, and the CI (+1%) was slightly above average, while the VCIx was at 0.96.

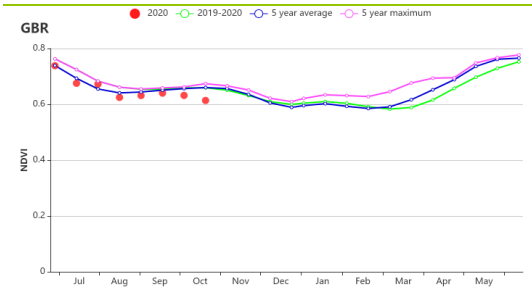
The **Central sparse crop region** is one of the country's major agricultural regions in terms of crop production. Crop condition development graph based on NDVI is similar to northern barley region. Rainfall was above average (RAIN +16%), radiation (RADPAR -15%) and temperature (TEMP -0.5℃) were below average. Biomass (BIOMSS -18%) was below average. This region is cultivated with a mixture of single and double cropping systems, and the CI (+1%) was slightly above average, while the VCIx was at 0.97.

In the **Southern mixed wheat and barley zone**, NDVI was below average or close to average. This region experienced the largest rainfall excess (RAIN +16%), while radiation (RADPAR -10%) and temperature (TEMP -0.3°C) were below average. The below-average radiation and temperature resulted in the below-average biomass (BIOMSS -10%). This region is cultivated with a mixture of single and double cropping systems, and the CI (+1%) was slightly above average. The region had an above-average VCIx (0.94).

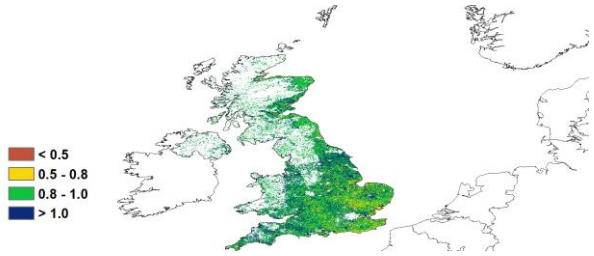
Figure 3.17 United Kingdom's crop condition, July - October 2020



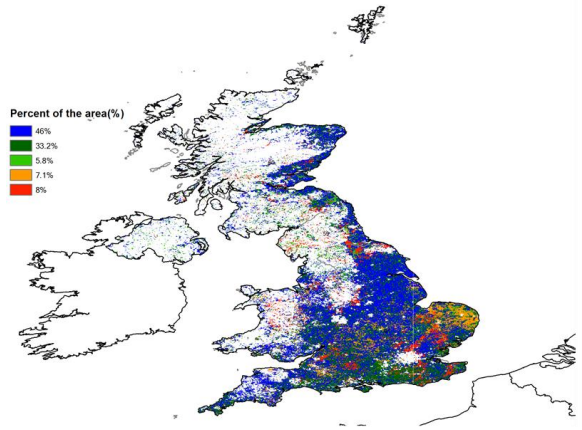
(a). Phenology of major crops



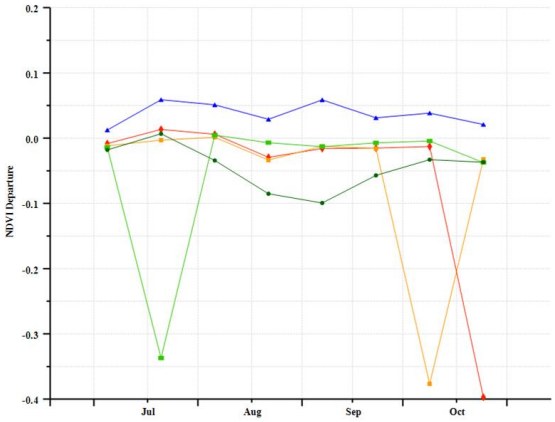
b) Crop condition development graph based on NDVI



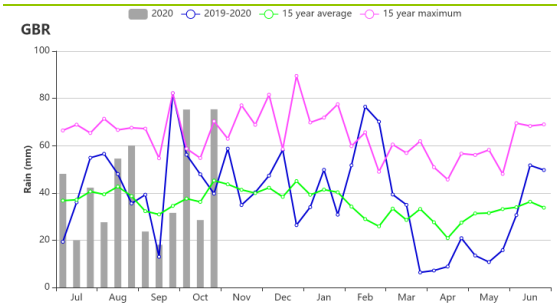
(c) Maximum VCI



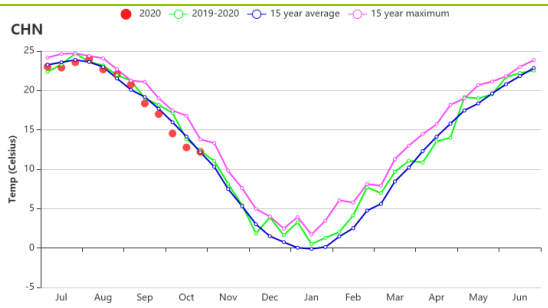
(d) Spatial NDVI patterns compared to 5YA



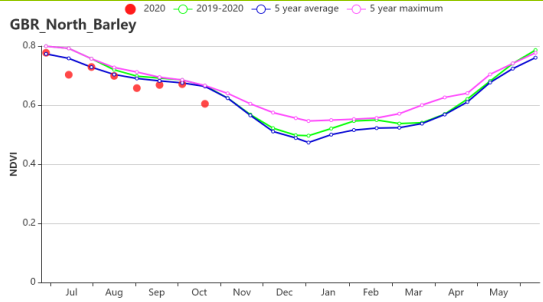
(e) NDVI profiles

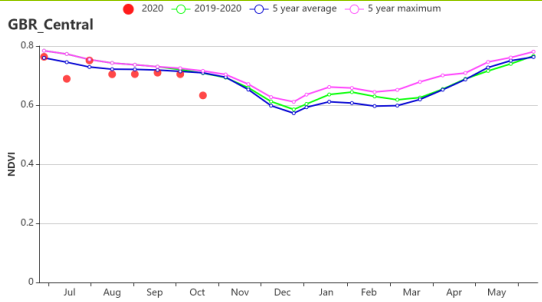


(f) Rainfall profiles

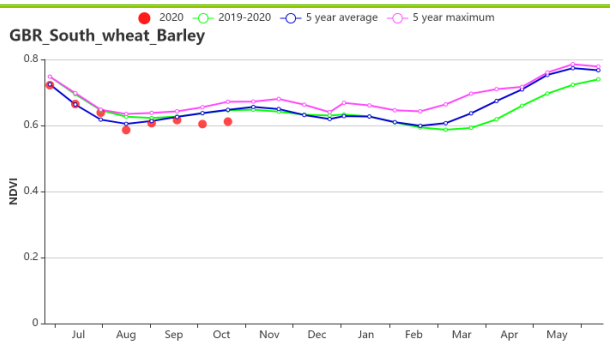


(g) Temperature profiles





(h) Crop condition development graph based on NDVI (Northern Barley region (left) and Central sparse crop region (right))



(i) Crop condition development graph based on NDVI (Southern mixed wheat and Barley zone)

Table 3.26 United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July- October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Northern Barley region(UK)	595	4	11	-0.6	512	-12	166	-16
Central sparse crop region (UK)	552	16	12	-0.5	540	-15	190	-18
Southern mixed wheat and Barley zone (UK)	399	16	14	-0.3	649	-10	261	-10

Table 3.27 United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July- October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Northern Barley region(UK)	100	0	106	1	0.96
Central sparse crop region (UK)	100	0	101	1	0.97
Southern mixed wheat and Barley zone (UK)	100	0	113	1	0.94

[HUN] Hungary

In Hungary, summer crops were harvested in September and October. Winter cereals, mainly wheat and barley, were sown in September and October.

At the national level, accumulated rainfall was above average (RAIN +39%), temperature increased by 0.3°C, and radiation decreased by 2%, which resulted in slightly above-average BIOMSS (BIOMSS +1%). According to the national NDVI development graphs, crop conditions were above average from July to mid-September but below average from late September to October.

Some spatial and temporal detail is provided by NDVI clusters: There were two main remarkable areas where the NDVI departure across the period was significant: As shown in Figure 3.20d, the green area has excellent crop conditions (24.2% of the area). It is mainly located in far western and eastern Hungary, where the NDVI departure was above average. The blue color region (12.0%), mainly located in central Hungary, represents poor crop conditions. About 27.6% of the area extending from west to east of Hungry, NDVI was above average from July to August, but below average from September to October. For about 17.9% of the area, located in mid-east region of Hungary, NDVI was above average from July to mid-September, but below average from late September to October. For about 18.4% of the area, located in northeastern Hungary, NDVI was below average from July to early August, but above average from September to October.

With the maximum VCI value reaching 0.95 at the national level and the cropped arable land fraction (CALF) at 100%, cropping intensity was 102%, crop conditions are estimated as favorable.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, Hungary is divided into four sub-regions: Northern Hungary, Central Hungary, the Great Plain (Puszta) and Transdanubia. Specific observations for the reporting period are included for each region. All sub-regions are characterized by unchanged fractions of cultivated arable land (CALF) compared to the average, i.e. 100%, indicating full cropping.

Central Hungary is one of the major agricultural regions in terms of crop production. A sizable share of winter wheat, maize and sunflower is planted in this region. According to the NDVI development graphs, NDVI was above average from July to August, below average from September to October. Agro-climatic conditions include above-average rainfall (RAIN, +25%) and temperature (TEMP +0.3°C), and below-average radiation (RADPAR -2%), which resulted in above-average biomass (BIOMASS +2%). The VCIx was 0.93. Cropping Intensity was 102%. The crop production in this region is expected to be favorable.

Northern Hungary is another important winter wheat region. During this reporting period crops showed favorable conditions according to the NDVI development curve. They were above average from July to mid-September and below average from late September to October. The rainfall was above average (RAIN +54%). Temperature was slightly above average (TEMP +0.1°C), and radiation was below average (RADPAR -3%). Estimated biomass decreased slightly (BIOMASS -3%). The maximum VCI was 0.96. Cropping Intensity was 106%. The crop production in this region is expected to be close to average.

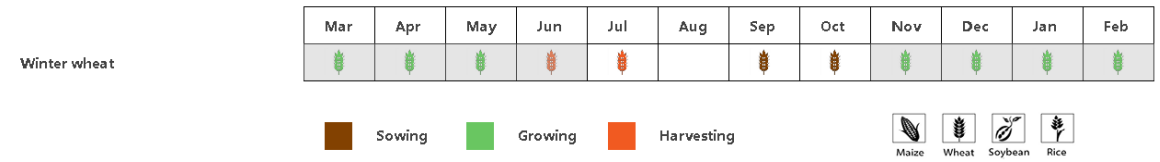
The Puszta region mainly grows winter wheat, maize and sunflower especially in the counties of Jaz-Nagykum-Szolnok and Bekes. According to the NDVI development graph, crop conditions were above average from July to mid-September and below average after then. The rainfall was above average (+46%). Temperature was also above average (TEMP +0.2°C), whereas radiation was below (RADPAR -2%), which resulted in average biomass. The maximum VCI was 0.97. Cropping Intensity was 103%. The crop production in this region is expected to be close to average.

Southern Transdanubia cultivates winter wheat, maize, and sunflower, mostly in Somogy and Tolna counties. Crop condition was close to average in July and October, above average from August to early September, and below average in mid-September. Rainfall and temperature were above average (RAIN +26%; TEMP +0.5°C) , whereas solar radiation was below average (RADPAR -2%) and biomass was slightly above (BIOMSS +3%). The maximum VCI was favorable at 0.91. Cropping Intensity was 101%. The crop production in this region is expected to be favorable.

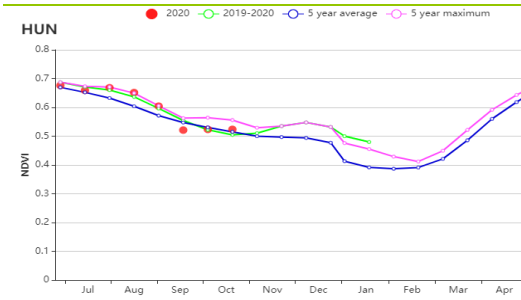
Summer crops production is expected to be slightly above average and the prospects for the winter

wheat are favorable as well.

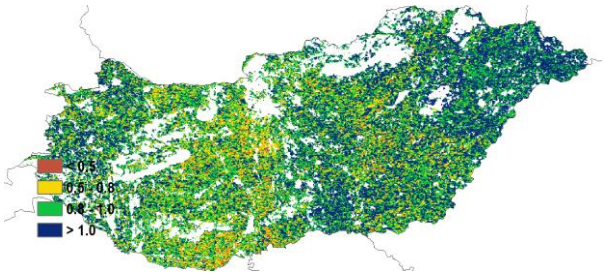
Figure 3.18 Hungary's crop condition, July-October 2020



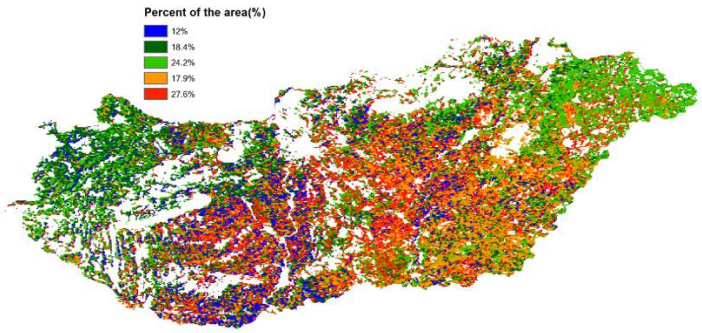
(a). Phenology of major crops



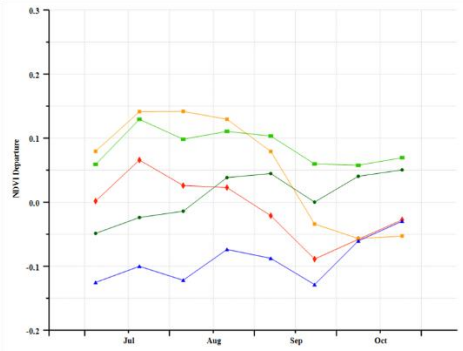
(b) Crop condition development graph based on NDVI



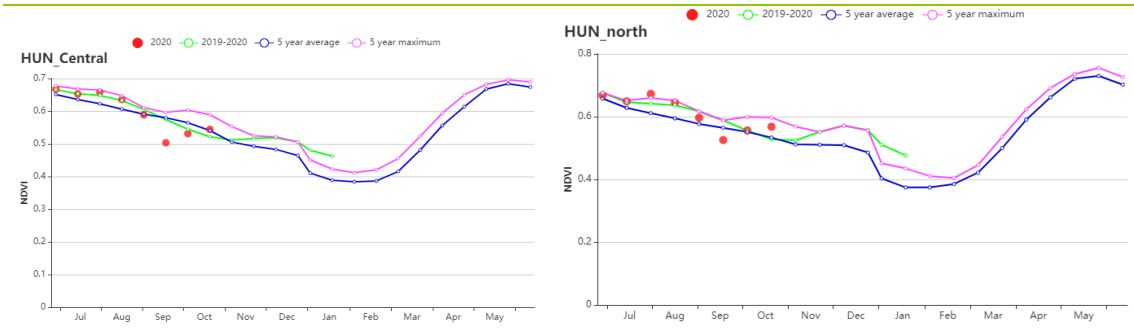
(c)Maximum VCI



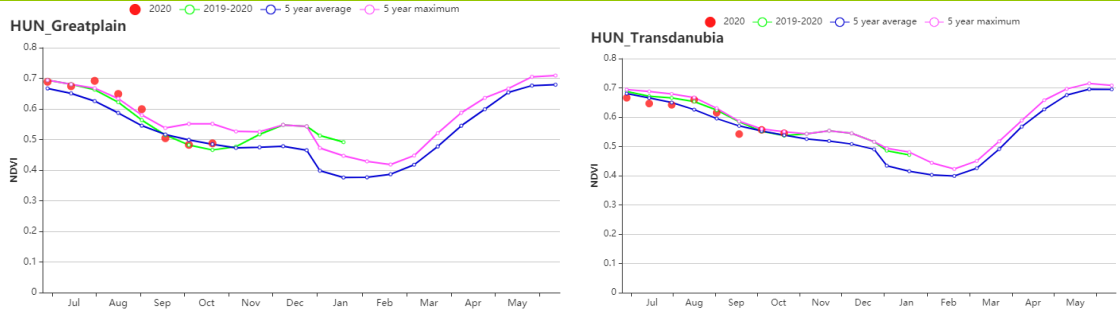
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Central Hungary Region (left) and North Hungary Region (right))



(g) Crop condition development graph based on NDVI (Great Plain Region (left) and Transdanubia Region (right))

Table 3.28 Hungary's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July- October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central Hungary	242	25	19	0.3	1008	-2	538	2
North Hungary	316	54	18	0.1	966	-3	486	-3
The Puszta	303	46	19	0.2	1010	-2	531	0
Transdanubia	277	26	18	0.5	1013	-2	526	3

Table 3.29 Hungary's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July- October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current (%)
Central Hungary	100	0	102	0	0.93
North Hungary	100	0	106	2	0.96
The Puszta	100	0	103	1	0.97
Transdanubia	100	0	101	-2	0.91

[IDN] Indonesia

During this monitoring period, the dry season maize and the second rice crop reached the mature stage and harvest began in October. Planting of the main rice crop started in October.

At the national scale, sunshine was below average (RADPAR -2%), whereas temperature (TEMP +0.2℃) and precipitation (RAIN +10%) were above the 15YA. The potential cumulative biomass (BIOMSS) was 1% below average as a result of reduced radiation.

According to the crop condition development graph based on NDVI, crop growth conditions were below the 5YA over the reporting period. NDVI clusters and profiles show that 43.9% of the cropland over Eastern Indonesia was in below-average conditions before September and recovered to average during October.

Considering that the area of cropped arable land (CALF 99%) in the country was close to the 5YA and the VCIx value reached 0.96, the national production is anticipated to be average or slightly below.

Regional analysis

CropWatch divides Indonesia in to four agro-ecological zones, namely **Sumatra** (92), **Java** (90), **Kalimantan and Sulawesi** (91) and **West Papua** (93), among which the first three regions are the most relevant for crop production. Java is the country's main agricultural region.

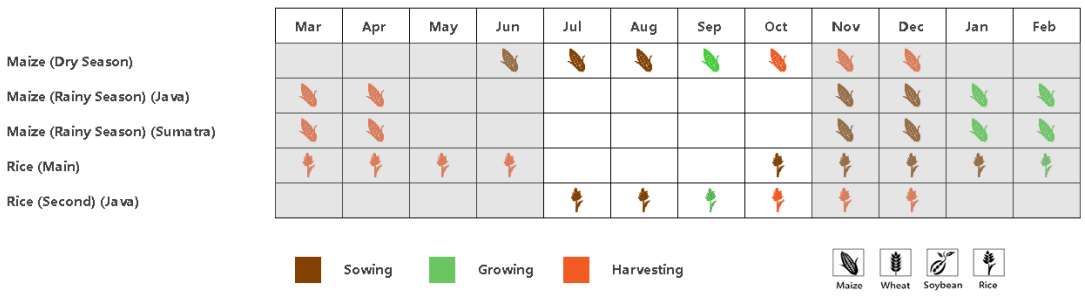
The cropped arable land fraction (CALF) reached 100% in all the regions except for **Java** (98%), but CALF in **Java** had increased by 1% over the 5YA.

The **Java** region received abundant precipitation (356 mm, +14%) during the monitoring period. The temperature was 25℃ as usual, and RADPAR was 1176 MJ/m² (+3%). BIOMSS (739 gDM/m2) did not change. The VCIx was just fair at 0.93. According to the NDVI development graph and average cropping intensity, the crop condition was close to the 5YA average. Overall, the crop conditions in Java were similar to those in previous years.

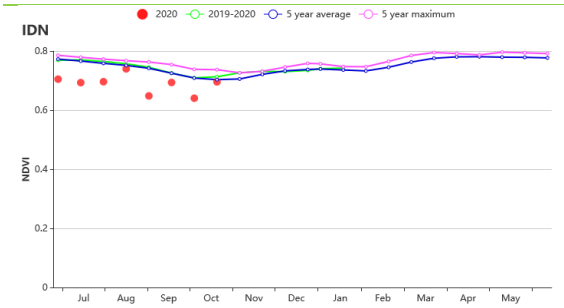
In the **Kalimantan and Sulawesi** area, precipitation was 23 % higher than the 15YA average, at 1128 mm, the largest increase in the four regions. The reduced temperature (-0.1℃) and RADPAR (-4%) brought a decrease in biomass production potential (BIOMSS -3%). According to the NDVI development graph and the VCIx (0.96), crop condition in Kalimantan and Sulawesi are assessed as close to or slightly below average.

During the reporting period, the **Sumatra** region recorded 1590 mm of RAIN (+6%). TEMP (+0.2℃) and RADPAR (-1%) as well as BIOMSS (774 gDM/m2) remained close the 15YA. VCIx was favorable at 0.97. Hence, the crop conditions were normal for this monitoring period.

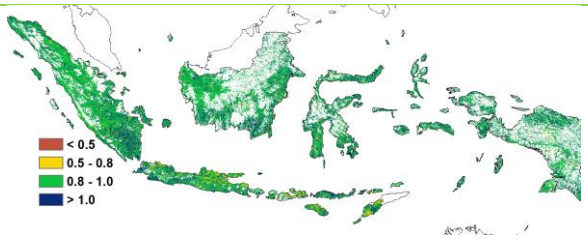
Figure 3.19 Indonesia's crop condition, July – October 2020



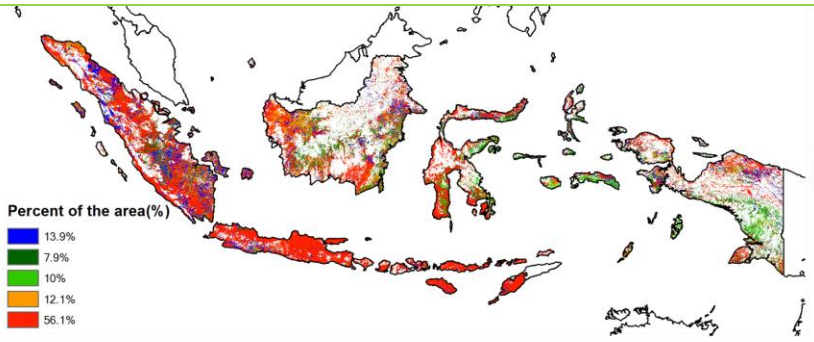
(a). Phenology of major crops



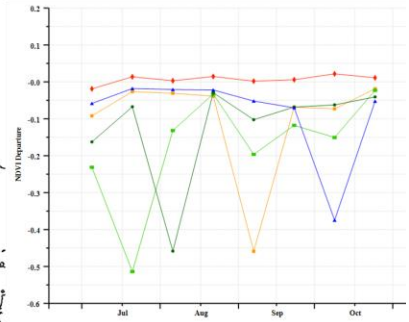
(b) Crop condition development graph based on NDVI



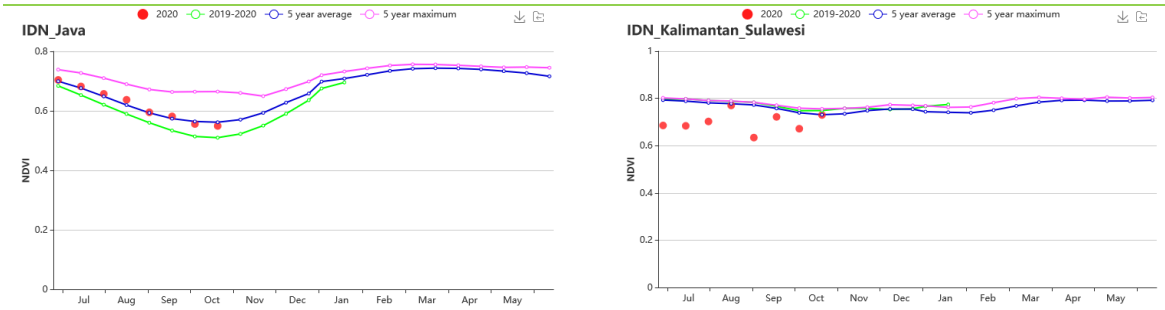
(c) Maximum VCI



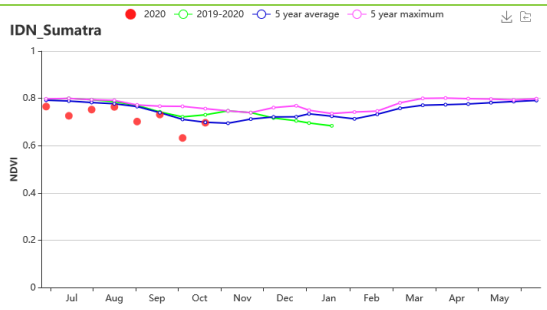
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Java (left) and Kalimantan-Sulawesi (right))



(g) Crop condition development graph based on NDVI (Sumatra)

Table 3.30 Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July – October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Java	356	14	25.2	0.4	1249	-2	739	0
Kalimantan and Sulawesi	1128	23	24.4	-0.1	1155	-4	754	-3
Sumatra	855	-8	24.7	0.2	1179	-1	774	0

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
West Papua	1590	6	23.1	0.3	949	-1	609	-1

Table 3.31 Indonesia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure from 5YA(%)	Current	Depature from 5YA(%)	Current
Java	98	1	118	-4	0.93
Kalimantan and Sulawesi	100	0	130	-3	0.96
Sumatra	100	0	121	-8	0.96
West Papua	100	0	132	-1	0.97

[IND] India

The current monitoring period covers the monsoon season, during which the main rice crop (Kharif) is grown. It is planted at the beginning of monsoon in June and harvested in October. Other major crops grown during this monitoring period are maize and soybean. Rabi wheat sowing started in October. The graph of NDVI development shows that the crop conditions were close to or above the average in general, except in mid-August, indicating that the crop conditions for Kharif rice, maize and soybean were favorable at the national level.

The CropWatch agroclimatic indicators show that nationwide TEMP (+0.3 °C) was close to average, wheras RADPAR was at the same level as the 15YA. India recorded abundant RAIN (+5%) after July, which exceeded the 15-year average for the same monitoring period. The increased rainfall and temperature resulted in a BIOMSS increase by 1% compared with the 15YA. Moreover, the overall VCIx was high, with a value of 0.97. As can be seen from the spatial distribution, only the South, Northeast and Northwest recorded values below 0.80. Most of India had high VCIx values. These spatial patterns of VCIx were thus generally consistent with those of NDVI. Almost all areas experienced continuously above-average crop conditions until September. The spatial distribution of NDVI profiles shows that in August, 28.9% of the areas recorded below-average crop conditions in the West and Northeast regions. CALF increased by 3% compared to the 5YA.

With the exception of a few areas, the crop conditions in all parts of India were favorable. During the last monitoring period, the crops in some areas were affected by excessive rainfall and flooding, but the general situation has turned favorable. Crop production for this season is estimated to be above average at the national level.

Regional analysis

India is divided into eight agro-ecological zones: the Deccan Plateau (94), the Eastern coastal region (95), the Gangetic plain (96), Assam and north-eastern regions (97), Agriculture areas in Rajasthan and Gujarat (98), the Western coastal region (99), the North-western dry region (100) and the Western Himalayan region (101).

The two agro-ecological zones of the Deccan Plateau and the Agriculture areas in Rajasthan and Gujarat show similar trends in agricultural indices. Compared to the same period of previous years, RAIN had increased, especially in the Agriculture areas in Rajasthan and Gujarat (+21%). Aided by slightly higher TEMP and RADPAR, abundant rainfall caused BIOMSS to be much higher than the 15-year average. CALF showed the same trends. In Rajasthan and Gujarat, it was 4% above the 5YA. The graph of NDVI development shows that the crop growth of these two agro-ecological regions during this monitoring period exceeded the 5-year maximum in most months. Generally, the crop production is expected to be above average.

The Eastern coastal region and the Western coastal region recorded similar trends of agricultural indices in this monitoring period. Compared to the same period of the previous years, RAIN had increased by more than 10%. TEMP was slightly below average (-0.1°C) in the Eastern coastal region and slightly above average (+0.1°C) in the Western coastal region. Below average RADPAR caused a decrease in BIOMSS. Both regions recorded increases of CALF (+3% and +6%, respectively). VCIx was above 0.95. The graph of NDVI development shows that the crop growth for the two regions exceeded the 5-year average. The crop production is expected to be above average.

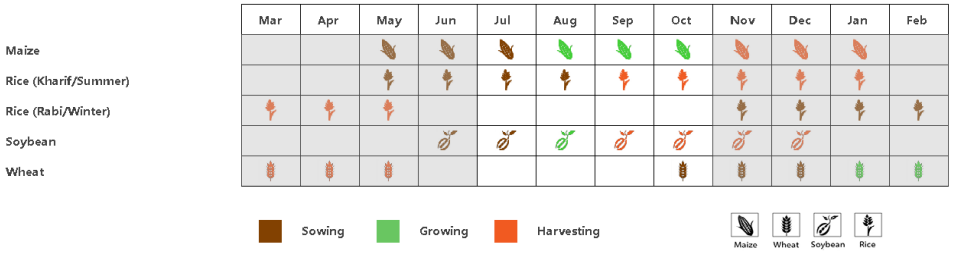
The North-western dry region recorded 512 mm of RAIN, which was 54% above average. TEMP was at 31.1°C (+0.3°C), and RADPAR was slightly below the 15YA at 1188 MJ/m² (-2%). BIOMSS was above the 5YA (+7%) due to the heavy rainfall. CALF reached 56% which was a significant increase by 44% over the 5-year average, and VCIx was 0.90. The graph of NDVI development shows that the crop growth of this region during this monitoring period exceeded the 5-year average in most months. Generally, the crop production is expected to be above average.

The Assam and Northeastern region recorded 2429 mm of RAIN, which was slightly above average (+4%). TEMP was at 24.3°C (+0.3°C) and RADPAR was at 863 MJ/m² (-9%). BIOMSS was below the 5YA (-7%) due to less solar radiation. CALF reached 95% which was near average, and VCIx was 0.94. The outlook of crop

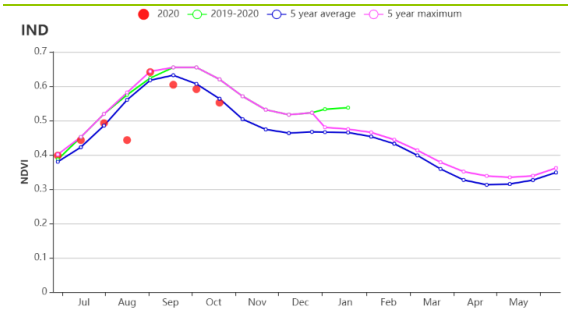
production in this region is slightly unfavorable due to the low radiation and high rainfall.

The Western Himalayan region and the Gangetic plain recorded similar trends of agricultural indices in this monitoring period. Compared to the same period of the previous years, RAIN had decreased significantly, especially in the Western Himalayan region (-53%). TEMP and RADPAR were slightly higher. Lack of rainfall caused BIOMSS estimates to be below the 15-year average. CALF was close to the 5-year average in both regions. The VCIx was higher than 0.94. The graph of NDVI development shows that crop growth for the two regions was below the 5-year average during the monitoring period. Therefore, crop production conditions were slightly unfavorable.

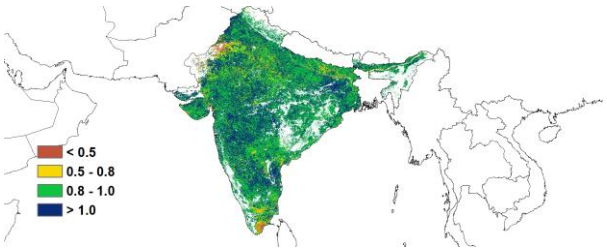
Figure 3.20 India's crop condition, July-October 2020



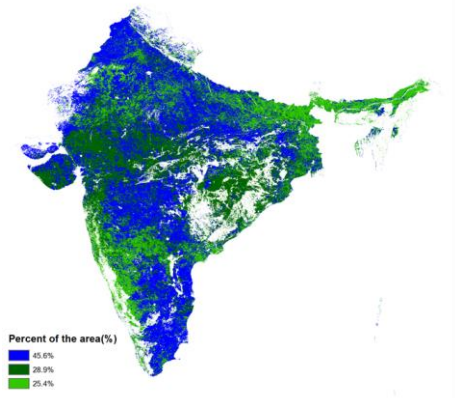
(a). Phenology of major crops



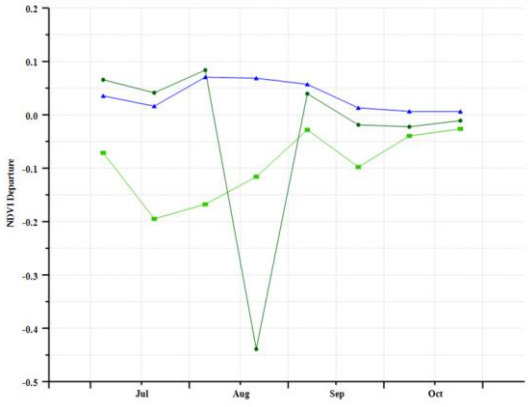
(b) Crop condition development graph based on NDVI



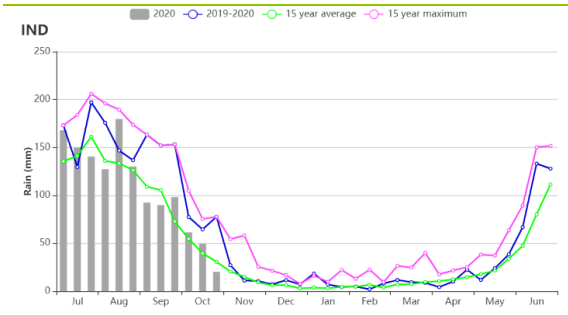
(c) Maximum VCI



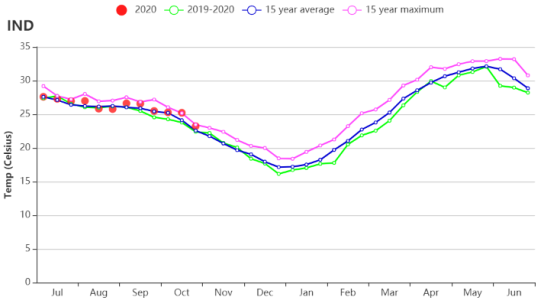
(d) Spatial NDVI patterns compared to 5YA



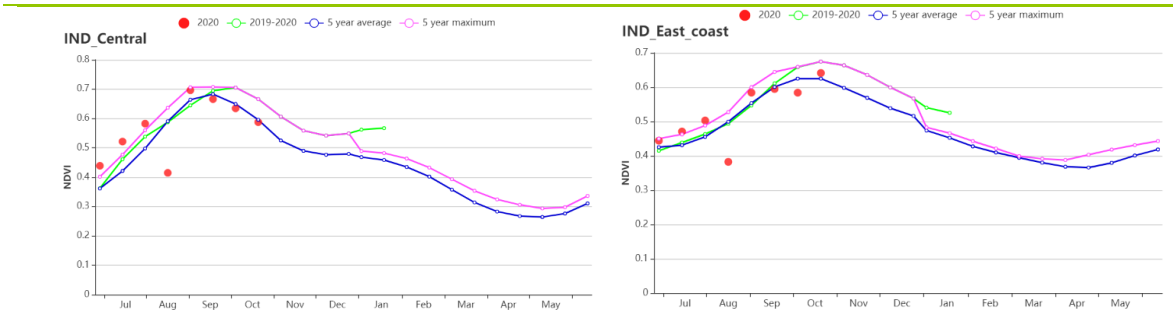
(e) NDVI profiles



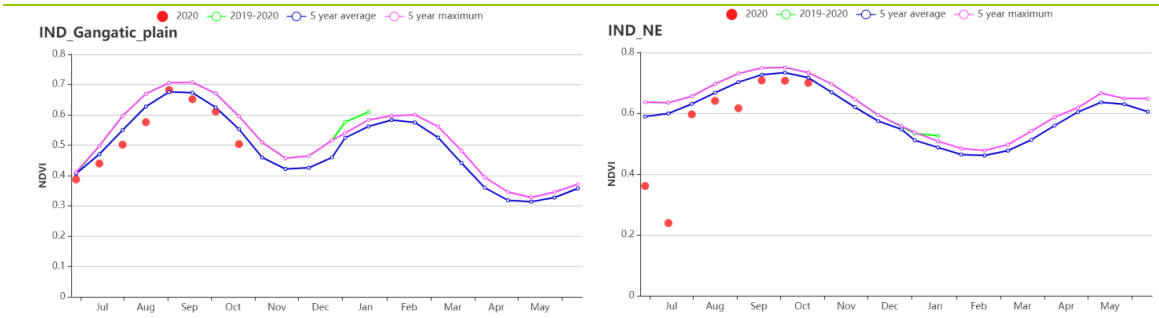
(f) Rainfall profiles



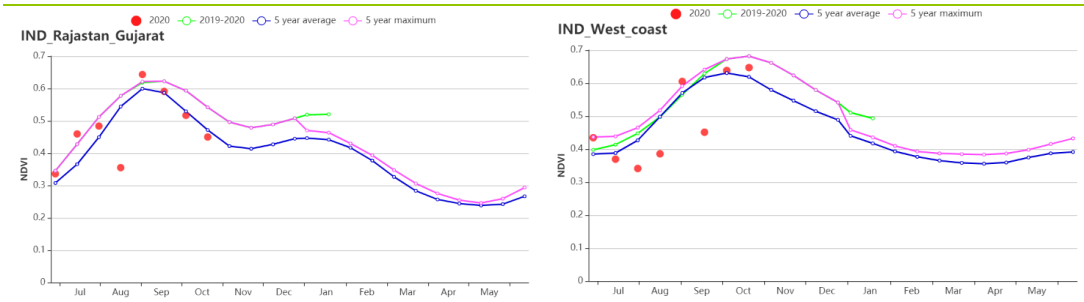
(g) Temperature profiles



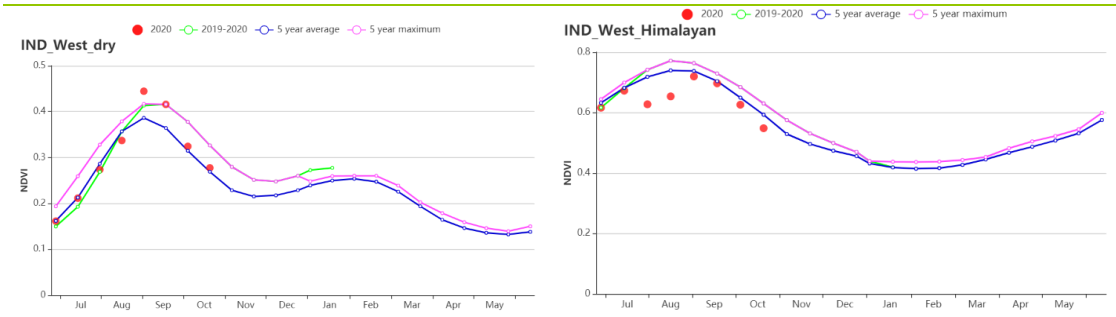
(h) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))



(i) Crop condition development graph based on NDVI (Gangetic Plains (left) and Assam and north-eastern regions (right))



(j) Crop condition development graph based on NDVI (Agriculture areas in Rajasthan and Gujarat (left) and Western Coastal Region (right))



(k) Crop condition development graph based on NDVI (North-western dry region (left) and Western Himalayan Region (right))

Table 3.32 India's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Deccan Plateau	1144	7	26.0	0.6	1079	3	662	
Eastern coastal region	1179	11	26.3	-0.1	1080	-2	710	
Gangetic plain	1048	-6	27.9	0.5	1148	2	667	

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Assam and north-eastern regions	2430	4	24.3	0.4	864	-9	538	
Agriculture areas in Rajasthan and Gujarat	1103	21	27.9	0.4	1077	0	648	
Western coastal region	1603	12	24.0	0.0	932	-4	608	
North-western dry region	512	54	31.1	0.3	1188	-2	604	
Western Himalayan region	436	-53	19.2	0.5	1280	7	431	

Table 3.33 India's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Croping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Deccan Plateau	99	1	126	6	0.99
Eastern coastal region	95	3	114	2	0.96
Gangatic plain	98	0	169	2	0.97
Assam and north-eastern regions	95	-1	137	-4	0.94
Agriculture areas in Rajasthan and Gujarat	97	4	130	3	0.97
Western coastal region	99	6	107	1	0.99
North-western dry region	56	44	129	3	0.9
Western Himalayan region	99	0	112	0	0.94

[IRN] Iran

The harvest of summer crops (potatoes and rice) was almost over by the end of August, while winter crops (wheat and barley) started to be sown in September. According to the NDVI-based crop condition development graph, the crop conditions in Iran during this whole monitoring period were better than the 5-year average. The cumulative rainfall was 13% below average. The average temperature was 0.7 ℃ below average, whereas the photosynthetically active radiation was down 4%. The potential biomass was 18% higher than the 15-year average. The national maximum vegetation condition index (VCIx) was 0.84, while the cropped arable land fraction (CALF) was 26% higher than the average of the past 5-years.

The NDVI spatial patterns show that from July to October, crop conditions in 44.3% of the cropped area were average or slightly above the 5-year average (marked in red). 16.7% of the cropped areas (marked in dark and light green) experienced above-average crop conditions until the end of the monitoring period, mainly located in the provinces of West and East Azarbaijan, Ardebil, Khuzestan, and Qazvin. 5.6% of the cultivated area experienced below-average crop conditions until the end of the monitoring period, mainly located in northern and southwestern parts of Iran, including the northern parts of the provinces of Gilan, Mazadaran, Golestan, and some parts of Khuzestan. The spatial pattern of maximum Vegetation Condition Index (VCIx) was in accord with the spatial distribution of the NDVI profiles.

When comparing the proportion of NDVI anomaly categories with their 5-year averages, all of the 16-day phases had less than 10% of the cropped areas with below-average crop conditions. As for the proportion of VHIn categories compared with 5-year average, the proportion of the cultivated areas with moderate to severe droughts increased to more than 20% for the last four phases.

In general, crop growth conditions were normal.

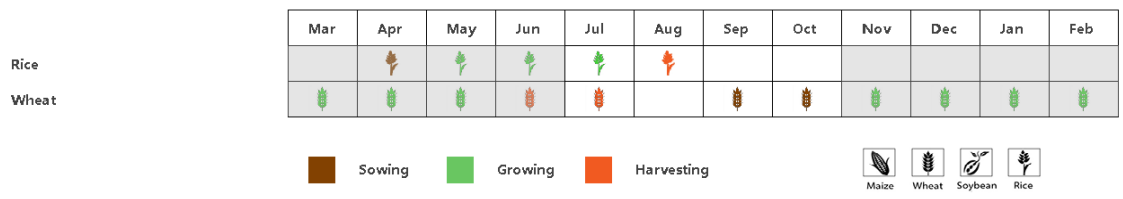
Regional Analysis

Based on farming system, climate, and topographic conditions, Iran can be subdivided into three regions, two of which are the main growing areas for crop production, namely the **semi-arid to the subtropical hilly region in the west and the north** and the **coastal lowland in the arid red sea plain area**.

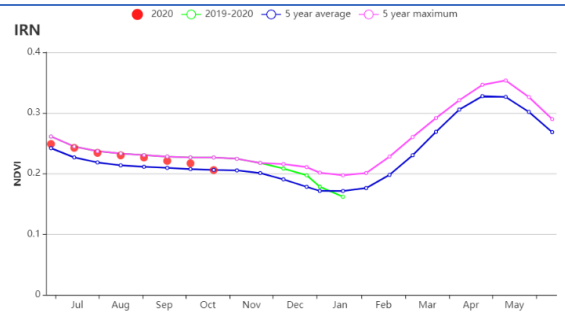
In the **Western and northern semi-arid subtropical hilly areas**, the cumulative precipitation during the monitoring period was 56 mm, 13% lower than average. Both temperature (-0.7 ℃) and photosynthetically active radiation (-5%) were below the 15YA. The potential biomass was 8% higher than average. Crop conditions were better than the 5-year average. The proportion of cultivated land was 14%, which was 22% higher than the 5YA. Cropping Intensity (CI) was slightly below the 5YA (-1%). The average VCIx for this region was 0.87, indicating a favorable crop prospect.

In the **Coastal lowland and plain areas of the arid Red Sea**, the temperature was 0.1℃ above average, while the accumulated precipitation was 48% below average and the photosynthetically active radiation was 2% below average. The potential biomass was 23% higher than the 15-year average. Crop conditions were generally better than the 5-year average. During the monitoring period, although CALF and CI was 60% and 2% higher than the average of the last 5-years, and the VCIx was 0.63, indicating below-average crop conditions.

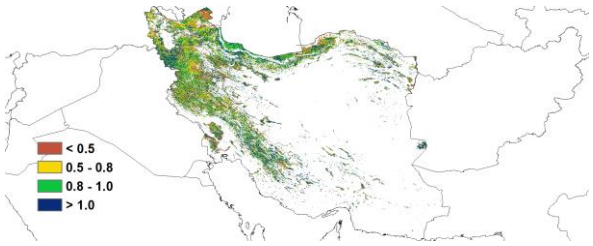
Figure 3.21 Iran's crop condition, July - October 2020



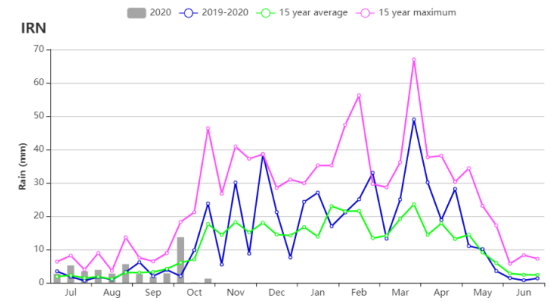
(a) Phenology of major crops



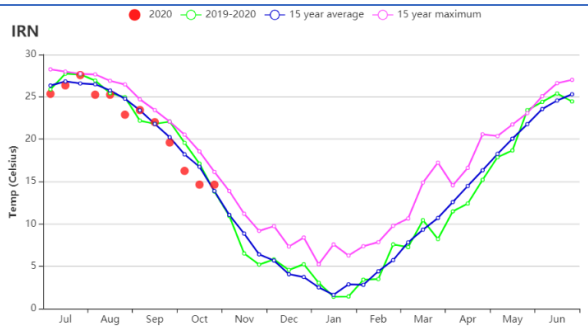
(b) Crop condition development graph based on NDVI



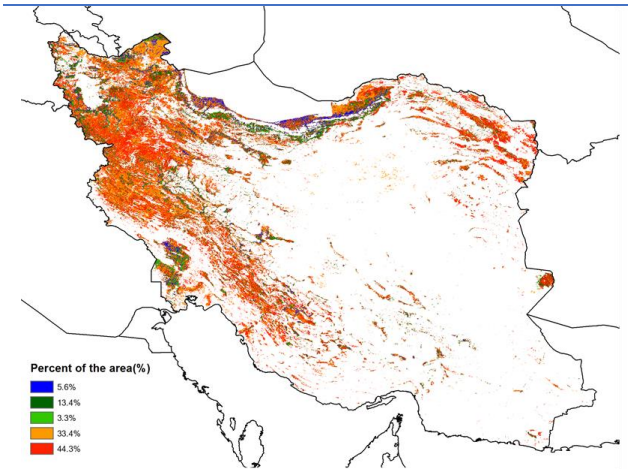
(c) Maximum VCI



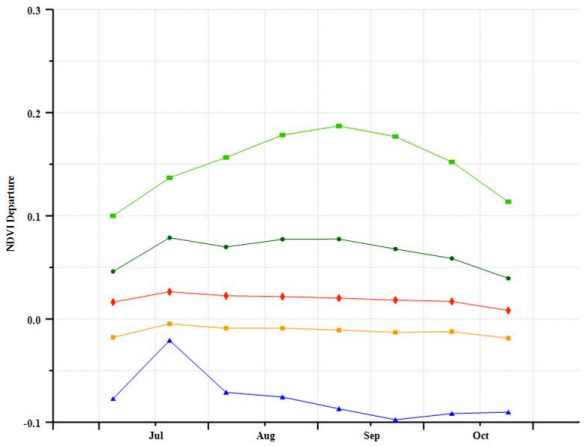
(d) Rainfall time series profile



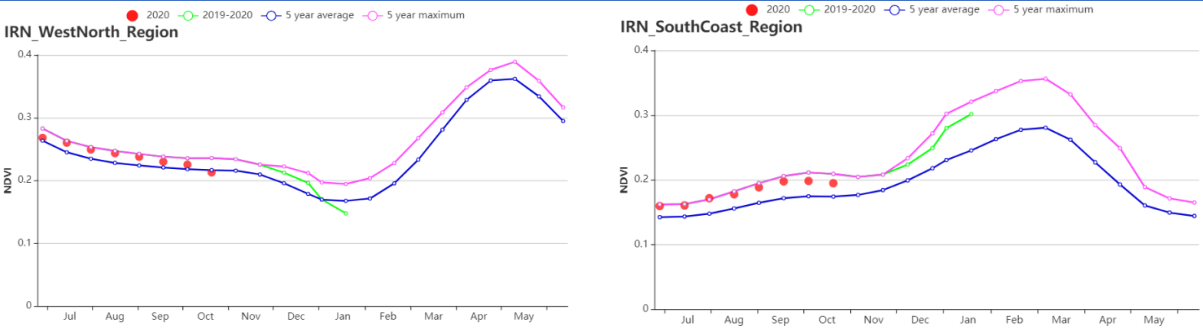
(e) Temperature time series profile



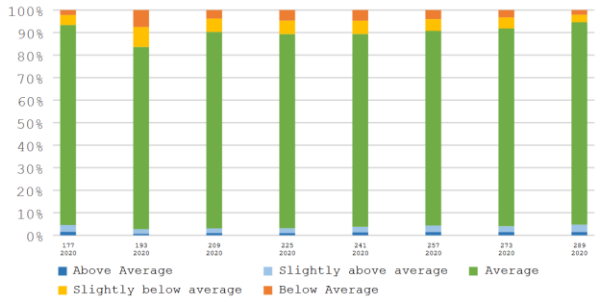
(f) Spatial NDVI patterns compared to 5YA



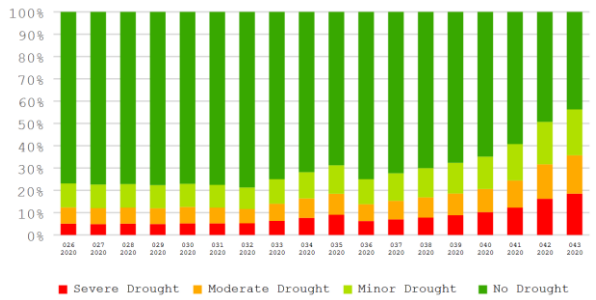
(g) NDVI profiles



(h) Crop condition development graph based on NDVI (Semi-arid to sub-tropical hills of the west and north region (left) and Arid Red Sea coastal low hills and plains region (right))



(i) Proportion of NDVI anomaly categories compared with 5YA



(j) Proportion of VHIm categories compared with 5YA

Table 3.34 Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Semi-arid to sub-tropical hills of the west and north	56	-13	20.3	-0.7	1347	-5	301	8
Arid Red Sea coastal low hills and plains	6	-48	33.0	0.1	1436	-2	161	23

Table 3.35 Iran's agronomic indicators by sub-national regions, current season's value and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Semi-arid to sub-tropical hills of the west and north	10	60	102	-1	0.63
Arid Red Sea coastal low hills and plains	14	22	107	2	0.87

[ITA] Italy

During this reporting period, winter wheat harvest was completed in July and the 2020-21 crop was sown in October.

Based on the agroclimatic and agronomic indicators, the crop conditions in Italy were generally close to the 5-year average during this reporting period. At the national level, total precipitation was significantly above average (RAIN, +14%), temperature was close to average and radiation below average (RADPAR, -1%). This resulted in a 2% reduction of potential biomass production(BIOMSS -2%).

CALF was 87%. Cropping Intensity was 109%. VCIx nationwide reached 0.86 and it varied greatly within the regions.

The NDVI departure clustering map and its development profiles reveal the noticeable changes of crop condition across regions and time. There are two main remarkable areas where the NDVI departure across the period was significant: the dark green areas have excellent crop conditions (14.4% of the cropland). They were mainly located in the Po Valley. The red and blue color regions (42.8%), stretching from the north to the south along the center of the peninsula, represent poor crop conditions. On about 26.3% of the cropland, located in northern Italy, NDVI was above average from July to late September, and close to average thereafter.

Overall, Crop production is expected to be near average.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, four sub-national regions can be distinguished for Italy. These four regions are East coast, Po Valley, Islands and Western Italy.

On **the East coast**, RAIN and RADPAR were below average (RAIN -19%, RADPAR -1%), TEMP was above average (TEMP +0.1°C), resulting in an increase of biomass (BIOMSS +4%) compared to the 15YA.VCIx was 0.75 and low CALF (64%) indicated low crop cultivation. Cropping Intensity was 102%. According to the NDVI development graph, crop conditions were close to the 5YA average from July to August but below average in September and October. Crop production is expected to be near average.

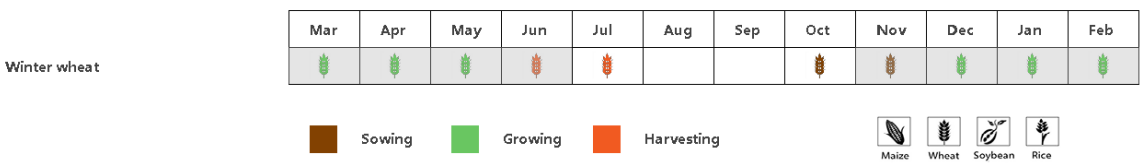
Crop production in the **Po Valley** was mainly affected by high rainfall (RAIN +26%). TEMP and RADPAR were the same as the 15YA average, which resulted in a slight BIOMSS increase (+3%). The area has a high CALF (100%) and the VCIx was 0.94 for this region. Cropping Intensity was 102%. The output for wheat is expected to be near average.

For the **Islands**, less rainfall (RAIN -17%) was observed. RADPAR was lower (-2%) and TEMP remained the same as the 15YA. Biomass was estimated at below-average level (BIOMSS -6%). NDVI was close to average during this reporting period except in mid-September. The VCIx was 0.74 and CALF reached 62%. Cropping Intensity was 101%. Hence, the output for wheat is expected to be close to average.

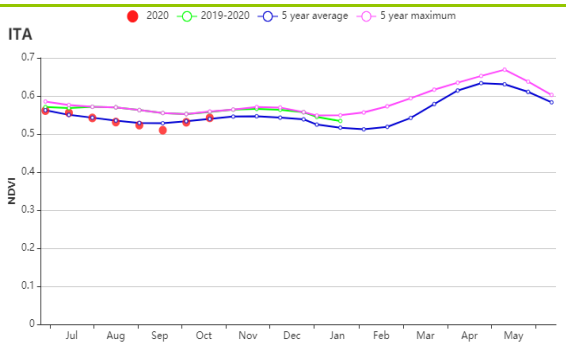
The situation in **Western Italy** is as follows: higher rainfall (RAIN +5%), normal temperatures (no departure from the 15YA) and lower radiation (RADPAR -2%). Accordingly, biomass was below average (BIOMSS -5%). The NDVI curve followed the average trend in July and October, and was below average in August and September. The VCIx was 0.88 and CALF reached 0.95. Cropping Intensity was 121%. The area has a high CALF (95%) and VCIx was 0.88. Crop conditions were normal.

Summer crops production can be expected to be near average and the prospects for the winter wheat also follow the long-term average.

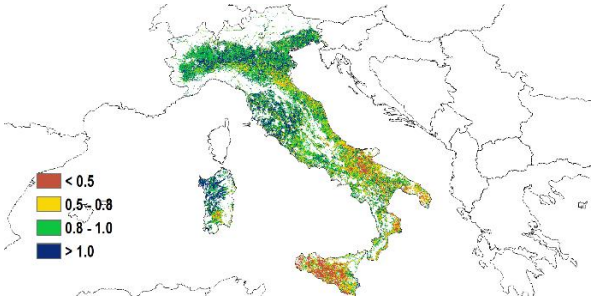
Figure 3.22 Italy's crop condition, July-October2020



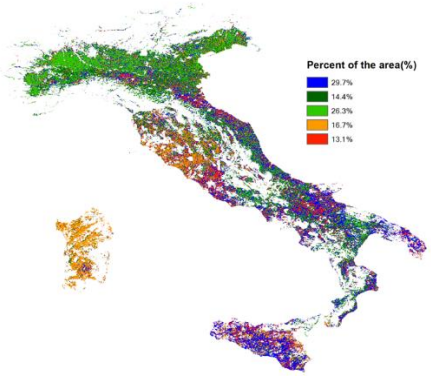
(a). Phenology of major crops



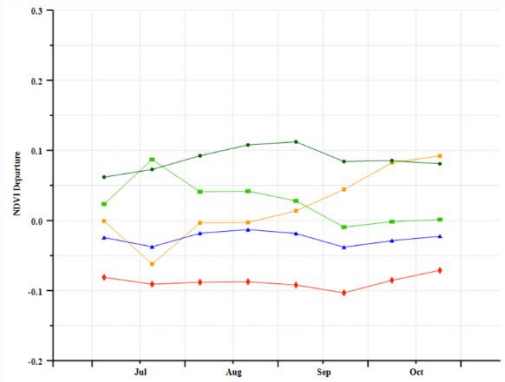
(b) Crop condition development graph based on NDVI



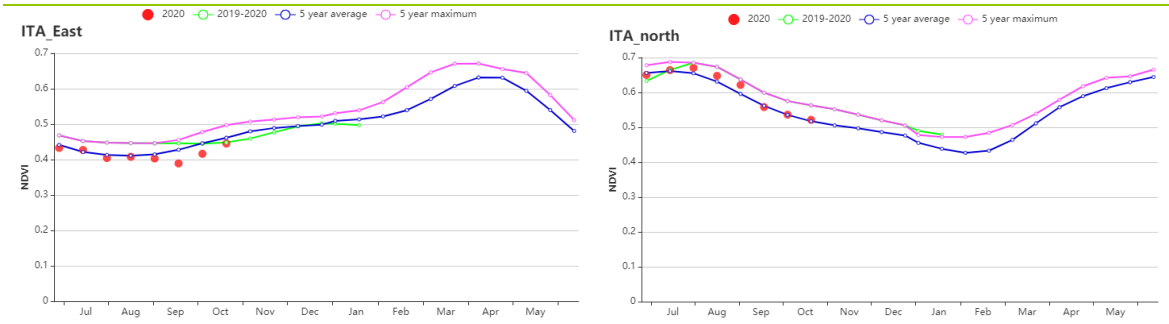
(c) Maximum VCI



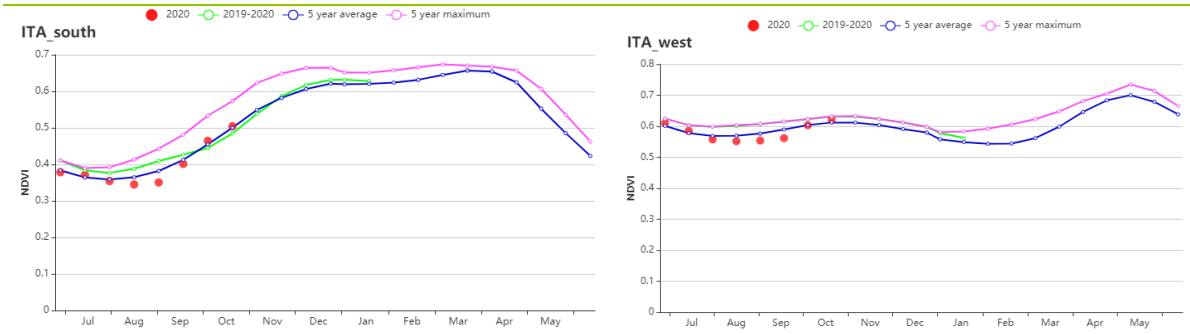
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (East coast Region (left) and Po Valley Region (right))



(g) Crop condition development graph based on NDVI (Islands Region (left) and Western Italy Ragion (right))

Table 3.36 Italy's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
East Coast	199	-19	20	0.1	1149	-1	633	4
Po Valley	604	26	17	0.0	1070	0	507	3
Islands	131	-17	22	0.0	1262	-2	550	-6
Western Italy	298	5	19	0.0	1143	-2	549	-5

Table 3.37 Italy's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current (%)
East Coast	64	-4	102	-4	0.75
Po Valley	100	0	102	-2	0.94
Islands	62	-3	101	-2	0.74
Western Italy	95	0	121	1	0.88

[KAZ] Kazakhstan

This report covers the growth and harvest of spring wheat In Kazakhstan. In October, winter rye and winter wheat, which are minor crops, were planted in the southern regions of the country. The crop conditions were generally below or close to average from July to October.

Compared to the 15-year average, accumulated rainfall was above average (RAIN +23%), while radiation and temperature were below average (RADPAR -4%, TEMP -0.7°C). Precipitation reached 10 mm above the 15-year average in early and late July, and mid-August. The temperature fluctuated along the average level during this reporting period. The agro-climatic conditions resulted in a normal level for the potential biomass (BIOMSS).

The national average maximum VCI index was 0.72. The Cropped Arable Land Fraction (CALF) was down by 7% over the recent five-year average, and the Cropping intensity (CI) was close to average. The spatial VCIx map matched well with the national crop condition development graphs in July. Crop conditions on about 21.5% of croplands were above average during the reporting period, mainly in southeastern areas of Akmola State and northeastern areas of Shyghys Kazakstan State. About 66.9% of croplands, which were distributed across the southern region, and most of Soltustik Kazakstan, Pavlodar, and Batysdy Kazakstan States, experienced poor crop conditions during the whole monitoring period except for mid-July. Remaining croplands (about 11.6%) experienced unfavorable crop conditions from July to mid-August, and then recovered to above average till end of October, mainly in the northern parts of Kostanay Sate.

Overall, due to below-average CALF and crop conditions, spring wheat production is estimated to be below average.

Regional analysis

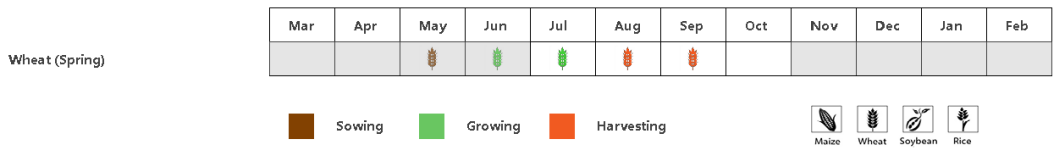
Based on cropping systems, climatic zones and topographic conditions, four sub-national agro-ecological regions can be distinguished for Kazakhstan, among which three are relevant for crop cultivation: the Northern region (112), the Eastern plateau and southeastern region (111) and the South region (110).

The **Northern region** is the main spring wheat production area. Accumulated rainfall was above average (RAIN +20%), but RADPAR and temperature were below average. According to NDVI profiles, crop conditions were below average from July to September. The average VCIx for this region was 0.71, and the proportion of cultivated land was 8% lower than the average. Production is estimated to be below average.

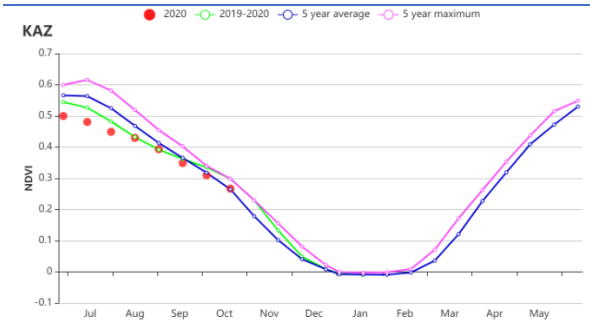
Crop conditions in the **Eastern plateau and Southeastern region** were mostly below average from July to August, and close to average from September to October. The accumulated rainfall in the region was above average (+31%), while radiation and temperature were below average (RADPAR -6%, TEMP -1.5°C). The average VCIx for this region was 0.76, and CALF was below average by 6%. Production of spring wheat is unfavorable.

The South region received 40 mm of rainfall only, which was far below average (down 24%). The average VCIx for this region was 0.77. CALF was above average by 4%. NDVI profiles show the poor crop condition from July to October.

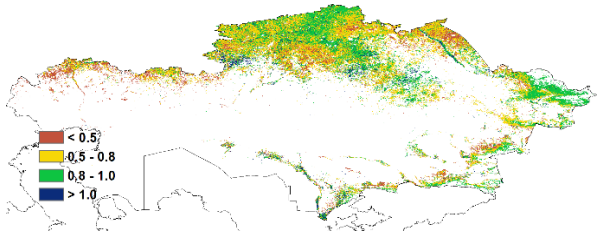
Figure 3.23 Kazakhstan's crop condition, July-October 2020



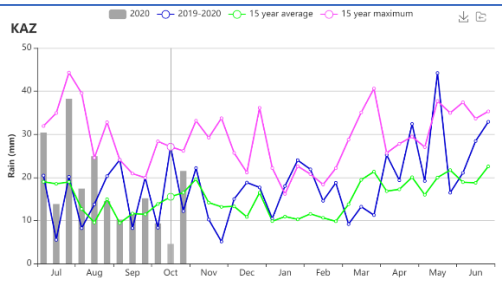
(a). Phenology of major crops



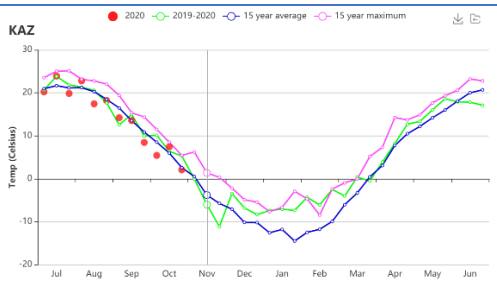
(b) Crop condition development graph based on NDVI



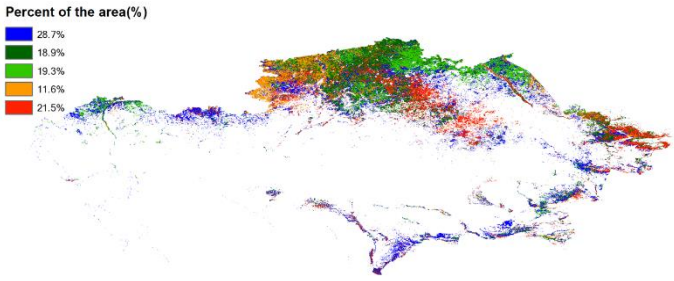
(c) Maximum VCI



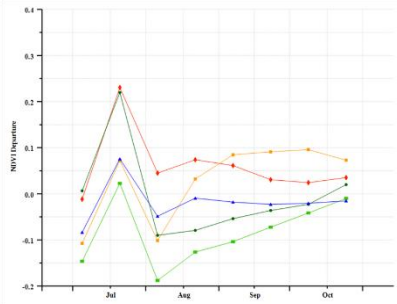
(d) Rainfall Index



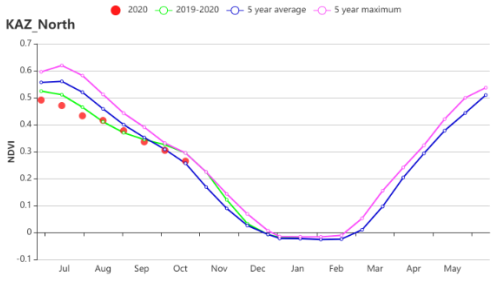
(e) Temperature Index



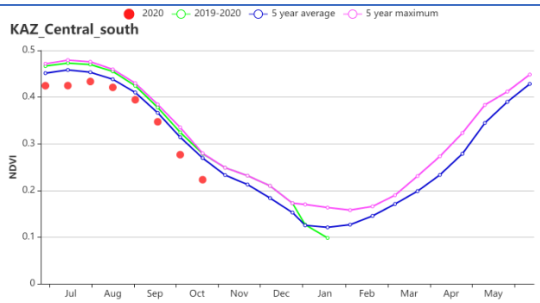
(f) Spatial NDVI patterns compared to 5YA



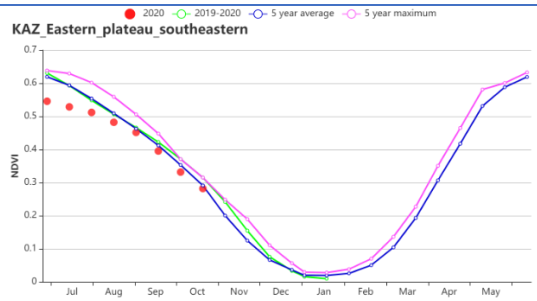
(g) NDVI profiles



(h) Crop condition development graph based on NDVI (Northern zone)



(i) Crop condition development graph based on NDVI (South zone)



(j) Crop condition development graph based on NDVI (Eastern plateau and southeastern zone)

Table 3.38 Kazakhstan agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Northern region	197	20	14.3	-0.3	900	-3	419	0
Eastern plateau and southeastern region	284	31	13.5	-1.5	1084	-6	425	-1
South region	40	-24	20.6	-1.1	1203	-4	523	15

Table 3.39 Kazakhstan, agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Maximum VCI	Cropping Intensity	
	Current (%)	Departure (%)	Current	Current	Departure (%)
Northern region	77	-8	0.71	100	0
Eastern plateau and southeastern region	78	-6	0.76	100	-1
South region	58	4	0.77	100	0

[KEN] Kenya

Kenya experiences two rainy seasons: The long rains last from March to May and the short rains from October to December. Maize can be grown during the long and short rains, whereas wheat is grown during the long rains only. During this reporting period, the long rain maize and wheat were harvested and the short rain maize was planted and started to grow.

At the national scale, precipitation was 21% above average. Above average rainfall was mainly concentrated in the Highland agriculture zone, Northern rangelands and South-west region, thus continuing the trend of the previous monitoring period. Excessive rainfall did not affect temperature and sunshine, both of which were close to the 15YA (TEMP -0.2℃, RADPAR unchanged) and BIOMSS was on average. The NDVI development graph at the national level stayed slightly above average during the entire monitoring period. According to the NDVI clusters and the map of NDVI profiles, 87.6% of the farmlands experienced favorable crop conditions from July to October, except for the central Machakos and southern Kwale. This was in agreement with the maximum VCI graph which showed VCIx in most zones between 0.8-1.0, except for some areas in the central and southern regions. Its national average reached 0.88 and the cropped arable land fraction increased by 11% compared to the 5YA. The national crop condition is assessed as generally favorable. Early growth of short rain maize will benefit from the abundant rainfall recorded in October.

Regional analysis

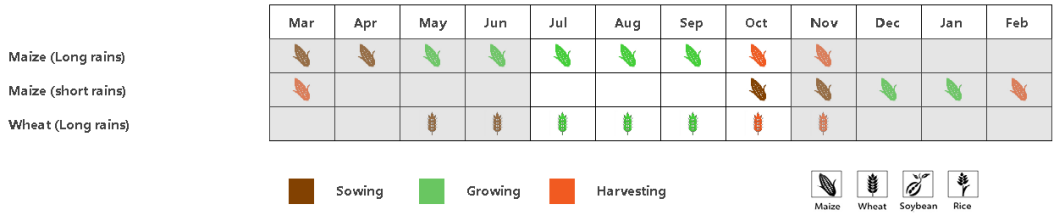
The Eastern coastal region is the only place where rainfall was significantly lower than the 15YA (-41%). Temperatures were slight warmer (+0.4℃) and adequate sunshine (+3%) resulted in an increased estimate for biomass (+3%). The NDVI values stayed below the 5YA with slight fluctuations throughout the reporting period. VCIx reached 0.81 with CALF up 4%. Cropping intensity is 142% close to average. Crop conditions were normal for both livestock and crops in the coastal areas. The crop production will stay at the same level as in previous years.

The Highland agriculture zone recorded 435 mm of rain, above average by 25%. Temperature (TEMP -0.1°C), sunshine (RADPAR -1%) and biomass (BIOMSS -1%) stayed close to average. The NDVI profile was slightly above average during the whole reporting period. The maximum VCIx value was recorded at 0.89. In this area, cropped arable land fraction increased significantly by 16% compared to the 5YA. Cropping intensity was 22% below the average. In general, the crop conditions were favorable.

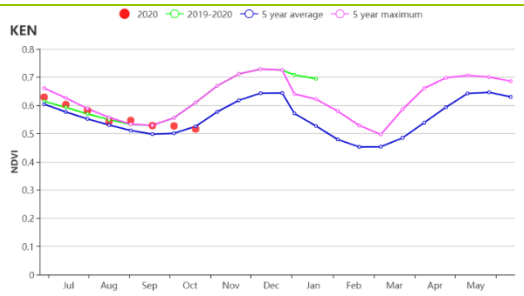
Agroclimatic indicators in **the Northern region** with sparse vegetation were similar to those in the Highland agriculture zone. Precipitation was above average (RAIN +33%). Temperature (TEMP unchanged), sunshine (RADPAR -2%) and BIOMSS (+2%) were close to the 15YA. The NDVI development curve stayed above the 5YA during the entire monitoring period. The maximum VCI was high at 0.90 with a comparative increase in CALF (+19%). Cropping intensity was 154% close to average. Overall, the CropWatch indicators point at favorable conditions.

South-west of Kenya includes the districts Narok, Kajiado, Kisumu, Nakuru, and Embu which are major producers of long rain wheat and maize. The total amount of rainfall recorded during the reporting period reached 646 mm (30% above average). Temperatures were slightly cooler (TEMP -0.9 ℃) and solar radiation (RADPAR +1%) was near average. Estimated biomass (BIOMSS -4%) was slightly lower. NDVI trended above average throughout the entire monitoring period. Cropping intensity was 11% above the average. CALF was almost unchanged and VCIx was at 0.87. All in all, crop conditions were favorable and slightly above average yields for long rain wheat and maize are estimated.

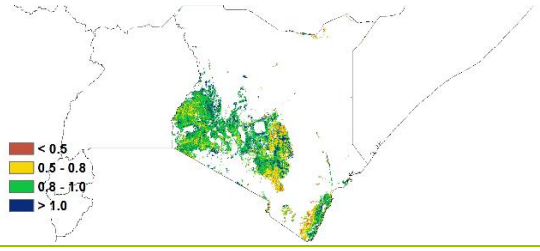
Figure 3.24 Kenya's crop condition, July-October 2020



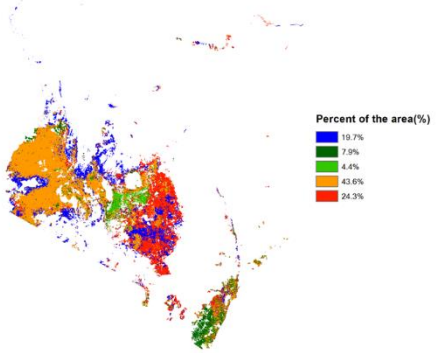
(a) Phenology of major crops



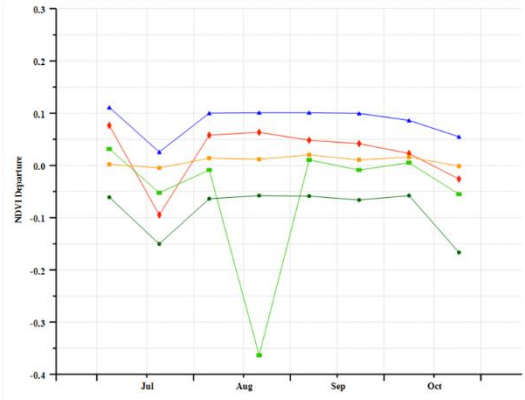
(b) Crop condition development graph based on NDVI



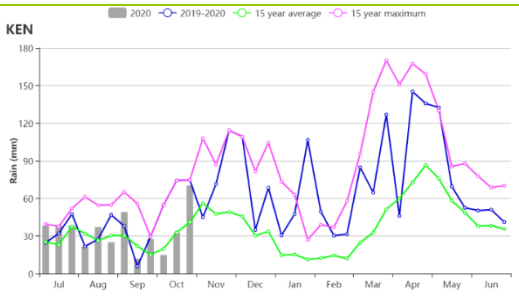
(c) Maximum VCI



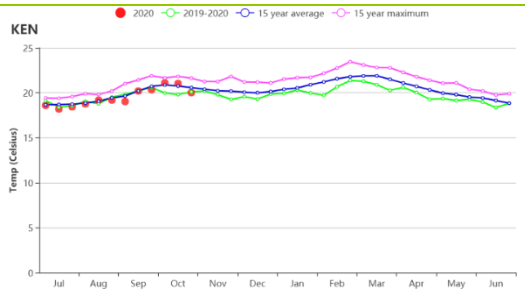
(d) Spatial NDVI patterns compared to 5YA



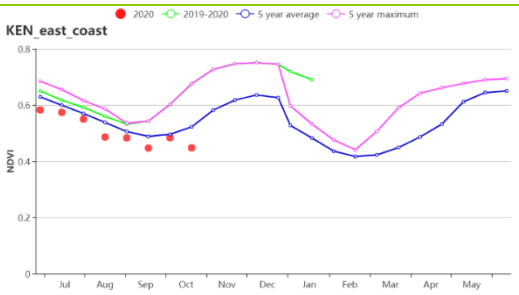
(e) NDVI profiles

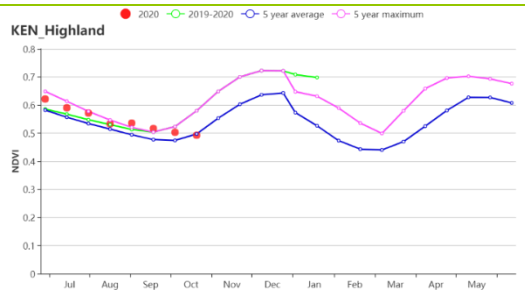


(f) Time series rainfall

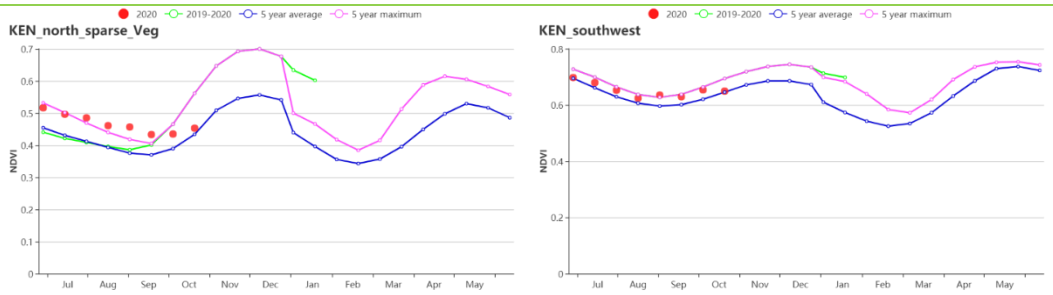


(g) Time series temperature





(h) Crop condition development graph based on NDVI, The eastern coastal region(left), The Highland agriculture zone(right)



(I)Crop condition development graph based on NDVI, the northern region with sparse vegetation(left), South-west(right)

Table 3.40 Kenya's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July -October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
Central region	152	-41	24.8	0.4	1234	3	797	
Highland agriculture zone	435	25	18.3	-0.1	1122	-1	530	
Northern rangelands	335	33	22.7	0.0	1209	-2	710	
South-west	646	30	18.5	-0.9	1215	1	591	

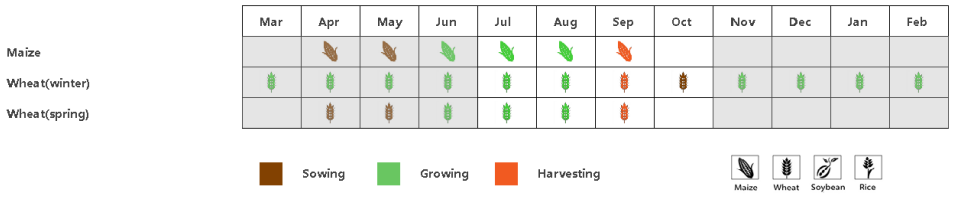
Table 3.41 Kenya's agronomic indicators by sub-national regions, current season's values and departure, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central region	97	4	142	-2	0.81
Highland agriculture zone	89	16	113	-22	0.89
Northern rangelands	73	19	154	3	0.90
South-west	100	1	165	11	0.87

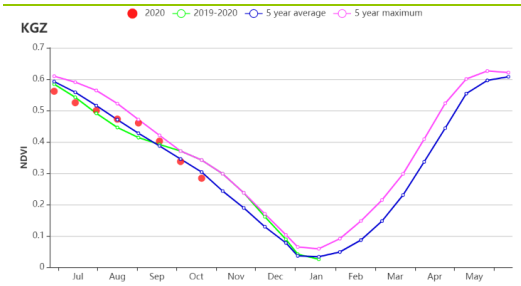
[KGZ] Kyrgyzstan

The reporting period covers the growth and harvest of wheat and maize. Among the CropWatch agro-climatic indicators, RAIN (+55%) increased largely and RADPAR (-7%) was below average, while TEMP (-1.6℃) was below average. The combination of these factors resulted in above average BIOMSS (+4%, compared to the 15YA). The time series precipitation profile shows that precipitation was higher than average and even exceeded the 15-year maximum in July. The temperature profile indicates that temperatures were a bit lower than the 15-year average during the reporting period, which was favorable for pastures. NDVI was a bit lower than the 5-year average in July and increased to above average, even close to the 5-year maximum in August and September, then decreased to average in October. The spatial NDVI clustering profile shows that in the northern region, the large area marked with green and blue color experienced a decrease in July, and an increase in August to September then a decrease in October. In the eastern region, the area marked with yellow and red showed similar pattern but higher values. This situation is largely confirmed by the VCIx map which shows high values (>0.8) in the central region of Ming-Kush, Ozgon, while low values were observed in the northern Bishkek and eastern Karakel region. CALF decreased less than 1% and the nationwide VCIx average was 0.84, which is in line with the favorable NDVI trend. Crop intensity is 100%. Crop conditions in Kyrgyzstan can be assessed as favorable. Good wheat and maize yields can be expected.

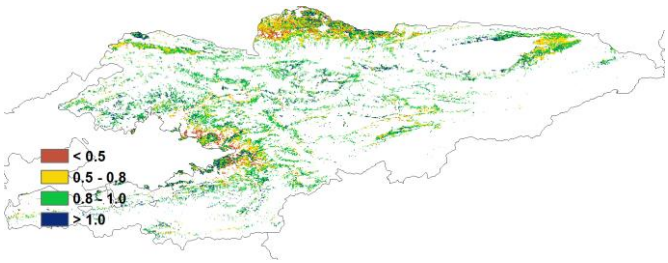
Figure 3.25 Kyrgyzstan's crop condition, July - October 2020



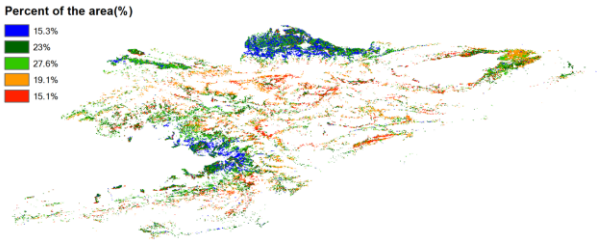
(a). Phenology of major crops



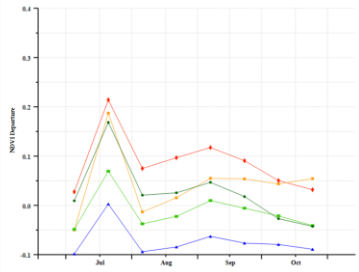
(b) Crop condition development graph based on NDVI



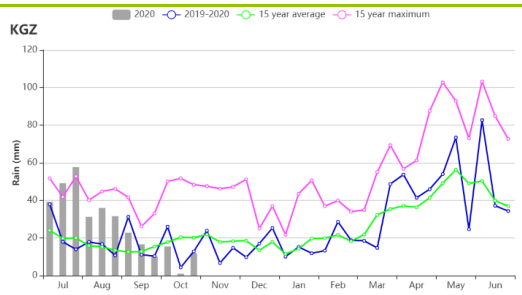
(c) Maximum VCI



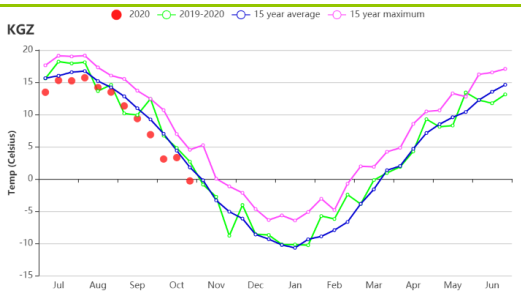
(d) Spatial NDVI patterns compared to 5YA



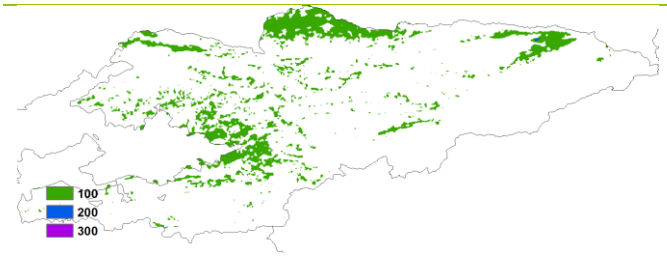
(e) NDVI profiles



(f) Rainfall profiles



(g) Temperature profiles



(h) Crop intensity

Table 3.42 Kyrgyzstan's agroclimatic indicators, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Kyrgyzstan	322	55	10.1	-1.6	1209	-7	383	

Table 3.43 Kyrgyzstan's agronomic indicators, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Kyrgyzstan	89	0	100	0	0.84

[KHM] Cambodia

This reporting period covers the monsoon season in Cambodia. The sowing period of early rice (wet season) and floating rice started before July, followed by the medium rice and late rice, which started in July and August respectively. The harvesting period of soybean started in July, followed by the wet season maize and early rice (wet season), which started in August and September respectively.

Cambodia generally experienced normal weather conditions, which were close to the respective averages of the previous 15 years. The precipitation (RAIN) was 2% below average, while the temperature (TEMP) rose by 0.2℃ and the radiation (RADPAR) increased by 1%, which resulted in a slightly increased estimate of biomass (BIOMSS, +1%). At the same time, the cropped arable land fraction (CALF, +1%) for the country was 98% and the maximum VCI value was at 0.93.

According to the NDVI profile for the country, the NDVI value was close to the average before August and near the 15-year maximum in early September. During this period, the deficit in precipitation had a small influence on the crop conditions. In late October, the NDVI dropped to below average as a result of excessive rainfall in that month. A large negative anomaly of NDVI was recorded in early October, which was presumably due to cloud cover in the satellite images.

Considering the spatial patterns of NDVI profiles, about 10.9% of crop land, mainly located in the lower Mekong River, experienced an above-average NDVI during the monitoring period. This high NDVI value shows that the crops benefitted from irrigation from the Mekong river. On the contrast, over 16% of the crop land had lower NDVI values than average, which was mainly located around the Tonle Sap Lake. The low NDVI values may have been caused by lower-than-average water levels of Tonle Sap due to water supply deficits from the Mekong River. Around 73% of the crop land had a stable NDVI, which is close to the average. All in all, the prospective production of maize and early rice is close to or slightly higher than average.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, four sub-national regions are described below: The **Tonle Sap lake area** where the seasonally inundated freshwater lake and especially temperature are influenced by the lake itself, **the Mekong valley between Tonle Sap and Vietnam border**, **Northern plain and northeast**, and **the Southwestern Hilly region** along the Gulf of Thailand coast.

In the **Tonle Sap lake area**, NDVI was close to or higher than average before the middle of September, while it dropped to below average subsequently. Compared to average, the rainfall (RAIN, +8%) and temperature (TEMP, +0.2℃) were higher. However, the radiation (RADPAR, -2%) and biomass (BIOMASS, -2%) for the region were below average. The fraction of cropped arable land (CALF, +1%) was above 5YA. Moreover, this region is cultivated with a mixture of single and double cropping system, and cropping intensity was below 5-year average (CI, -2%).

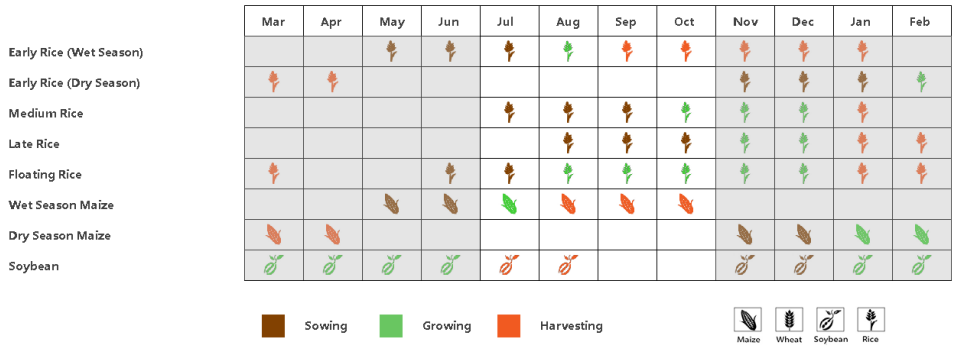
The **Mekong valley between Tonle Sap and Vietnam border**, the main rice growing area of Cambodia, recorded a slight increase of precipitation (RAIN, +4%) and a rise of temperature (TEMP, +0.3℃). Both the radiation (RADPAR) and the biomass (BIOMSS) were near average. At the same time, this region is cultivated with a mixture of single and double cropping system, and cropping intensity was lower than 5-year average (CI, -1%). However, the NDVI profile for the region shows that the NDVI was higher than average before October and then dropped to below average. As a result, the soybean and wet season maize harvested there seems to have a good production.

The **Northern plain and northeast** had a deficit of rainfall (RAIN, -12%) accompanied by above-average radiation (RADPAR, +3%) and biomass (BIOMSS, +4%). The temperature (TEMP) was at average. Moreover, this region is cultivated with a mixture of single and double cropping system, and cropping intensity was below 5-year average (CI, -11%). The regional NDVI was slightly higher than average in middle August. Otherwise, it was below average, which indicates that the crop conditions for the region were unfavorable.

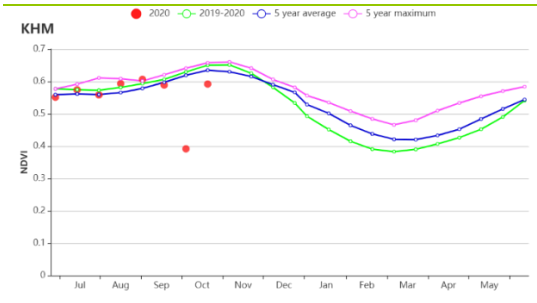
The **Southwest Hilly region** experienced an increase of rainfall (RAIN, +8%) and a rise of temperature (TEMP, +0.4℃), while the radiation (RADPAR) and biomass (BIOMSS) were near average. At the same time, the cropped

arable land remained very close to average (CALF, -0%) and the maximum VCI value was at 0.92. This region is cultivated with a mixture of single and double cropping system, and cropping intensity was below 5-year average (CI, -22%). However, the NDVI for the region was higher than average before September. It subsequently dropped to below average, which means that the crop conditions for this region were unfavorable at the end of this monitoring period.

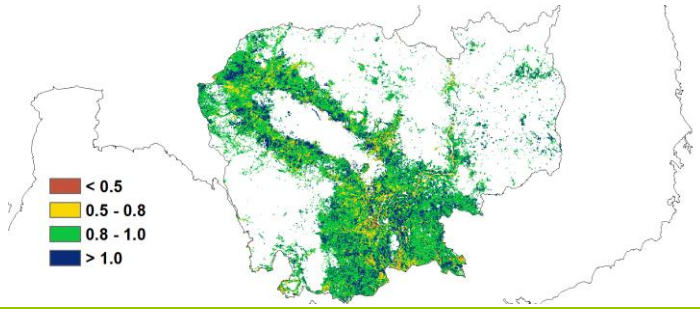
Figure 3.26 Cambodia's crop condition, July - October 2020



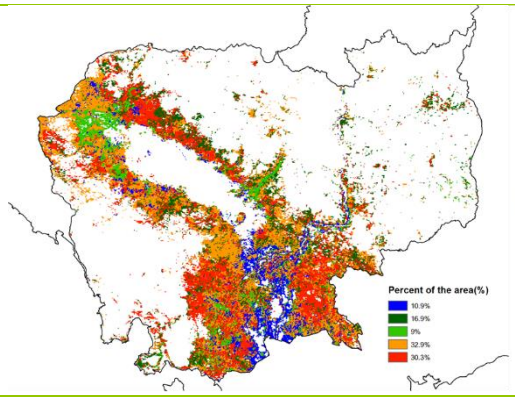
(a). Phenology of major crops



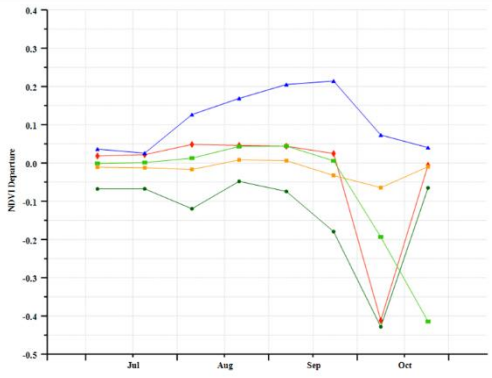
(b) Crop condition development graph based on NDVI



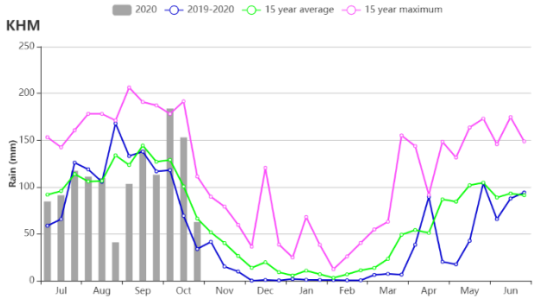
(c) Maximum VCI



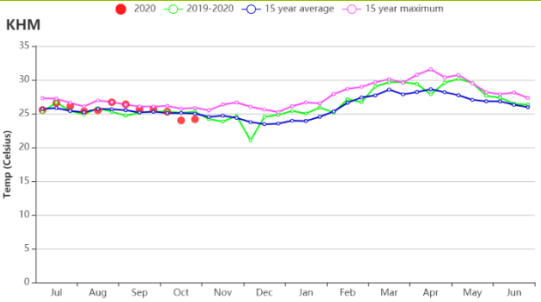
(d) Spatial NDVI patterns compared to 5YA



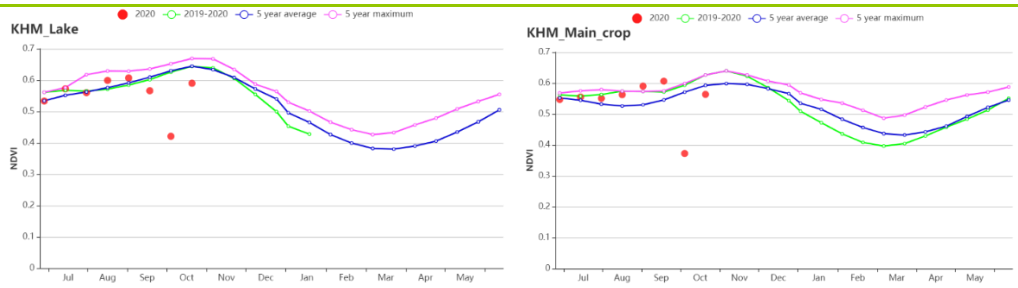
(e) NDVI profiles



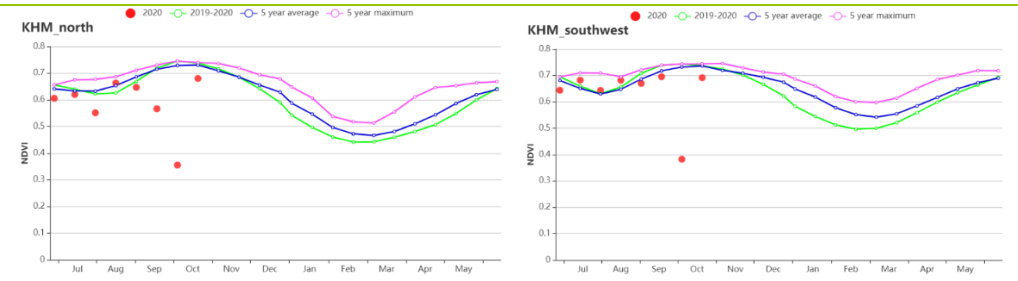
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (central_Sparse_Veg Region (left) and Mixed_Farming_Graze Region (right))



(i) Crop condition development graph based on NDVI (Mixed_Dry_Irrigated Region (left) and Dry (right))

Table 3.44 Cambodia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Tonle Sap lake area	1201	8	25.8	0.2	1079	-2	727	-2
Mekong valley	1244	4	26.1	0.3	1104	0	749	0
Northern plain and northeast	1399	-12	25.3	0.1	1085	3	726	4
Southwest Hilly region	1344	8	24.7	0.4	1079	0	735	0

Table 3.45 Cambodia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Tonle Sap lake area	99	1	112	-2	0.93
Mekong valley	96	2	121	-1	0.93
Northern plain and northeast	99	0	104	-11	0.94
Southwest Hilly region	99	0	103	-22	0.92

[LKA] Sri Lank

This report covers the second season (Yala) growing and harvesting of rice and maize from July to September, as well as the main season (Maha) sowing for crops in October. According to the CropWatch monitoring results, crop conditions were near average for the period from July to October.

Similar to the last monitoring period, this period was dominated by the south-western monsoon, which is active between May and September. At the national level, temperature experienced a slight increase (TEMP +0.2℃), while precipitation and radiation decreased as compared to the 15YA (RAIN -23%, RADPAR -3%). The decrease in rainfall mainly happened between August to October, which are harvesting and sowing periods. The fraction of cropped arable land (CALF) remained nearly comparable to the 5YA, while cropping intensity increased by 22% than the 5YA. BIOMSS was 3% down comparable to the 15YA. As shown on the NDVI development graph, NDVI values were near average from July to August and slightly below-average from September to October. The below-average NDVI values in September and October can be seen as a result from the significantly reduced precipitation. Nevertheless, the normal NDVI values in growing season indicated good condition for biomass accumulation and favorable prospect of crop production. The maximum VCI for the whole country was 0.95.

As shown by the NDVI clusters map and profiles, the trends were quite different across the island. More than half of the country's cropland showed below-zero NDVI departure values during the whole period. 10% of cropland showed a large decline of NDVI values in early August, as well as the 6.5% of cropland in early August and late September, which may have been outliers due to cloud cover. These croplands with negative NDVI departure values were mainly distributed in the north and southwest part of the country, including south of North Western Province, North Central Province, Western Province and Southern Province. Almost half of the cropland, i.e., 44.3%, showed above-zero NDVI departure values before mid-October. These croplands were distributed in North Western Province, Eastern Province and Uva Province.

Regional analysis

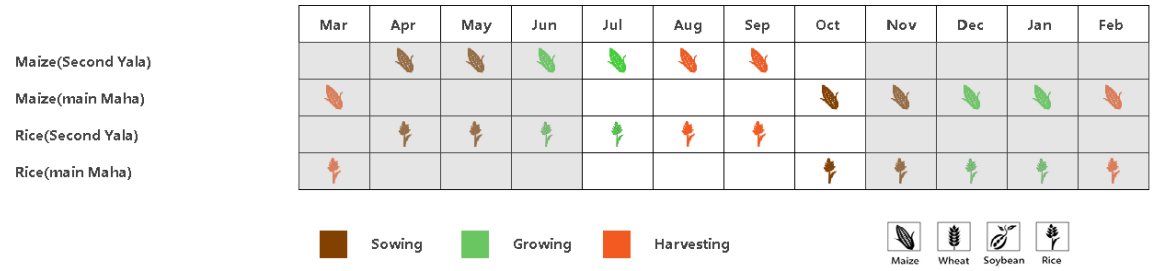
Based on the cropping system, climatic zones and topographic conditions, three sub-national agroecological regions can be distinguished for Sri Lanka. They are the Dry zone, the Wet zone, and the Intermediate zone.

In the Dry zone, the recorded RAIN (361 mm) was 41% below average and amounted to more than 3 mm per day, which was close to the water demand of the growth of maize in this region. TEMP was 0.2°C above average, RADPAR was down by 4% and BIOMSS also decreased by 5% as compared to the 15YA. CALF was near the 5YA level and 97% of cropland was utilized. NDVI followed a similar trend as the whole county. The VCIx for the zone was 0.93. Overall, crop conditions were below average for this zone.

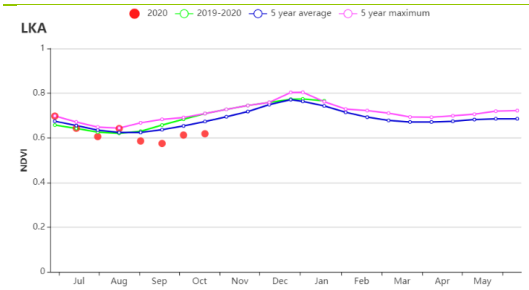
The Wet zone received the highest precipitation among three sub-national regions. RAIN (1836 mm) was down by 13% as compared to the 15YA. TEMP and RADPAR were near average. BIOMSS was comparable to the 15YA and cropland was fully utilized as usual. NDVI values were below average almost for the whole period, especially in from July to September. The VCIx value for the zone was 0.98. Crop conditions were also below average for this zone.

The Intermediate zone also experienced deficient rain (RAIN 840 mm), 25% below the 15YA. This is 7 mm per day and is supposed to be sufficient for rice and maize. TEMP was average and RADPAR down by 2% compared to the 15YA. With full use of cropland, BIOMSS was 3% below average. Similar to the last report, the NDVI values fluctuated around the average and the VCIx value for this zone was 1. Conditions of crops were assessed as near average.

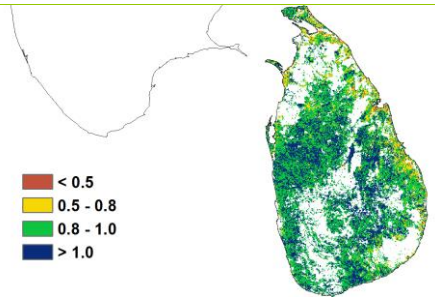
Figure 3.27 Sri Lanka's crop condition, July - October 2020



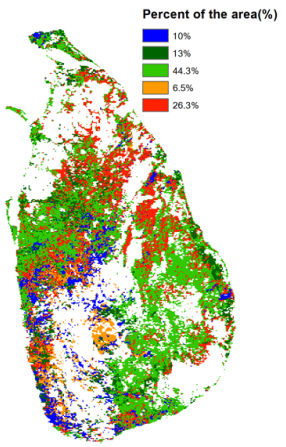
(a). Phenology of major crops



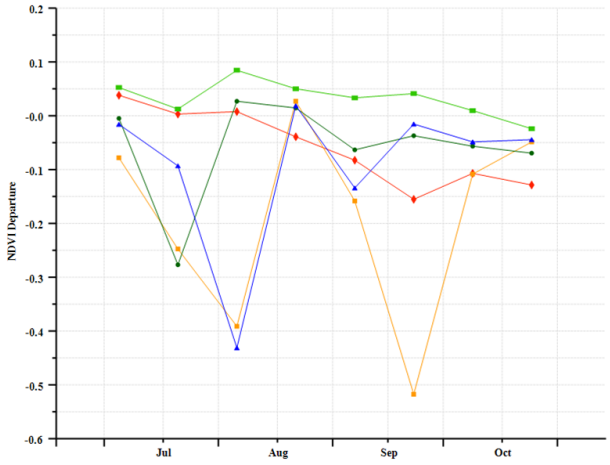
(b) Crop condition development graph based on NDVI



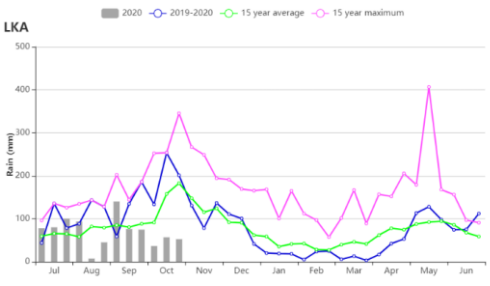
(c) Maximum VCI



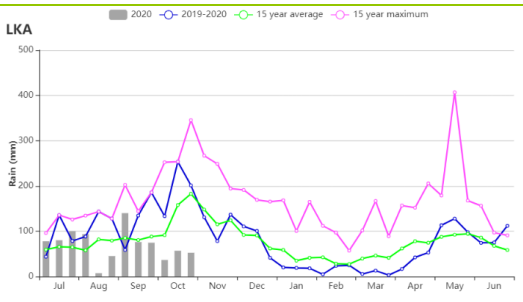
(d) Spatial NDVI patterns compared to 5YA



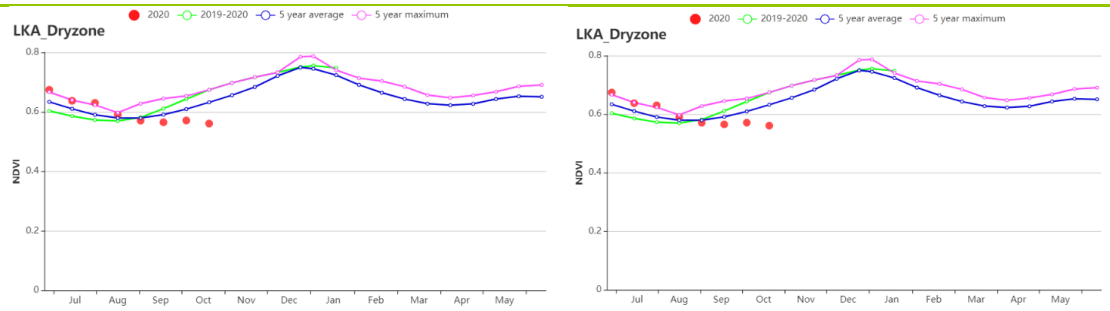
(e) NDVI profiles



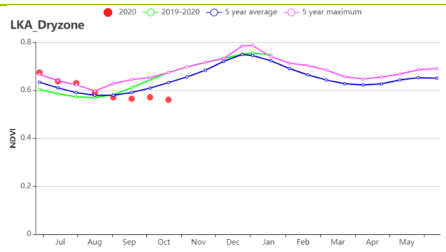
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Dry zone (left) and Wet zone (right))



(i) Crop condition development graph based on NDVI (Intermediate zone)

Table 3.46 Sri Lank's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Dry zone	361	-41	27.5	0.2	1201	-4	780	-5
Wet zone	1836	-13	24.3	0.1	1168	1	780	0
Intermediate zone	840	-25	24.8	0.0	1135	-2	733	-3

Table 3.47 Sri Lank's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Dry zone	97	0	166	17	0.93
Wet zone	100	0	134	19	0.98
Intermediate zone	100	0	180	33	1.00

[MAR] Morocco

Apart from irrigated maize, which is harvested in July, no cereal crops are grown during this monitoring period in Morocco. Sowing of winter wheat starts in November. Precipitation has been below average in recent months, although most rains fall in the November to March period. The cumulative rainfall was 53 mm, it is lower than the 15-year average (15YA) by 39% The average temperature was 23.1°C (higher than the 15YA by 0.4 °C). The temperature profile fluctuated around the average.

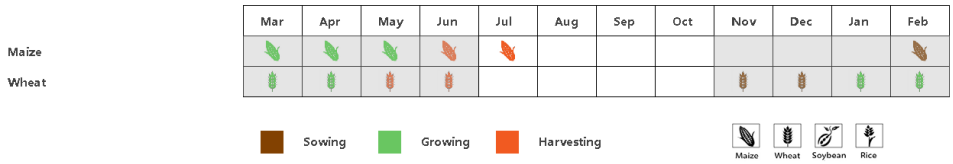
Regional analysis

CropWatch adopts three agro −ecological zones (AEZs) relevant for crop production in Morocco: the Sub-humid northern highlands, the Warm semiarid zone, and the Warm sub-humid zone. Both RADPAR and BIOMSS were below the 15YA by 2% and 5%, 1% and 2%, and 1% and 6% respectively for the three zones in their listed order.

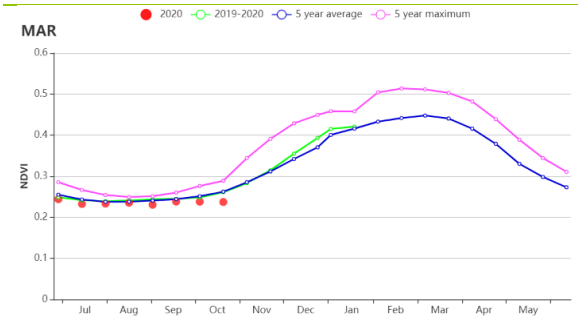
In the Sub-humid northern highlands and the Warm sub-humid zone, rainfall was below the 15YA by 35% and 39% respectively while the temperature was at the 15YA. The cropped arable land fraction (CALF) was above the 5YA by 11% and 8% respectively. The crop condition development graph based on NDVI indicates average conditions. The maximum VCI values for both zones were 0.62 and 0.61, which confirms the near-average conditions.

In the Warm semiarid zone, rainfall was below the 15YA by 42% while the temperature was above the 15YA by 1°C. The CALF was below the 5YA by 13%. The crop condition development graph based on NDVI indicates below-average conditions. The VCIx was at 0.42. Cropping Intensity estimates indicate that in general all regions dominated by single cropping during the investigation period.

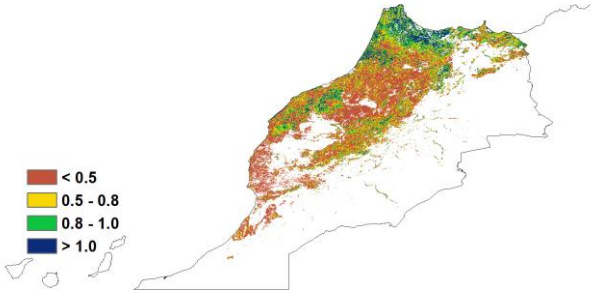
Figure 3.28 Morocco's crop condition, July - October 2020



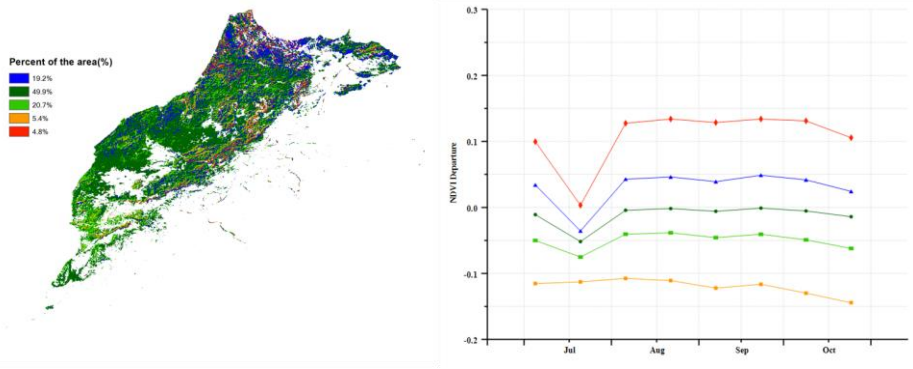
(a). Phenology of major crops



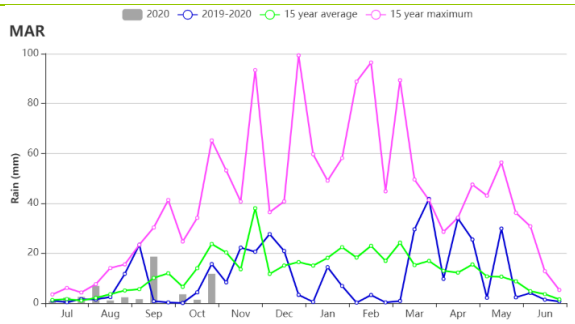
(b) Crop condition development graph based on NDVI



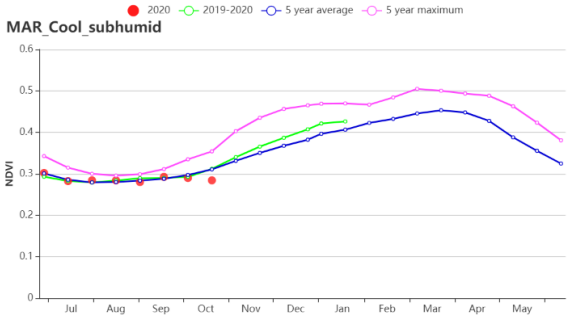
(c) Maximum VCI

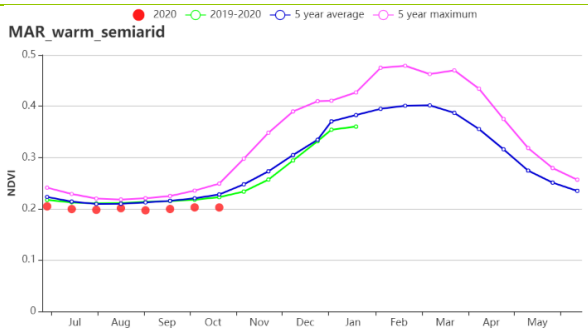


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles

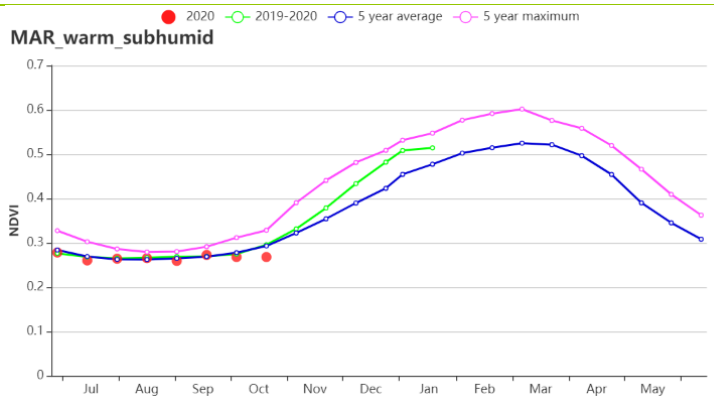


(f) Rainfall profiles (g) Temperature profiles





(h) Crop condition development graph based on NDVI (Sub-humid northern highlands (left) and Warm semiarid zones (right))



(i) Crop condition development graph based on NDVI (Warm subhumid zones)

Table 3.48 Morocco's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Sub-humid northern	68	-35	23	0	1340	-2	558	-5

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
highlands								
Warm semiarid zones	41	-42	24	1	1355	-1	587	-2
Warm sub-humid zones	61	-39	23	0	1337	-1	573	-6

Table 3.49 Morocco's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure from 5YA (%)	Current
Sub-humid northern highlands	19	11	105	1	0.62
Warm semiarid zones	2	-13	101	-1	0.42
Warm sub-humid zones	14	8	102	-1	0.61

[MEX] Mexico

Maize is the most important crop grown in Mexico. In the rainfed production regions of the country, maize reached maturity in September and October. Sowing of irrigated maize started in September. Its main production region is in the northwest. Winter wheat sowing begins in November. Both soybean and rice reached maturity by the end of this reporting period.

Crop conditions were below average between July and October according to the crop condition development graph based on NDVI. The CropWatch agroclimatic indicators show that TEMP (+0.4°C) and RADPAR (+1%) were close to average, but RAIN was down (-6%), which was unfavorable to crop growth, as indicated by a relatively normal value of maximum VCI (0.83). CALF decreased by 6%, compared with the previous 5-year average. BIOMSS decreased by 5% as compared to the average. According its spatial pattern, maximum VCI greatly varied within the country. Very high values (greater than 1.0) occurred mainly in the coastal area of Tamaulipas whereas extremely low values (less than 0.5) occurred in the North (Chihuahua and Sonora). The maximum VCI in other regions of Mexico was moderate, with the values between 0.5 and 1.0. As shown in the spatial NDVI profiles and distribution map, about 17.1% of the total cropped areas were below average during the entire monitoring period, mainly distributed in Chihuahua, Sonora and the western coastal area of Sinaloa, while 22.7% of the total cropped areas, mainly in the coastal area of Veracruz and Tamaulipas, were just slightly above average. An area accounting for 60.2% of the total region changed little and was close to average.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, Mexico is divided into four agroecological regions. They include the Arid and semi-arid region (128), Humid tropics with summer rainfall (129), Sub-humid temperate region with summer rains (130) and Sub-humid hot tropics with summer rains (131). Regional analyses of crop conditions can provide more detail for the production situation in Mexico.

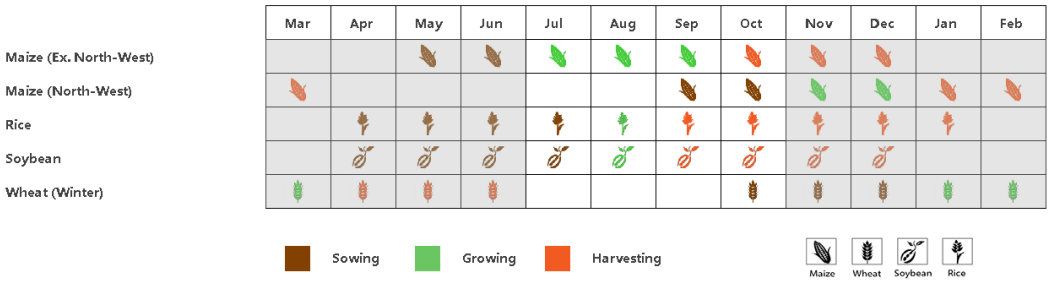
The Arid and semi-arid region located in northern and central Mexico accounts for about half of the cropland of the country. The maximum VCI was relatively low with a value of 0.70 and CALF decreased by 14%. Compared with the 15YA average, rainfall was reduced by 20%, which caused NDVI to be lower than the average during the July to October period according to the NDVI development graph. TEMP (+0.5°C) and RADPAR (+2%) were higher, but BIOMSS decreased by 9%. On the whole, crop conditions were unfavorable for this region, due to a lack of rainfall.

The Sub-humid temperate region with summer rains is situated in central Mexico. Crop conditions were below average from July to October. The agroclimatic condition showed that RAIN decreased by 6% and TEMP and RADPAR increased by 0.2°C and 2% compared to average, BIOMSS also increased by 1%. The maximum VCI (0.94) confirmed moderate crop condition in this region.

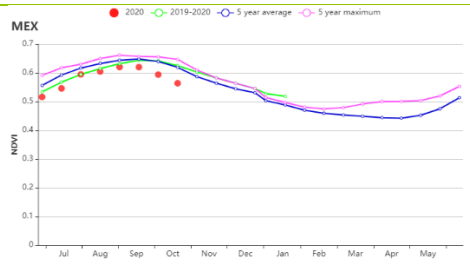
The Sub-humid hot tropics with summer rains region is located in southern Mexico. During the monitoring period, crop conditions were slightly below average in this region, as shown by the NDVI profiles. Agroclimatic conditions showed that RAIN was significantly below average (-7%) while TEMP and RADPAR were near average (+0.3°C and 0%). The VCIx in these areas was 0.92 and BIOMSS decreased by 1%. Climatic conditions were close to normal and the relatively high VCI indicates that the crop conditions were near average.

Humid tropics with summer rainfall located in southeastern Mexico. The agro-climatic conditions show that RAIN was above average (+9%), average TEMP was 0.1℃ warmer and RADPAR was down by 1%. As shown in the NDVI development graph, crop conditions were closed to average from July to October. The Maximum VCI (0.95) and suitable climatic conditions confirmed favorable crop condition in this agroecological region.

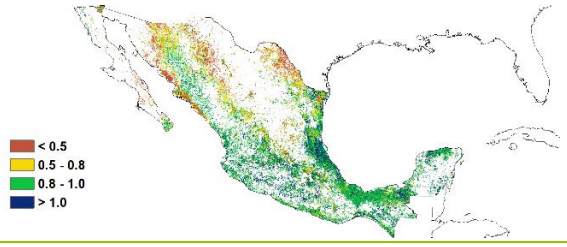
Figure 3.29 Mexico's crop condition, July - October 2020



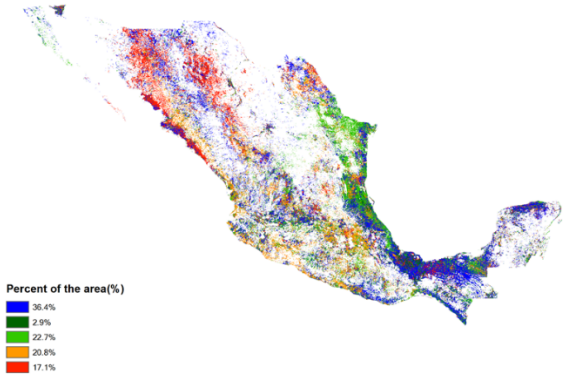
(a). Phenology of major crops



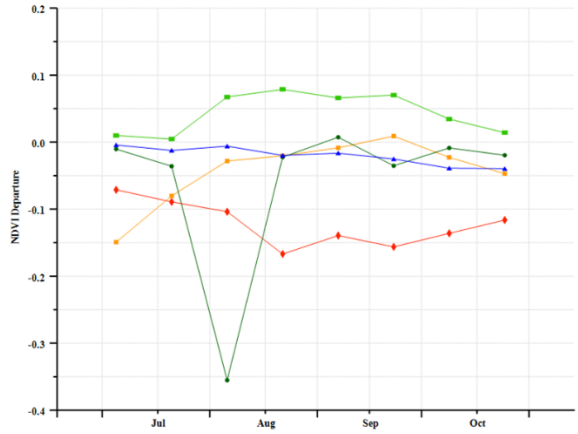
(b) Crop condition development graph based on NDVI



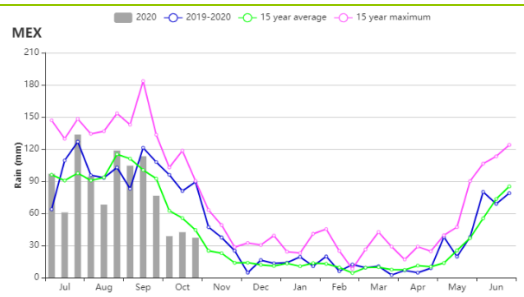
(c) Maximum VCI



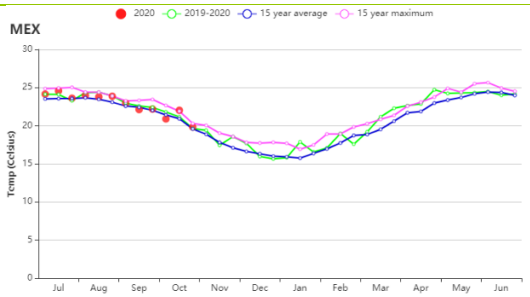
(d) Spatial NDVI patterns compared to 5YA



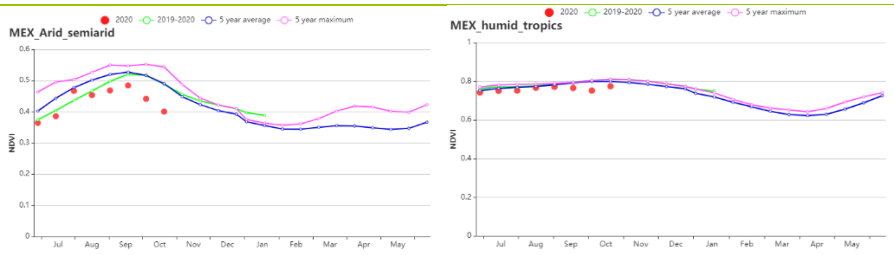
(e) NDVI profiles



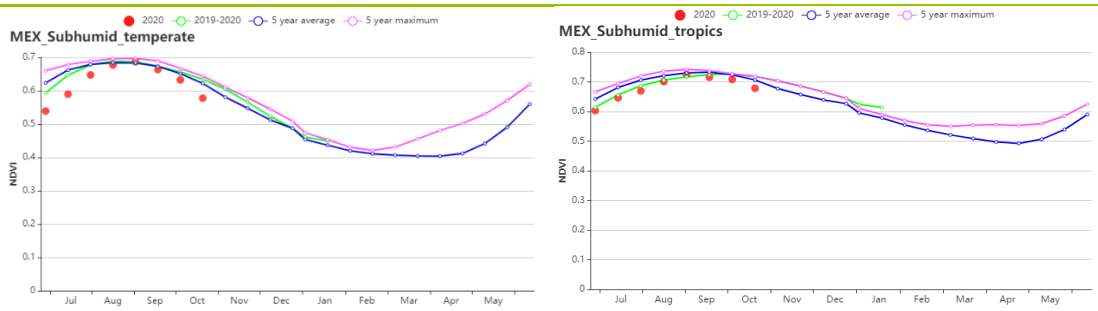
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Arid and semi-arid regions (left) and Humid tropics with summer rainfall (right))



(i) Crop condition development graph based on NDVI (Sub-humid temperate region with summer rains (left) and Sub-humid hot tropics with summer rains (right))

Table 3.50 Mexico's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central region	579	-20	23.2	0.5	1319	2	641	-9
Dry region	1385	9	24.9	0.1	1254	-1	829	0
Dry and irrigated cultivation region	1124	-6	18.9	0.2	1246	2	607	1
Dry and grazing region	1130	-7	22.7	0.3	1234	0	709	−1

Table 3.51 Mexico's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central region	70	-14	104	-4	0.70
Dry region	100	0	114	3	0.95
Dry and irrigated cultivation region	98	0	108	1	0.94
Dry and grazing region	94	-2	113	2	0.92

[MMR] Myanmar

This monitoring period covers the monsoon season in Myanmar. The main rice (monsoon rice) was grown between June and September. Harvest started in October. Planting of maize and wheat started in September and October. Crop conditions were generally below average during the monitoring period.

RAIN (-4%) and RADPAR (-3%) were lower than the 15YA, whereas TEMP (+0.6°C) was above the 15YA. As a result, potential cumulative biomass (BIOMSS) was 2% below the average, while the utilization of cropland was close to the 5YA. Cropping intensity was also at the level of 5YA. NDVI values were below average during the entire period except for mid-July and early September. The maximum VCI during this period was 0.92.

More than half of country's croplands suffered from below-average crop condition during the period. Negative departures were mainly observed for the Central plain and the Hills region, including Mandalay Region, Magwe Region, south of Sagaing Region and Shan State. 19.7% of cropland showed positive NDVI departures from July to mid-September, whereas 23.2% of cropland was above average in July only. These croplands were mostly located in the Delta and Southern Coast region, including Regions of Yangon, Bago, Ayeyarwady, part of Magwe, Thanintaryi and States of Mon and Kayin. The maximum VCI was less than 0.8 in the central dry zone. Higher values were observed in the other regions.

Regional analysis

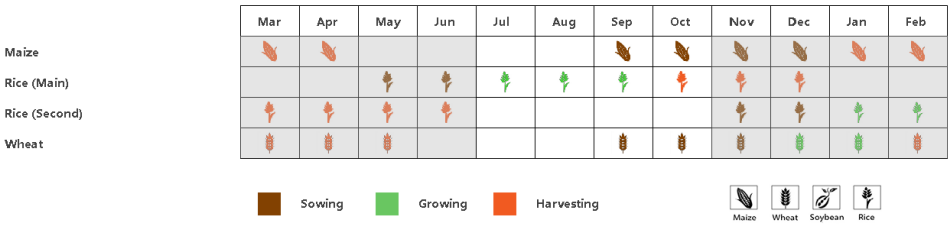
Three sub-national agro-ecological zones (AEZ) can be distinguished for Myanmar based on the cropping system, climatic zones and topographic conditions. They are the Central plain, the Hills and the Delta and Southern Coast regions.

The Central Plain had a marked rainfall deficit (RAIN -21%), with RADPAR down 1% and TEMP up 1°C compared to the 15YA. BIOMSS was 1% higher than the 15YA, which was the only increase among the three sub-national regions. CALF showed that 95% of the cropland was fully utilized, but it was 2% below the 5YA. NDVI was consistently below the 5YA level during the whole period. The VCIx was 0.89. Crop conditions for this region were unfavorable.

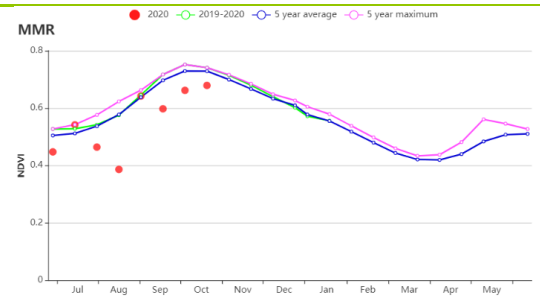
The Hills region had the highest RAIN (1936 mm) compared with the other two sub-national regions. It was 9% above the 15YA. RADPAR decreased by 5% while TEMP increased by 0.4°C. BIOMSS was 3% below 15YA. The cropland was almost fully used (CALF 99%). The NDVI values were generally below the 5YA and near average only in mid-June and October. The VCIx was 0.97. Crop conditions are assessed as below the 5YA level.

The Delta and Southern Coast region experienced a dry monsoon season, with RAIN far below the 15YA (-25%). TEMP increased by 0.3°C and RADPAR was near average. Estimated BIOMSS was also at the level of 15YA. Since the vast majority of cropland in this region is irrigated, the lack of rainfall had a limited negative impact on crop growth and production. CALF was 1% above the 5YA and VCIx was 0.93. Similar to other sub-national regions, crop conditions in this region were below average.

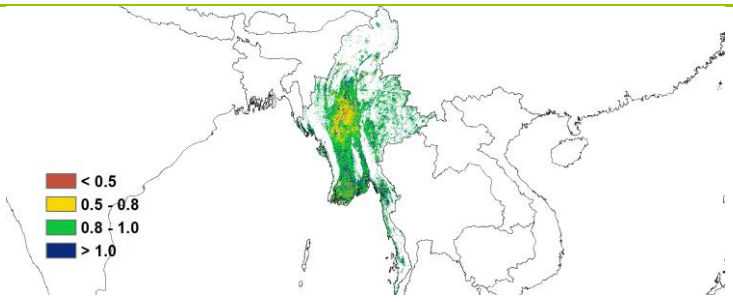
Figure 3.30 Myanmar's crop condition, July - October 2020



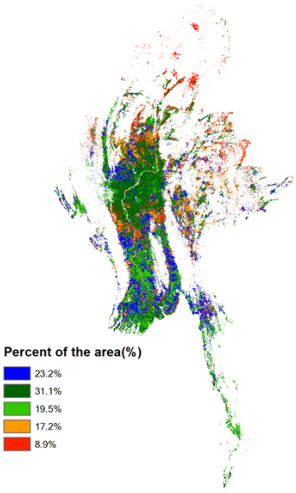
(a). Phenology of major crops



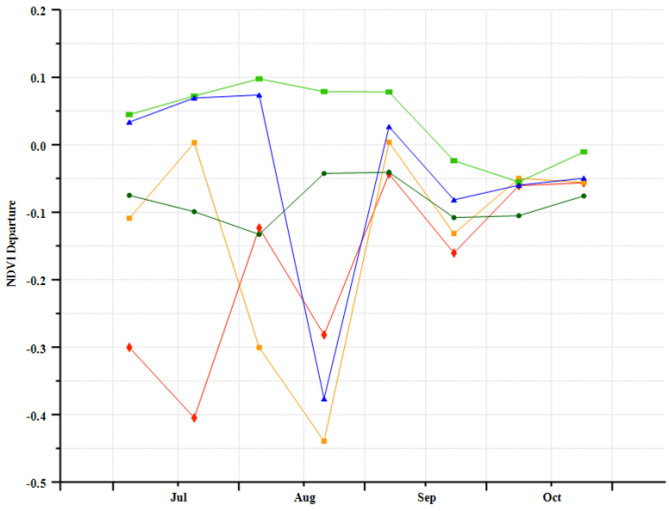
(b) Crop condition development graph based on NDVI



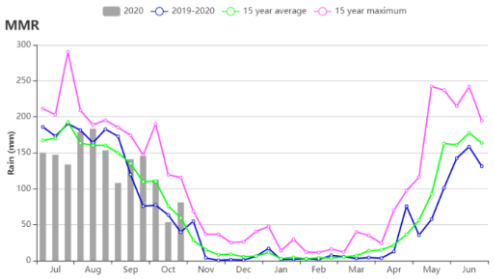
(c) Maximum VCI



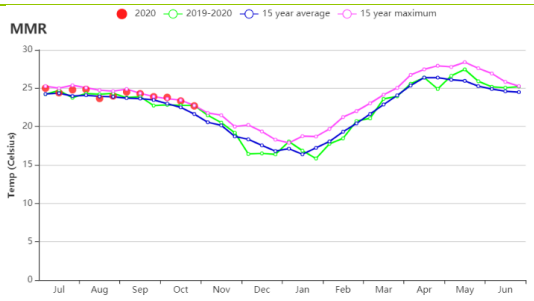
(d) Spatial NDVI patterns compared to 5YA



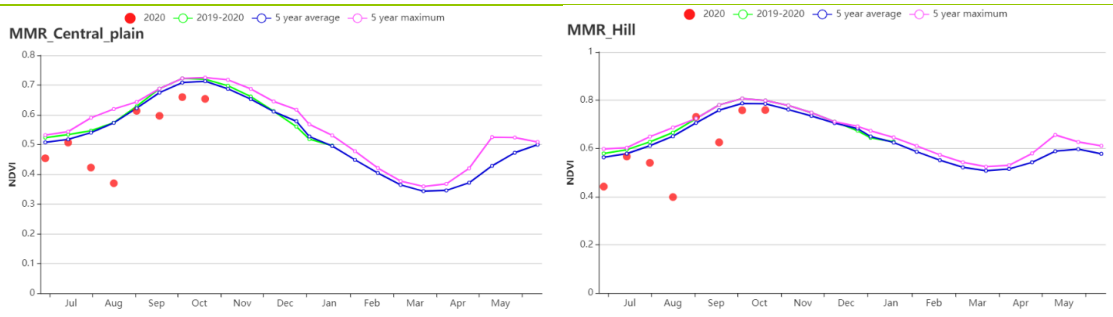
(e) NDVI profiles



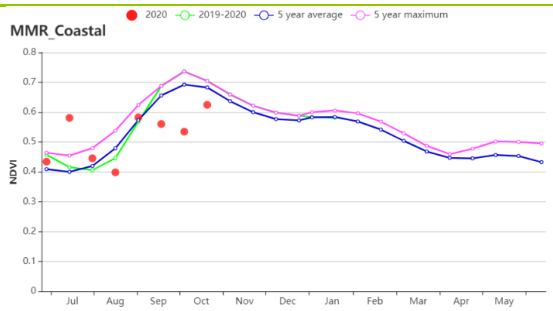
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Central Plain (left) and Hills regions (right))



(i) Crop condition development graph based on NDVI (Delta and Southern Coast)

Table 3.52 Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central plain	933	-21	25	1	1031	-1	670	1
Hills region	1936	9	22.9	0.4	913	-5	559	-3
Delta and southern-coast	1632	-21	26	0.3	1078	0	733	0

Table 3.53 Myanmar's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central plain	95	-2	105	-1	0.89
Hills region	99	0	109	1	0.97
Delta and southern-coast	95	1	125	1	0.93

[MNG] Mongolia

This reporting period covers the humid summer and autumn season in Mongolia from July to October. Wheat, which is the main cereal crop, is harvested during September. The agroclimatic indicators for this 4-month period show a large increase in rainfall (RAIN, +67%). The average temperatures were cooler than the 15YA (TEMP -1.2°C) and solar radiation was also below average (RADPAR -8%). The decline in solar radiation combined with cooler temperatures caused a reduction in estimated biomass by 14% as compared to the 15YA. The recorded crop arable land fractions (CALF, 82%-100%) and maximum vegetation condition index (VCIx, 0.89-0.97) were favorable. The crop condition development graph indicates that the crop conditions were slightly better than the 5YA from July to September and near average in October.

The maximum VCIx map shows that relatively favorable crop conditions (around 80%) were observed in all of the territories. Among all regions, Hangai Huvsgul had slightly less favorable conditions during these four months. The crop conditions, as assessed by the NDVI profile, were favorable in Mongolia.

Regional analysis

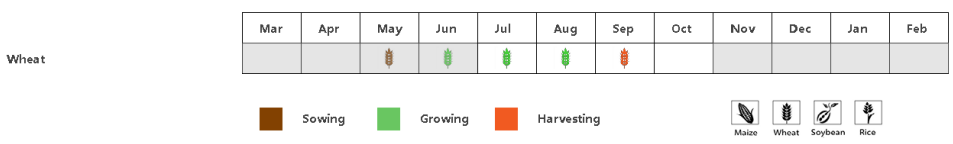
Taking into consideration the climate, vegetation, altitude, soil, and farming systems, Mongolia is divided into five agro-ecological zones (AEZ). Three of them (Selenge-Onon Region, Central, and Eastern Steppe, and Hangai Khuvsgul Region) are cultivated as cropland, and two (Altai and Gobi Desert) are non-agriculture land. For all the subregions, crop intensity is 100%, same as last year.

TEMP and RADPAR in the Hangai Khuvsgul region decreased by 1.1°C and 7% respectively, while RAIN was 65% above average. Accordingly, BIOMASS declined by 13% from the fifteen-year average. VCIx (0.90) was just average, and CALF was elevated by 1%. According to unfavorable conditions of agroclimatic indicators, the NDVI profile was mostly below the 5YA excluding August, where the NDVI profile was near average. Overall, crop conditions were negatively impacted by the cool temperatures.

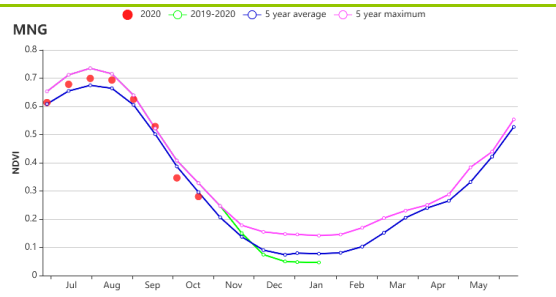
In the Selene-Onon region, RAIN was 71% above average, but temperature and radiation were significantly below average (TEMP -1.2°C; RADPAR -8%). The estimated BIOMSS decreased by 16%, and the cropped arable land fraction was up by 2%. The maximum VCIx for this region was 0.97. The crop condition development graph indicates that the crop conditions were above the 5YA during the season. In conclusion, the crop conditions in the Selene-Onon region were favorable.

For the period from July to September, crop conditions were slightly above the five-year average in theCentral and Eastern Steppe region. This region also received above-average rainfall (RAIN, +53%). Temperature and radiation were below average (TEMP -1.0°C; RADPAR -9%). CALF increased by 3%, and regional VCIx was 0.89. The estimated BIOMSS decreased by 12%. The Central and Eastern Steppe region has only a small fraction of cropland. Most of the arable land experienced favorable conditions during this reporting time.

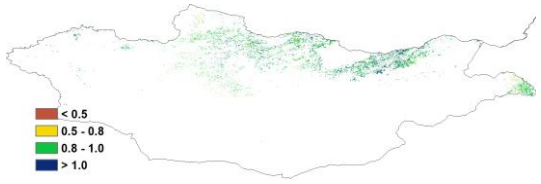
Figure 3.31 Mongolia's crop condition, July - October 2020



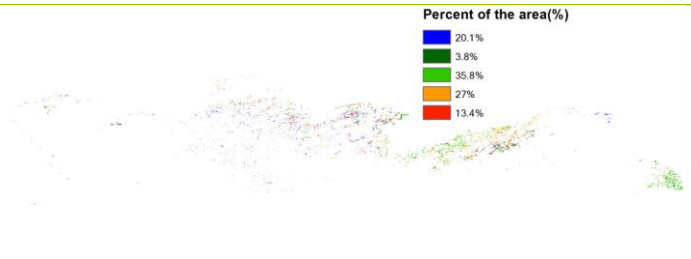
(a). Phenology of major crops



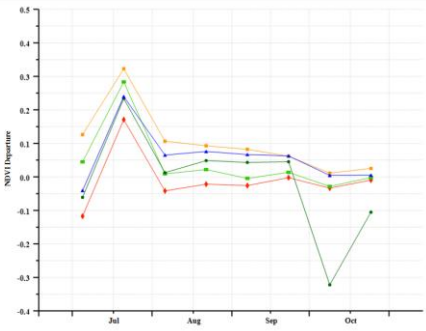
(b) Crop condition development graph based on NDVI



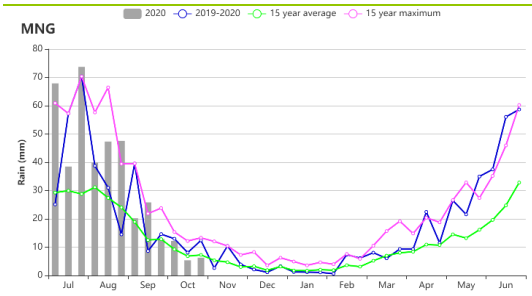
(c) Maximum VCI



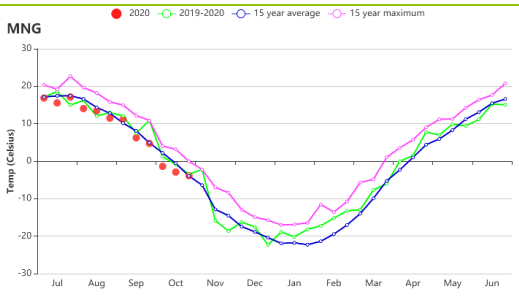
(d) Spatial NDVI patterns compared to 5YA



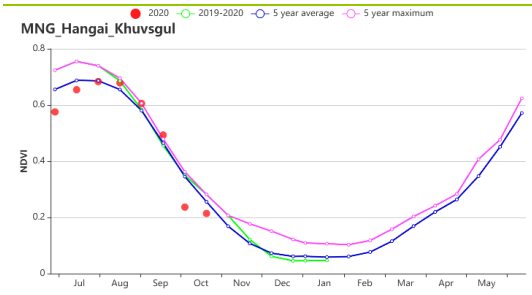
(e) NDVI profiles

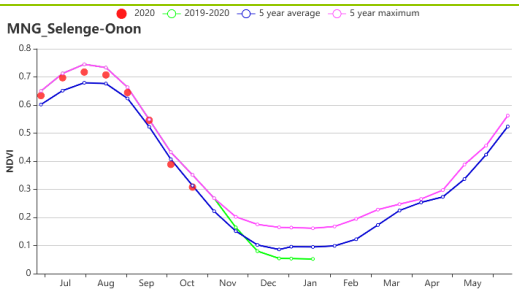


(f) Rainfall profiles

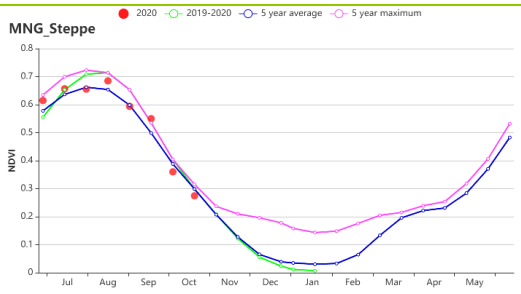


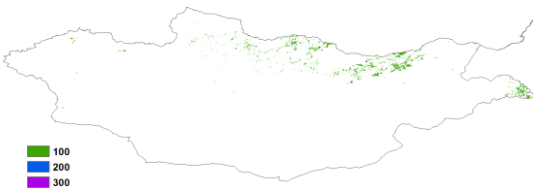
(g) Temperature profiles





(h) Crop condition development graph based on NDVI (Hangai Khuvsgul Region (left) and Selenge-Onon Region (right))





(i) Crop condition development graph based on NDVI (Central and Eastern Steppe)

(j) Crop intensity

Table 3.54 Mongolia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Hangai Khuvsgul Region	439	65	5.9	-1.1	985	-7	258	
Selenge-Onon Region	406	71	9.1	-1.2	963	-8	311	
Central and Eastern Steppe	301	53	12.5	-1	951	-9	396	

Table 3.55 Mongolia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Hangai Khuvsgul Region	100	1	100	0	0.9
Selenge-Onon Region	100	2	100	0	0.97
Central and Eastern Steppe	100	3	100	0	0.89

[MOZ] Mozambique

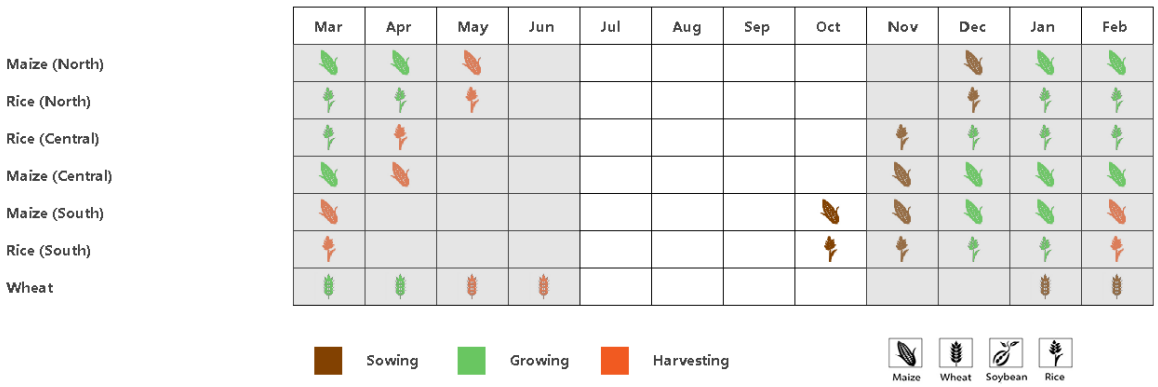
In Mozambique, the July-October monitoring period is the dry season and covers mostly land preparation. During this period, maize sowing started in southern Mozambique, followed by rice in late October. Except for rainfall (RAIN +15%), decreases in the remaining agroclimatic indicators were observed (TEMP -0.4°C and RADPAR -7%). Estimated biomass production also decreased by about 4%. With few crops growing in the field, the NDVI development graph was well below the average of the past five years, and the spatial NDVI patterns show that only 7.7% of the arable land, mostly along the Limpopo River (southern Mozambique) which is irrigated, presented favourable crop conditions. During this period, CALF was near average and a maximum VCIx of 0.81 was observed.

Regional analysis

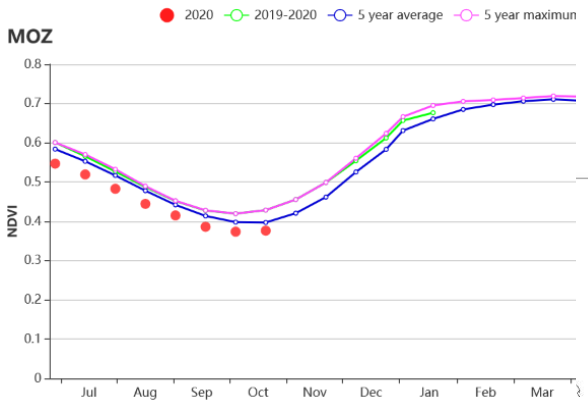
According to the cropping system, topography and climate, CropWatch has subdivided Mozambique into five agro-ecological zones (AEZ): Buzi Basin, Northern High-altitude Areas, Low Zambezi River Basin, Northern Coast, and Southern Region.

With the exception of the Buzi basin, the country's sub-regions development graphs based on the NDVI indicates below-average crop conditions in all agro-ecological zones. All agro-ecological zones recorded increases in rainfall. Highest increases were recorded in the Buzi basin and High-altitude areas (about 19% and 31%), as compared to the 15YA. In the Buzi basin, Low Zambezi river basin and Southern region, the temperature decreased by about 0.7℃, 0.5℃, and 0.7℃, respectively. The temperature in Northern High-altitude areas was near average, while a slight decrease of about 0.1ºC was recorded in the Northern coastal area. The increased rainfall will be beneficial for the upcoming sowing period. CALF was estimated at 90% (+2%). In general, prospects for the upcoming main growing season are favorable.

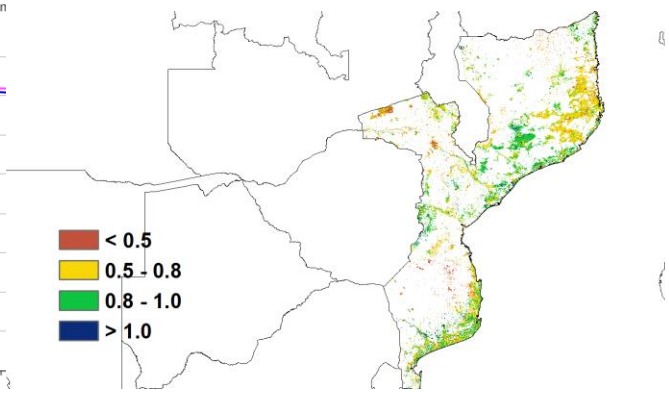
Figure 3.32 Mozambique's crop condition, July - October 2020



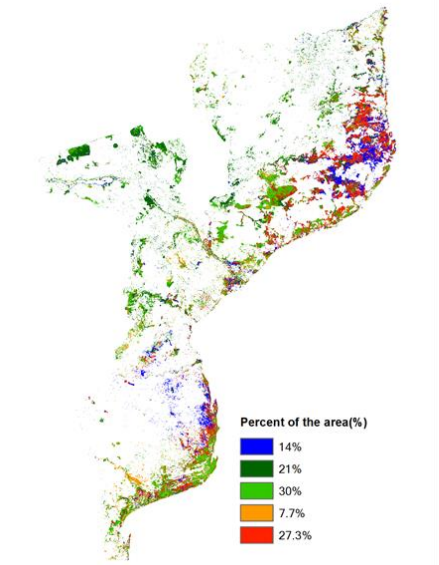
(a) Phenology of major crops



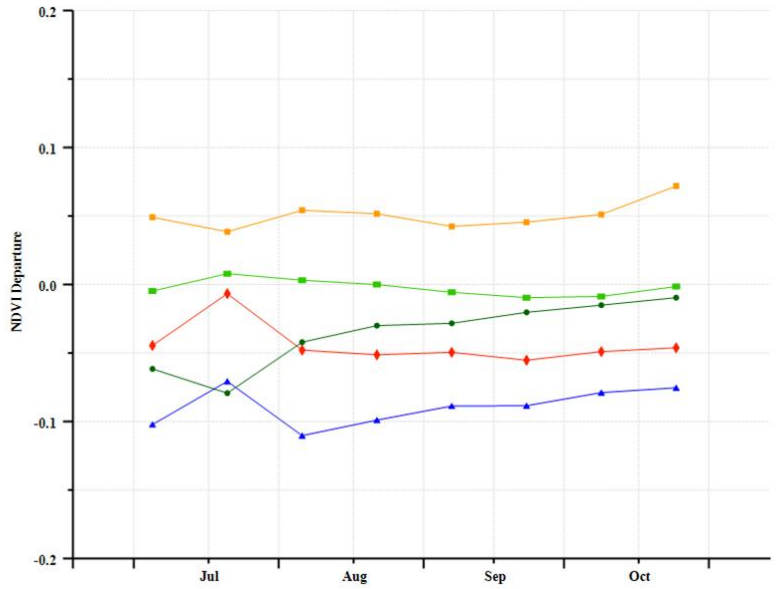
(b) Crop condition development graph based on NDVI



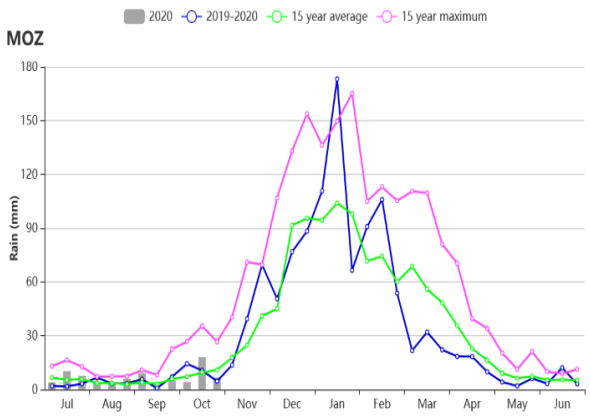
(c) Maximum VCI



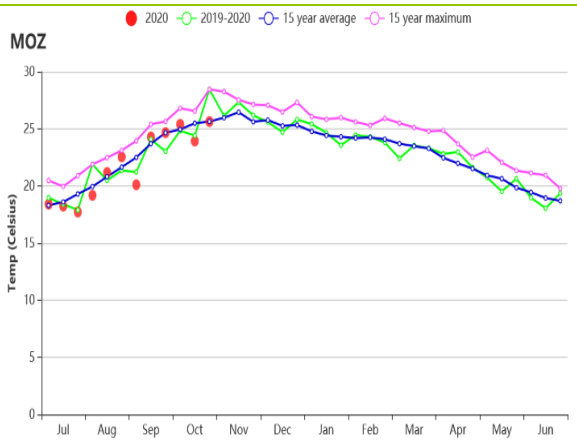
(d) Spatial NDVI patterns compared to 5YA



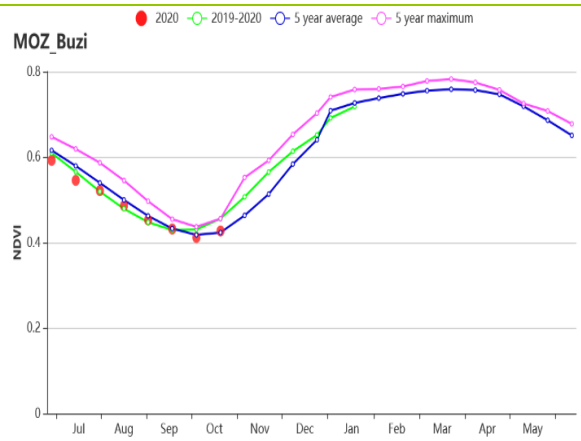
(e) NDVI profiles

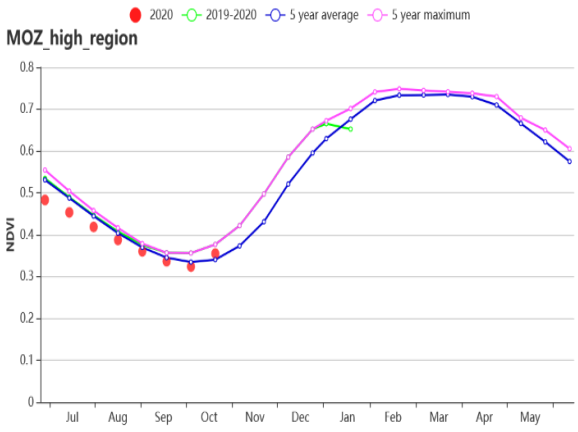


(f) National time-series rainfall profiles

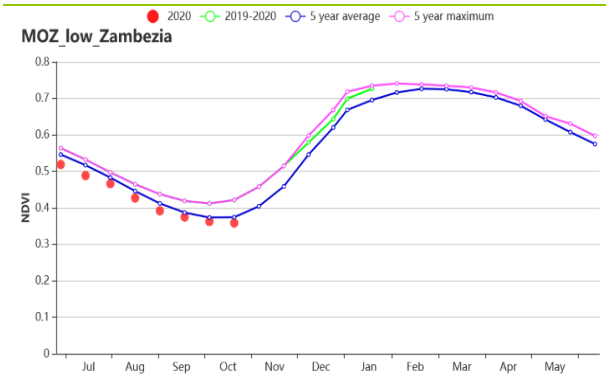


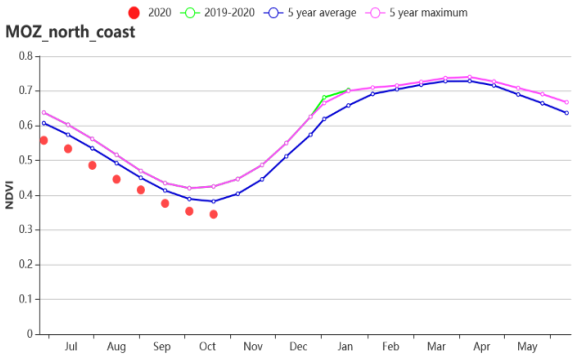
(g) National time-series temperature profiles



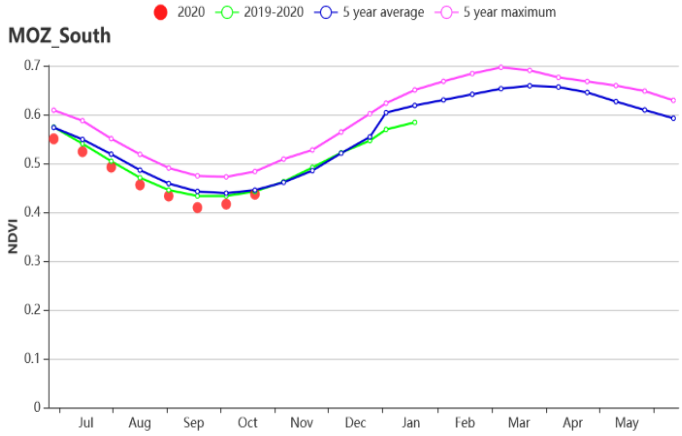


(h) Crop condition development graph based on NDVI-Buzi basin (left), and Northern high-altitude areas (right)





(i) Crop condition development graph based on NDVI-Lower Zambezi River basin (left), and Northern coast region (right)



(j) Crop condition development graph based on NDVI-Southern region

Table 3.56 Mozambique agro-climatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020.

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Buzi basin	80	19	19.1	-0.7	1126	-9	557	-6
Northern high-altitude areas	60	31	21.7	0.0	1140	-4	603	-1
Low Zambezia River basin	71	13	21.8	-0.5	1111	-8	566	-3
Northern coast	86	16	22.8	-0.1	1087	-7	622	-4
Southern region	94	8	21.1	-0.7	971	-9	546	-8

Table 3.57 Mozambique agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020.

Region	CALF		Cropping Intensity		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Buzi basin	94	-2	100	0	0.80
Northern high-altitude areas	66	-21	100	-1	0.70
Low Zambezia River basin	67	-10	100	-1	0.72
Northern coast	95	-3	100	0	0.74
Southern region	90	2	100	-1	0.74

[NGA] Nigeria

The current reporting period covers the harvest of main season maize and sorghum in the south. The soybean growing season spanned from June to October. Across the country, rainfall was 708 mm and the temperature was 25.1 °C. The radiation was 1080 MJ/m² (-1%), while the estimated biomass was 667 gDM/m², which was below the 15YA (-4%). Cropping intensity was 122% (-3%). CALF was 94 (+1%) and the vegetation condition was at 0.93. The NDVI development curve was generally below average, but improved to average conditions by the end of this monitoring period. Crop conditions were mostly unfavorable, especially in the derived savanna and humid forest zones due to a lack of rainfall.

Regional analysis

The CropWatch analysis is done for four agro-ecological zones in Nigeria; the Sudano-Sahel which is the driest zone located in the north, the Guinea savanna and Derived savanna, both in the center, and the Humid forest zone in the south.

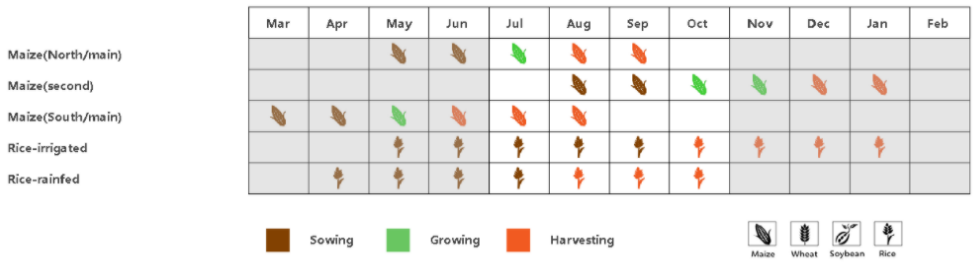
In the the Sudano-Sahelian zone, the observed rainfall was much lower than average (290 mm, -37%), temperature was 27.8ºC (-0.1°C) and radiation was slightly lower (-4%) as compared to the 15YA. These climate conditions resulted in a biomass of 670 gDM/m² (-7% of departure from 15YA) while CALF was 86% (+3%) and VCIx was 95. The NDVI graph shows that from July up to August, NDVI values were slightly below average and subsequently fluctuated around the average.

In the Guinean savanna, recorded precipitation was 585 mm, a 29% drop as compared to the 15YA. Temperature was close to the average of 24.8°C (-0.1°C). The radiation was 1124 MJ/m2 (-2%), the biomass was 666 gDM/m² (-8 %) and CALF was 99, with no departure from the 15YA. Vegetation condition index was at 0.93. Based on the NDVI development graph, crop conditions stayed below average throughout most of this monitoring period, but reached the 5YA in October.

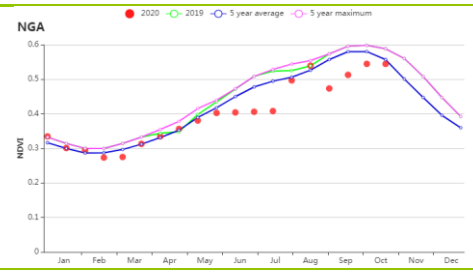
In the Derived savanna zone, rainfall was also much below average at 794 mm (-26%), the temperature was 24.2°C (+0.1°C) and the radiation was 1064 MJ/m2, a +1% increase as compared to the 15 YA. The estimated biomass was 685 gDM/m² (+1%). The cropped land was at 99, and the vegetation condition index was 0.93. The NDVI profile graph shows that values trended below average for the whole period.

In the Humid forest zone, rainfall was 1236 mm (-22%), the temperature was 24 ºC (-0.1°C) and the radiation increased by 1% above the 15YA. Average values were observed for biomass at 633 gDM/m² (+1%) and CALF was 97% (+1%). The vegetation condition index (VCIx) in this region was at 92. The crop development graph based on NDVI indicates below-average crop conditions for the entire monitoring period.

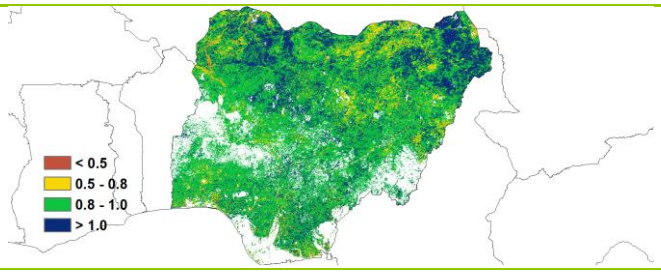
Figure 3.33 Nigeria's crop condition, July - October 2020



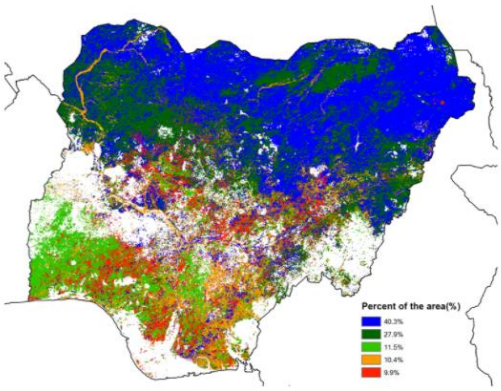
(a). Phenology of major crops



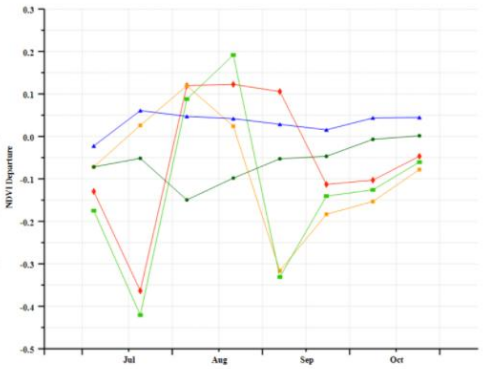
(b) Crop condition development graph based on NDVI



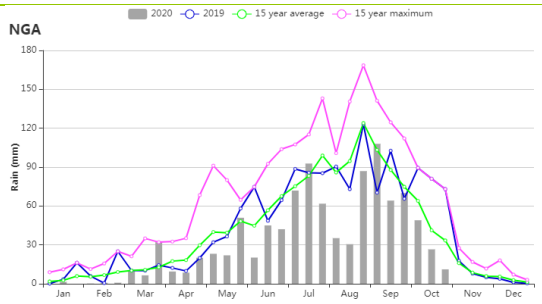
(c) Maximum VCI



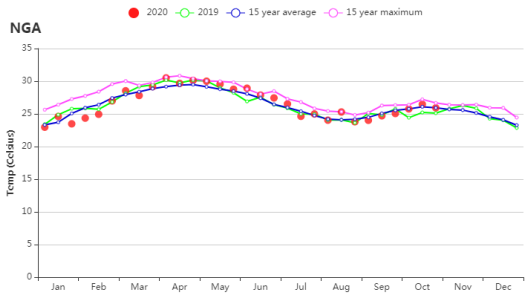
(d) Spatial NDVI patterns compared to 5YA



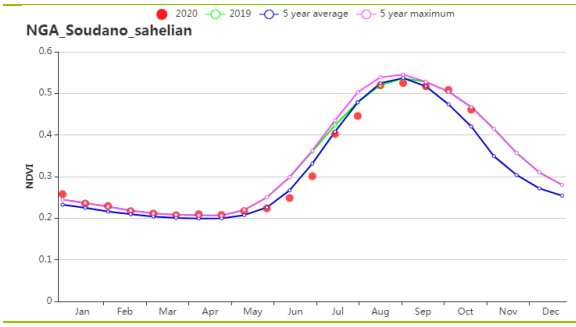
(e) NDVI profiles

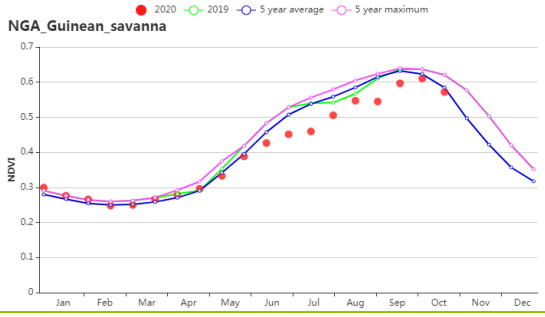


(f) Rainfall profiles

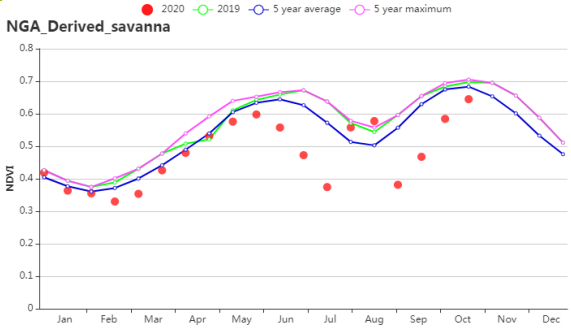


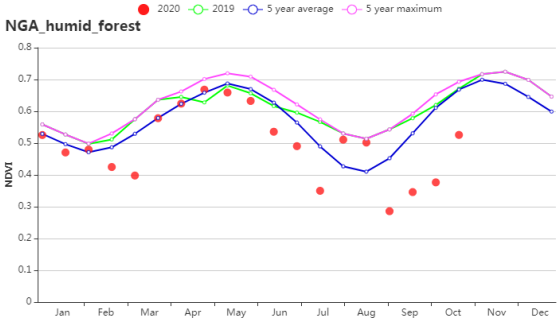
(g) Temperature profiles





(h) Crop condition development graph based on NDVI (Soudano −Sahelian region (left) and Guinean savanna (right))





(i) Crop condition development graph based on NDVI (derived Savanna (left) and Humid forest zone (right))

Table 3.58 Nigeria's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Derived_savanna	794	-26	24.2	0.1	1064	1	685	1
Guinean_savanna	585	-29	24.8	-0.1	1124	-2	666	-8
humid_forest	1236	-22	24.1	-0.1	955	1	633	1
Soudano_sahelian	290	-37	27.8	-0.1	1156	-4	670	-7

Table 3.59 Nigeria's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Derived_savanna	99	0	157	-7	0.93
Guinean_savanna	99	0	106	-2	0.93
humid_forest	97	1	178	-2	0.92
Soudano_sahelian	86	3	100	0	0.95

[PAK] Pakistan

This report covers the production period for main maize and rice, which were harvested in October. It also covers the sowing of winter barley and wheat. Overall, crop conditions were generally favorable from July to October.

RAIN was slightly below average (-2%), together with lower TEMP and RADPAR (-0.3°C and -3% respectively), which resulted in a decrease of BIOMSS (-1%). CropWatch agro-climatic Indicators (CWAIs) were close to average over the 15YA. The overall favorable conditions, together with a high VCIx (0.96) and a significant increase of the fraction of cropped arable land (+12%) indicate favorable production prospects for the summer crops.

As shown by the nationwide NDVI development graph, crop conditions were close to average in July and August and later reached and even exceeded the maximum of 5YA in September, which was consistent with the time series profile of RAIN. According to the spatial NDVI patterns and profiles, 7.2% of the cropped areas presented continuously below-average conditions during the reporting period, which were mostly distributed along the rivers. This could be a result of flooding over the areas close to the rivers due to excessive rainfall. About 22.6% of cropland, concentrated in northern Pakistan, northern Multan and eastern Hyderabad, presented slightly below average conditions before August but recovered to average levels starting in September. Cropping Intensity for the whole country was 146%, which was 1% above average.

Regional analysis

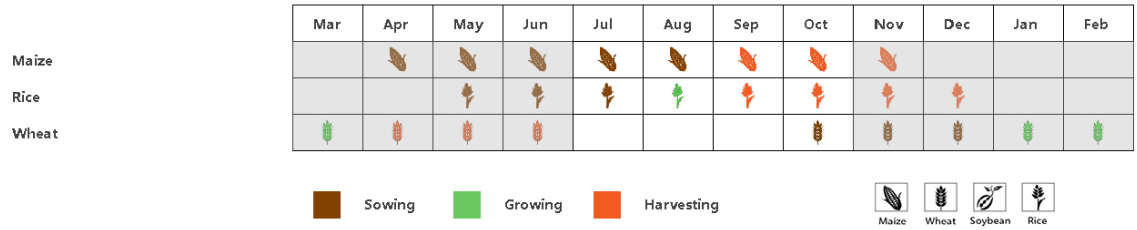
For a more detailed spatial analysis, CropWatch subdivides Pakistan into three agro-ecological regions based essentially on geography and agro-climatic conditions: the Northern highlands, Northern Punjab region and the Lower Indus river basin in South Punjab and Sind.

In **the Lower Indus basin,** RAIN was greatly above average (+80%), TEMP and RADPAR were below average by 0.1°C and 4% respectively. The estimated BIOMSS was 4% above average. NDVI was average in July and August, and later markedly above average. The CALF value of 66% exceeds the average by 15% and a VCIx of 0.92 also indicates excellent crop conditions. Overall, the situation for the region is assessed as favorable.

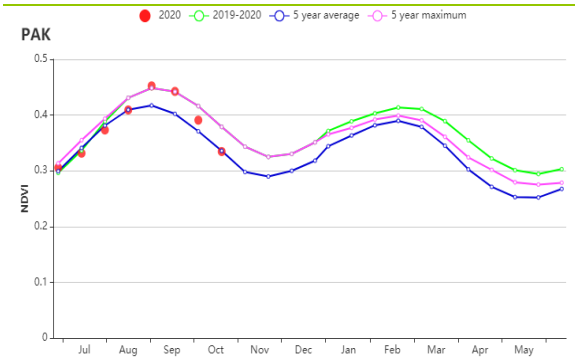
Compared to average, in **the northern highland region**, RAIN was above average by 5% and RADPAR and TEMP were below average (-5% and -0.6°C respectively). BIOMSS decreased by 10%. The region also showed a low CALF of 65%, but still higher than the 5YA by 12%. The NDVI profile stayed below average during July to August and subsequently recovered. Overall, the situation for the region is deemed to be at least average.

Northern Punjab, the main agricultural region of Pakistan, recorded below-average RAIN (-21%). TEMP and RADPAR were below average (-0.2°C and -2% respectively). The resulting BIOMSS was 18% below average. The NDVI profile presented below-average conditions during the July to August period, mainly due to a slow start of the monsoon rains. Heavy rainfall in August promoted crop growth and NDVI exceeded the maximum of the 5YA from September to early October. In addition, CALF in this area reached 84%, which was up by 7% compared to 2019, and VCIx was at 0.94. CI was above average by 3%. Overall, the crop production potential for the region is assessed as favorable.

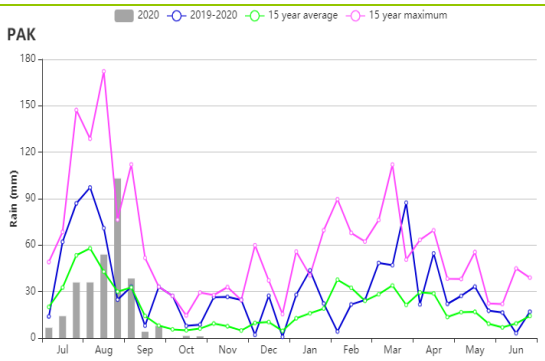
Figure 3.34 Pakistan's crop condition, July-October, 2020



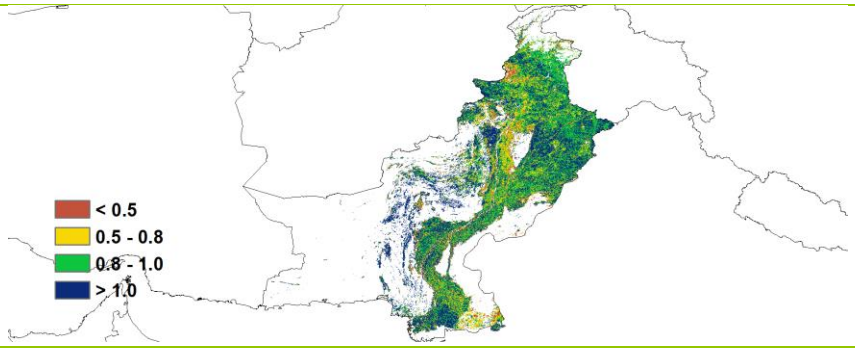
(a). Phenology of major crops



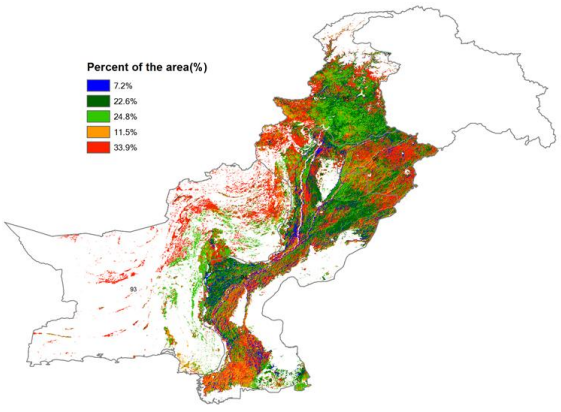
(b) Crop condition development graph based on NDVI



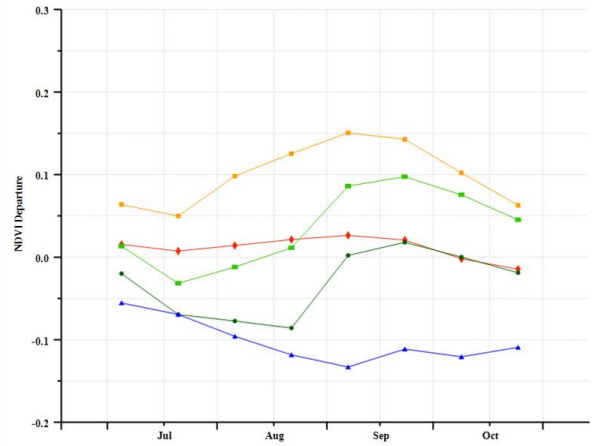
(c) Time series precipitation profile



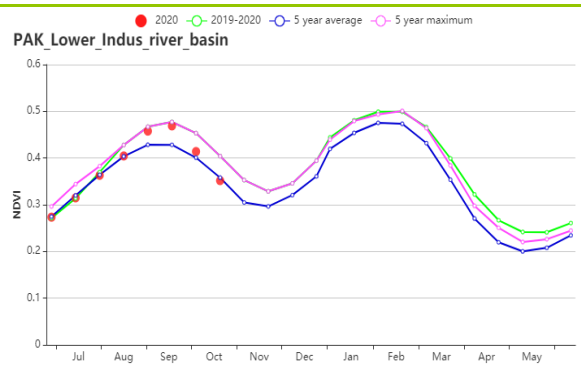
(d) Maximum VCI

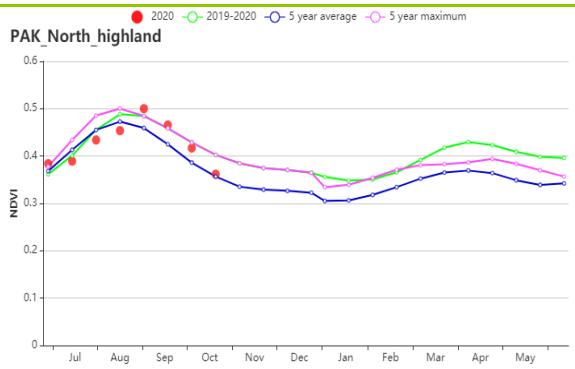


(e) Spatial NDVI patterns compared to 5YA

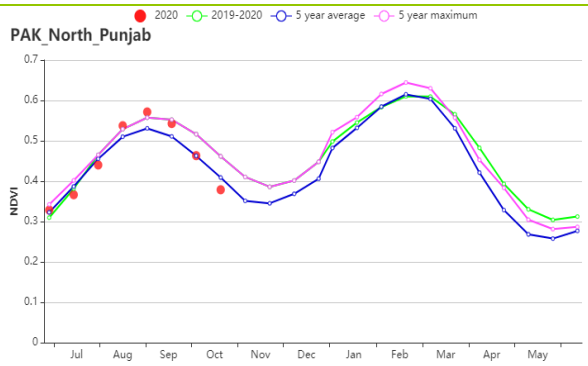


(f) NDVI profiles





(g) Crop condition development graph based on NDVI in Lower Indus river basin in south Punjab and Sind (left) and Northern Highlands (right)



(h) Crop condition development graph based on NDVI in Northern Punjab

Table 3.60 Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Lower Indus river basin in south Punjab and Sind	261	80	32.8	-0.1	1265	-4	591	2
Northern highlands	375	5	20.9	-0.6	1309	-5	537	-10
Northern Punjab	281	-21	30.7	-0.2	1239	-2	611	-18

Table 3.61 Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Lower Indus river basin in south Punjab and Sind	66	15	157	1	0.92
Northern highlands	65	12	132	3	0.95
Northern Punjab	84	7	177	3	0.94

[PHL] Philippines

This report covers the second half of the monsoon season, which lasts from May to October. The harvest for the main maize was completed at the end of September, followed by the harvest for the main rice crop. The second maize and second rice crops started to be planted in October. Compared to average, the country suffered a small precipitation deficit (RAIN, -2%) accompanied by warmer temperatures (TEMP, +0.4℃) and higher radiation (RADPAR, +3%). In response, the biomass (BIOMASS) for the country showed a slight rise by 3% compared to average. The cropped arable land fraction (CALF) for the country was almost close to 100% and the maximum VCI value was at 0.97, which means the crop conditions were generally favorable.

According to the NDVI profile for the country, conditions were near average until October. The slight departure in early August may have been due to cloud cover in the satellite image or temporal flooding. The negative departures of NDVI starting in September can probably be attributed to the frequent typhoons. Especially the 17th typhoon Saudel and 18th typhoon Molave caused widespread flooding.

Considering the spatial patterns of NDVI, around 52.7% of cropland, mainly located in the western coast and middle area of Luzon island and most part of Mindanao island, had a stable NDVI which was close to average during the reporting period. For about 17.1% of the cropland, NDVI was close to average before October and suffered a great decrease of up to 0.4 NDVI units in October. This was mainly in the Central Luzon region, south CalgayanValley region and south Cordillera region. Although the great decrease was due to cloud cover brought by typhoon in satellite images, the vegetation there suffered a lot as well, which was reflected in a decrease of the NDVI curve. An anomaly, in which the NDVI dropped up to 0.4 NDVI units in middle October and recovered 0.35 NDVI units in late October, appeared in Southern Tagalog region and the middle of Calgayan Valley region. Another anomaly, in which the NDVI dropped over 0.35 NDVI units in early August and recovered 0.4 NDVI units in middle August was observed for the Southern Tagalog region and Southern Mindanao region, on around 18.7% of crop land. Subsequently, the NDVI for these regions decreased gradually. Both anomalies may have been caused by cloud cover in the satellite image, while the general drop of NDVI in October is probably due to the influence of typhoons. All in all, taking the NDVI without anomalies and near-average agro-climate indicators into consideration, the estimated production for the country in the reporting period is slightly below average.

Regional analysis

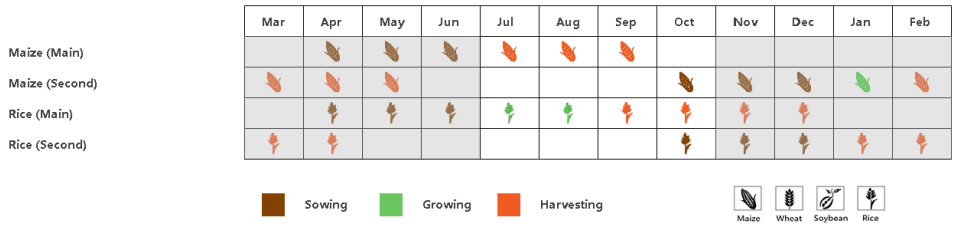
Based on the cropping systems, climatic zones and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are **the Lowlands region** (northern islands), **the Hilly region** (Island of Bohol, Sebu and Negros), and **the Forest region** (mostly southern and western islands). All the regions are characterised by a stable (almost 100%) cropped arable land fraction (CALF) and a high maximum VCI value (VCIx>0.96).

The **Lowlands region** experienced warmer temperature (TEMP, +0.5℃) and higher radiation (RADPAR, +6%) compared to average. Although the rainfall (RAIN, -15%) for the region was lower, the potential biomass (BIOMASS, +6%) value was higher than average. In terms of the NDVI profile, the NDVI for the region was lower than average in late July and improved gradually. However, a drop of NDVI appeared in early September again and the departure of NDVI from average reached a maximum at the end of the reporting period. It seems that the typhoons had a great influence on the crops in this region. As a result, the crop conditions were not favorable.

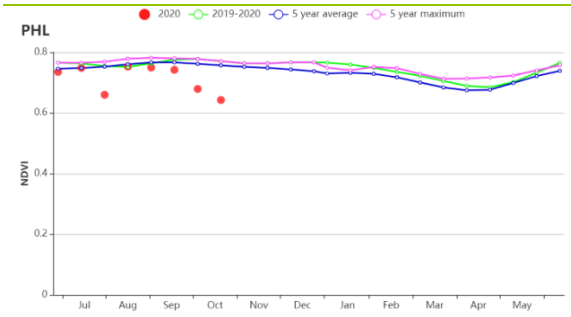
Compared to the previous 15 years, **the Hilly region** (Negros and central Visayas island region) went through wetter than normal conditions, as the rainfall (RAIN +9%) and the temperature (TEMP +0.5℃) increased. Both the radiation (RADPAR, +4%) and potential biomass (BIOMASS, +4%) for the region were higher than average. As for the NDVI for the region, it was below average in July but recovered to average in middle August. However, the NDVI decreased again in September and was recovering at the end of the reporting period. Crop conditions were generally unfavorable.

The **Forest region** had an above-average rainfall (RAIN, +13%) and slightly warmer temperatures (TEMP, +0.2℃). The radiation (RADPAR) for the region was above average by 1% and the potential biomass (BIOMASS) was close to average. The NDVI profile shows that the NDVI for the region was below average in late July and recovered in middle August. Subsequently, the NDVI dropped to below average again in October. Although the NDVI was varying, the departures of NDVI from the average were relitevely small. As a result, the prospected crop conditions for the region were slightly below or close to average.

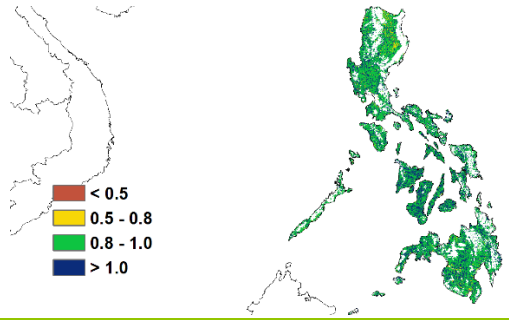
Figure 3.35 Philippines' crop condition, July - October 2020



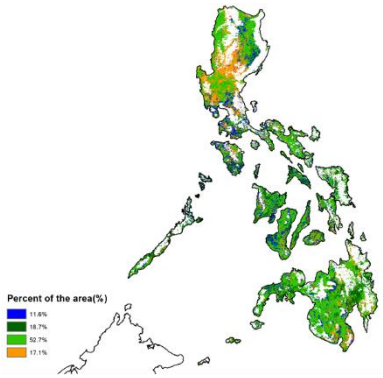
(a). Phenology of major crops



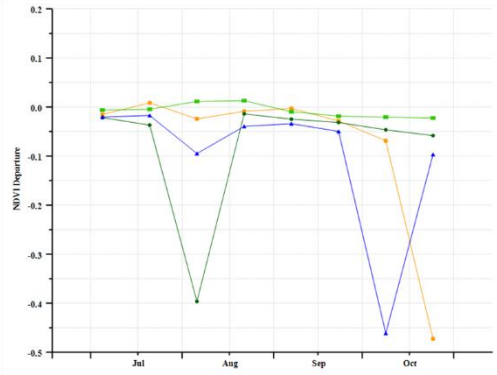
(b) Crop condition development graph based on NDVI



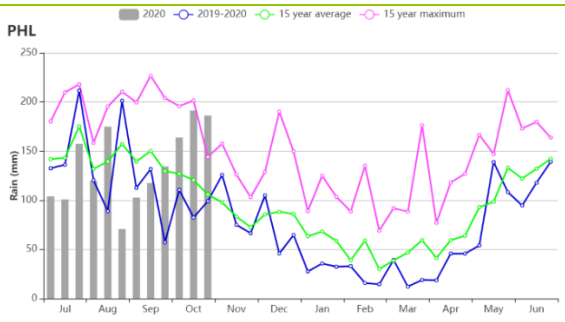
(c) Maximum VCI



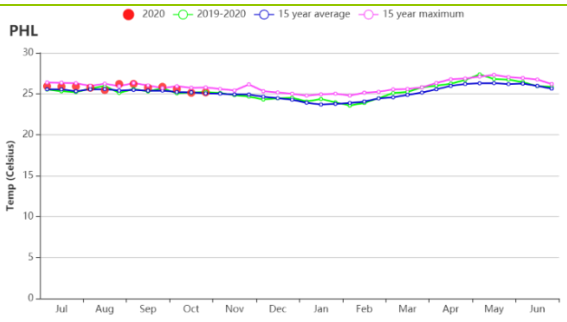
(d) Spatial NDVI patterns compared to 5YA



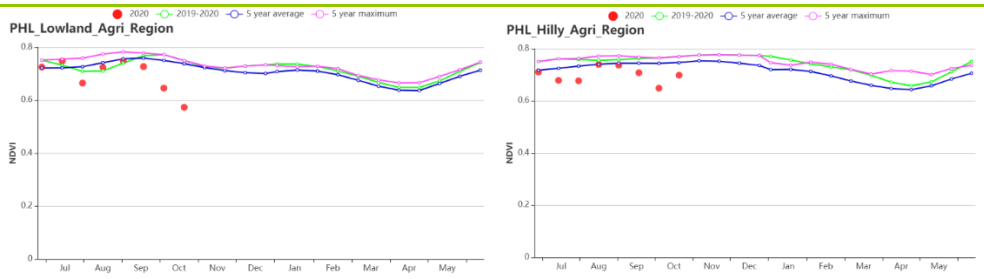
(e) NDVI profiles



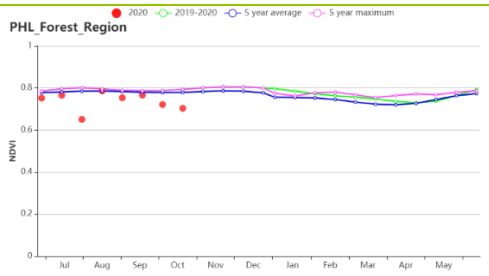
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Lowlands region (left) and Hills region (right))



(i) Crop condition development graph based on NDVI (Forest Region)

Table 3.62 Philippines' agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Forest region	1609	13	25.4	0.2	1222	1	820	0
Hilly region	1773	9	27.1	0.5	1289	4	883	4
Lowlands region	1609	-15	25.9	0.5	1235	6	833	6

Table 3.63 Philippines' agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Forest region	100	0	135	-3	0.97
Hilly region	100	0	121	-3	0.99
Lowlands region	100	0	142	-2	0.97

[POL] Poland

This monitoring period covers the harvesting period of three crops: Maize (October), spring wheat (August) and winter wheat (July-August), as well as the main growing period of maize (July-September) and the sowing period of winter wheat (September-October). Compared to the average of the last 15 years, the national-scale rainfall and average temperatures in Poland during the monitoring period were higher by 13% and 0.5°C respectively; while sunshine (RADPAR) was lower by 3%. Estimated BIOMSS was lower by 5%, due to cloudy conditions. CALF was close to the average of the last 5 years and up to 100%. VCIx was 0.99.

As shown in the graph of crop growth, NDVI was close to the average of the last 5 years during the entire monitoring period, with temperatures being lower in July and higher after August, and rainfall being slightly below average from July to August and significantly higher in September-October, compared to the average of the last 15 years. VCIx was above 0.8 for the entire country. The NDVI cluster map shows that NDVI on 25.2% (blue) of the country's cropland was above average throughout the monitoring period, 15.5% (dark green) was below average and 32.3% (red) was significantly above average in July and close to average after August, and the rest of the cropland was characterized by fluctuating changes.

Overall, crop conditions are satisfactory, but October's heavy rainfall may have had a negative impact on winter wheat planting and maize harvesting.

Regional analysis

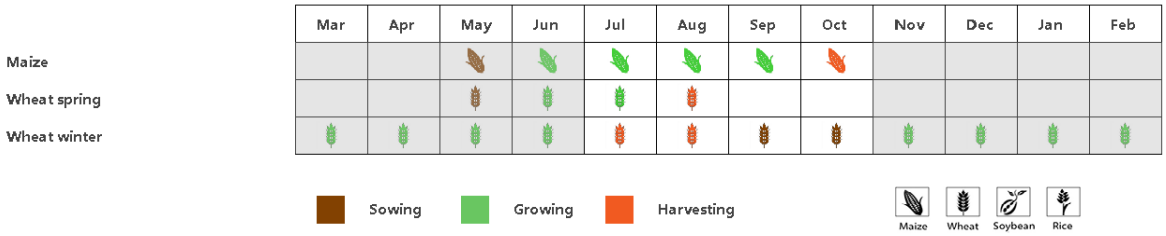
Poland is divided into four subregions based on agro-ecological characteristics, namely: (a) **Northern oats and potatoes area** (including the Western Pomeranian, Eastern Pomeranian and Wamenia-Masuria regions), (b) **Northern-central wheat and sugar-beet area** (including the Cuyavia-Pomeranian to Baltic Sea region), (c) **Central rye and potatoes area** (including the Lubus to South Podlaski and North Lublin regions) and (d) **Southern wheat and sugar-beet area** (including the southern Lower Silesia to South Lublin and the Carpathian along the Czech and Slovak border).

In the **Northern oats and potatoes area** temperature was higher by 0.6°C, while rainfall and RADPAR were lower by 11% and 4% respectively and potential biomass was 8% lower than the average of the last 15 years. Lower rainfall mainly occurred before mid-August, while the NDVI was also below average in August, but due to good soil moisture conditions in the early stages, it did not adversely affect the summer crop harvest, and the rainfall was abundant after September. The moisture content of the soil was conducive to the cultivation of winter crops. VCIx in the subregion reached 1.00, CALF was close to 100%. In general, crop growth was satisfactory.

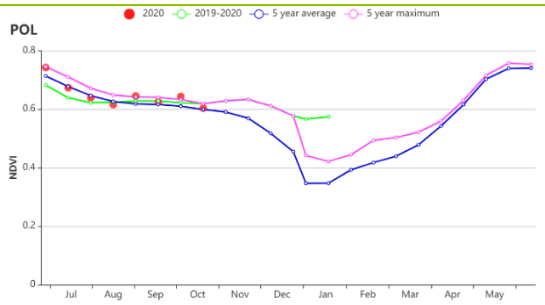
In **Northern-central wheat and sugar-beet area** and **Central rye and potatoes area**, rainfall was 4% to 6% higher and temperatures were 0.5°C higher in both subregions and were also above the average of the last 15 years. But RADPAR was 3-4% lower and potential biomass was 4-8% lower. Both subregions were characterized by cool and dry weather in July and above-average rainfall and temperatures after August, which favored crop growth. VCIx for both subregions were close to 1.0 and CALF approached 100%. Overall, agronomic conditions were favorable for crop growth in both areas.

Compared to the average of the last 15 years, rainfall in the **Southern wheat and sugar-beet area** was significantly higher by 35%, temperature was slightly higher by 0.3°C, and RADPAR and BIOMSS were lower by 4% and 3%, respectively. Rainfall in the region was consistently above average levels, and in mid-September and mid-October, it was even close to the highest levels of the past 15 years, which favors winter crops, but may be detrimental to the harvesting of summer crops and the planting of winter crops.

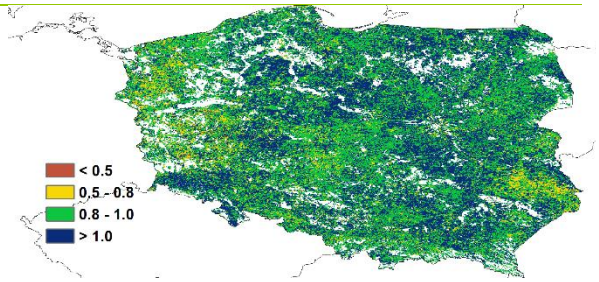
Figure 3.36 Poland's crop condition, July - October 2020



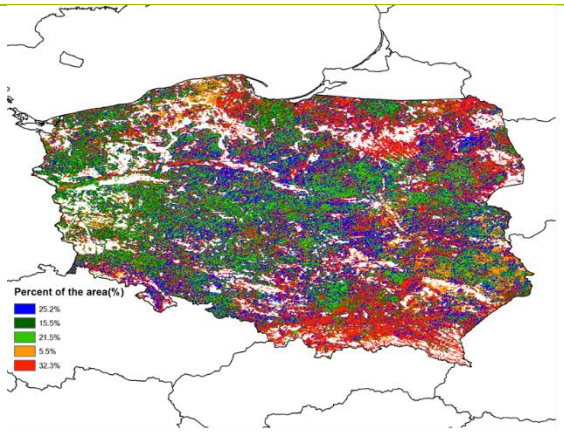
(a). Phenology of major crops



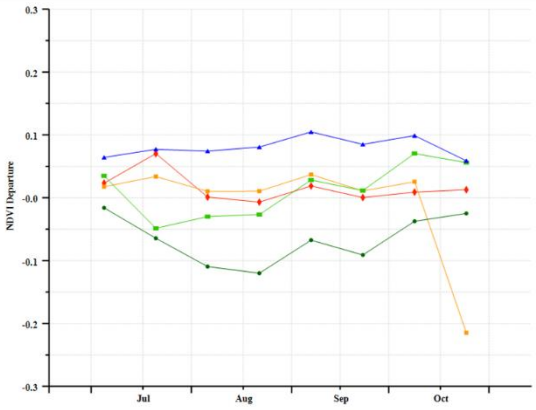
(b) Crop condition development graph based on NDVI



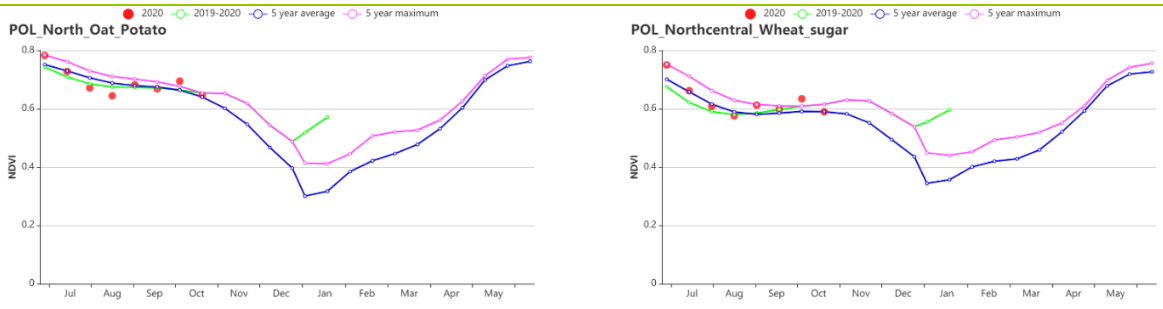
(c) Maximum VCI



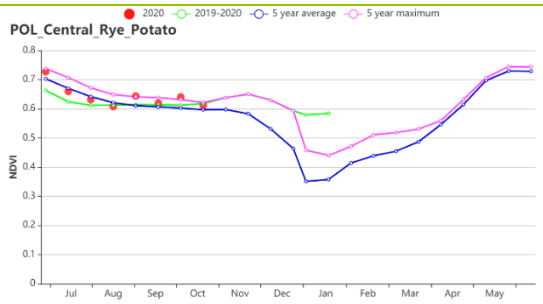
(d) Spatial NDVI patterns compared to 5YA

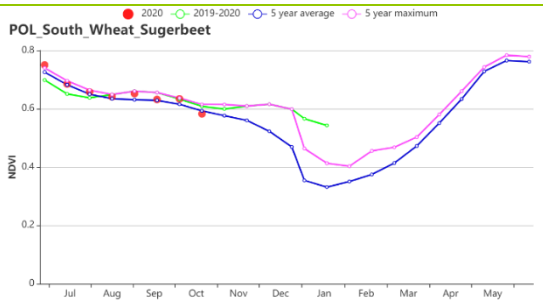


(e) NDVI profiles

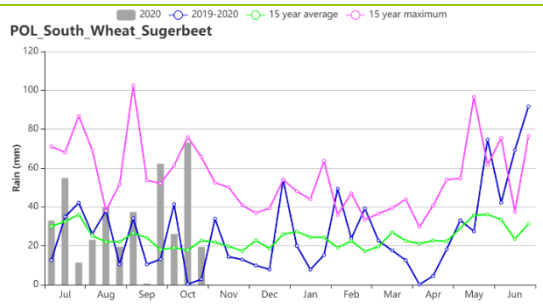


(f) Crop condition development graph based on NDVI, Northern oats and potatoes area (left) and Northern-central wheat and sugar beet area (right).

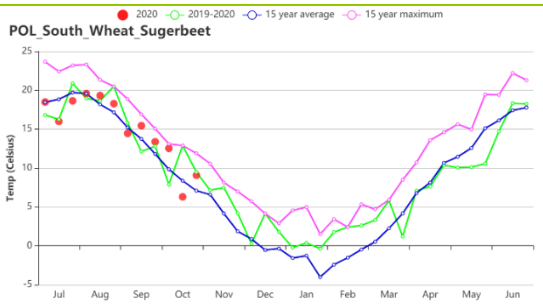




(g) Crop condition development graph based on NDVI, Central rye and potatoes area (left) and Southern wheat and sugar beet area (right).



(h) Rainfall index



(i) Temperature Index

Table 3.64 Poland's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Northern oats and potatoes areas	287	-11	15.4	0.6	774	-4	326	-8
Northern-central wheat and sugarbeet area	292	4	15.6	0.5	789	-4	339	-8
Central rye and potatoes area	293	6	16.1	0.5	817	-3	372	-4
Southern wheat and sugarbeet area	400	35	15.1	0.3	864	-4	381	-3

Table 3.65 Poland's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current	Departure (%)	Current	Departure (%)	Current
Northern oats and potatoes areas	100	0	103	1	1.00
Northern-central wheat and sugarbeet area	100	0	104	-3	1.00
Central rye and potatoes area	100	0	106	-2	0.98
Southern wheat and sugarbeet area	100	0	110	6	0.99

[AFG] Romania

The reporting period includes the harvest of the 2019-20 winter wheat (which started in July), the sowing of the 2020-21 winter wheat (which started in September) and also the harvesting of spring wheat, maize and other summer crops in September. Overall, crop conditions were fair. Rainfall was 16% lower than average; TEMP (+0.7°C) was above the 15YA, whereas RADPAR (-1%) and BIOMSS (-2%) were below average. The nationwide NDVI profile shows that crop conditions was a bit lower than average during July to early October and above average in late October. The temperature fluctuated around above average levels and rainfall was below average in August. The southeast suffered from drought conditions, which had started already in the previous reporting period. The CALF of Romania during the reporting period was 97%, 2% lower than average and the maximum VCIx was 0.86, which was fair.According to the spatial distribution of VCIx, the western and central subregion has higher values (0.8-1.0) than the eastern subregion (0.5-0.8). The NDVI pattern profile shows that regions marked with blue color located in the western and central maize, wheat and sugar beet plateau experienced a sharp decrease during July-October. NDVI was also far below average in the eastern and southern maize, wheat and sugar beet plain, shown in light green and red. Conditions improved in October, but all major summer crops grown in that region had reached maturity by then. These crops suffered from drought conditions, which had been observed already in the previous report. Hence, production prospects for this important region of Romania are unfavorable, while they are closer to normal for the other regions.

Regional analysis

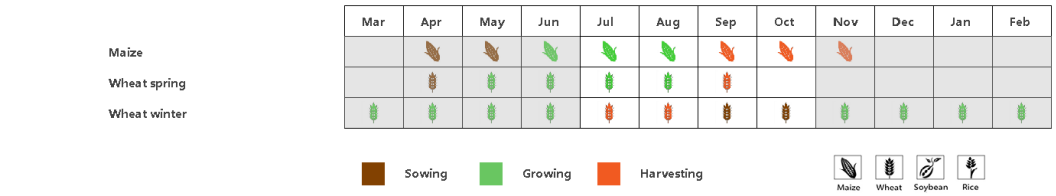
More spatial detail is provided below for three main agro-ecological zones: **Western and central maize**, **wheat and sugar beet plateau** (106), the **Central mixed farming and pasture Carpathian hills** (104) and the **Eastern and southern maize**, **wheat and sugar beet plains** (105).

For the **Western and central maize**, wheat and sugar beet plateau, rainfall was higher than average by 45%, temperature was average and radiation were somewhat lower (TEMP +0℃, RADPAR -3%), and biomass decreased 4%, probably due to decrease in solar radiation. Spatial NDVI profiles show that crop condition was better than average during August to September. However, this period was the end of wheat growing, and the total biomass is less affected. Maximum VCI of this region was 0.88, a bit low and the spatial distribution was between 0.8 and 1.0. Also the NDVI development decreased from July to October, consistent with the VCI values.The crop inensity is 102, -0.58 lower than last year.

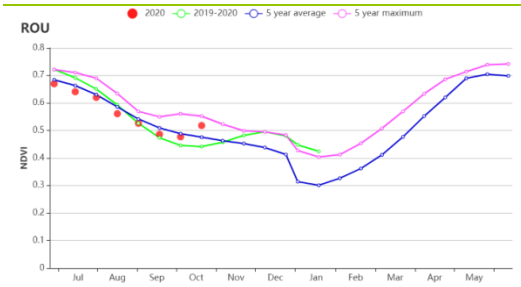
For **the Central mixed farming and pasture Carpathian hills**, rainfall increased by as much as 27% above average while temperature and radiation were both up (TEMP +1℃ , RADPAR -2%) and BIOMSS decreased 1%. According to the NDVI development, crop condition was better than average during reporting period. The maximum VCI map shows values above 0.8 , with the regional average at 0.97. The NDVI spatial distribution shows that NDVI was fair throughout the reporting period. As this AEZ occupies only a small fraction of cropland in Romania, a small patch of irrigated land in Transylvania, its fair NDVI cannot represent much of Romania crop production.The crop inensity is 100, -2.34 lower than last year.

For **the Eastern and Southern maize**, wheat and sugar beet plains, rainfall decreased 9%, temperature increased 1℃, radiation remained average and biomass decreased 2%. The NDVI development graph shows that crop condition was worse than average during July to August and improved afterwards. The increase of precipitation in this period has partially mitigated the drought impact from previous periods, while current NDVI condition is still below average. VCI max value of this region was 0.80 and according to the distribution map, VCI values were between 0.5-0.8 in most of the central and middle region (counties of Tulcea and Constanta), representing about 14.3% of national cropland. The crop inensity is 105, -2.78 lower than last year.

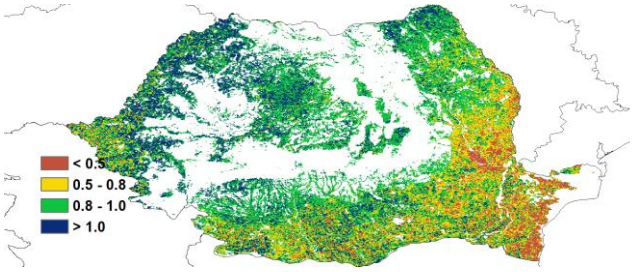
Figure 3.37 Romania's crop condition, July - October 2020



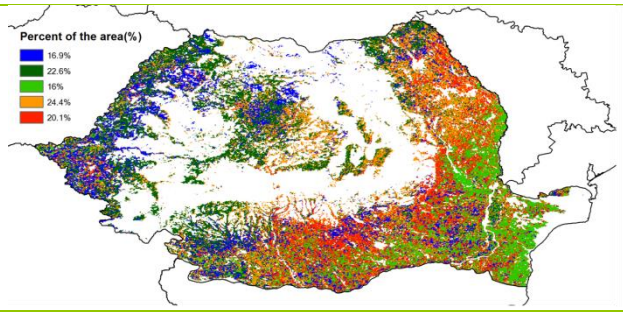
(a) Phenology of major crops



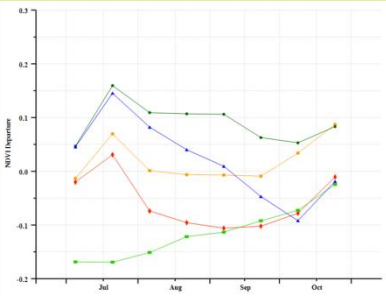
(b) Crop condition development graph based on NDVI



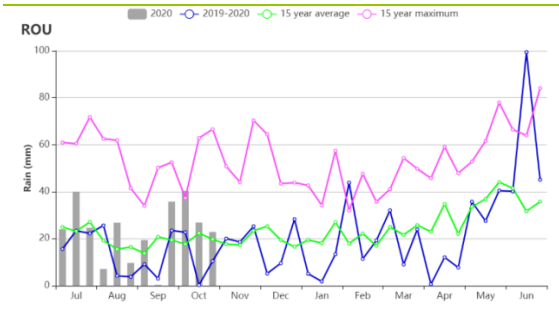
(c) Maximum VCI



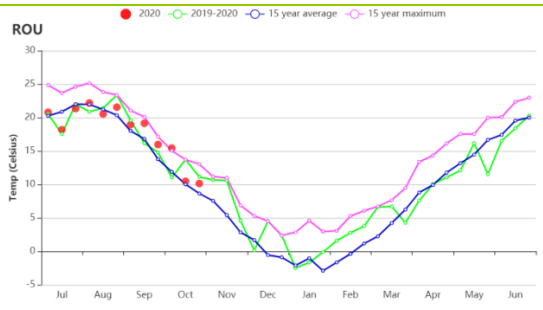
(d) Spatial NDVI patterns compared to 5YA



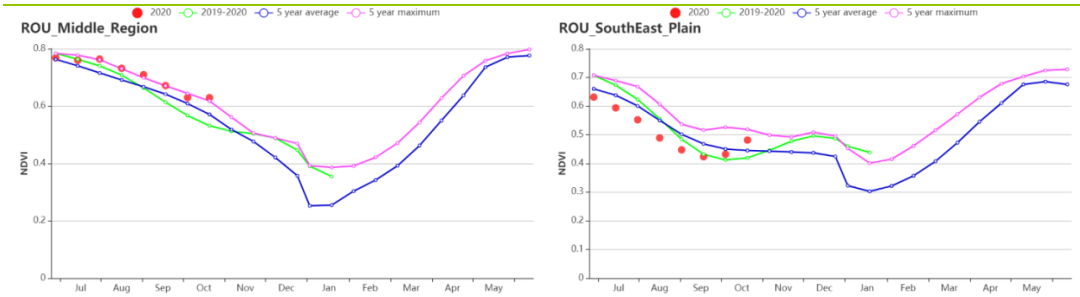
(e) NDVI profiles



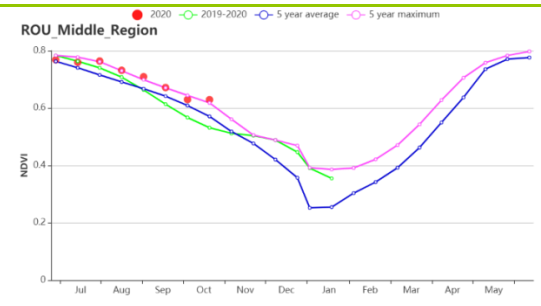
(f) Rainfall profiles

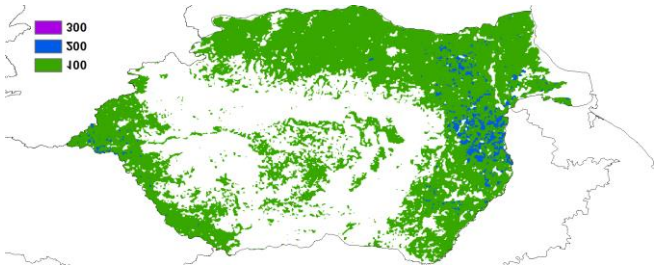


(g) Temperature profiles



(h) Crop condition development graph based on NDVI (Central mixed farming and pasture Carpathian hills (left) and Eastern and southern maize, wheat and sugarbeet plains (right))





(i) Crop condition development graph based on NDVI (Western and central maize, wheat and sugarbeet plateau) (j) Crop intensity

Table 3.66 Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central mixed farming and pasture Carpathian hills	353	27	15	1	1020	-2	430	
Eastern and southern maize wheat and sugarbeet plains	205	-9	19	1	1060	0	523	
Western and central maize wheat and sugarbeet plateau	343	45	17	0	1017	-3	468	

Table 3.67 Romania's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central mixed farming and pasture Carpathian hills	100	0	100	-2.34	0.97
Eastern and southern maize wheat and sugarbeet plains	95	-3	105	-2.78	0.8
Western and central maize wheat and sugarbeet plateau	100	0	102	-0.58	0.98

[RUS] Russia

July to October is the main harvesting time in Russia: winter crops are harvested from the end of June to the middle of July; spring grain crops have their peak season in July and are mainly harvested from August to September. The sowing of the current year's winter crops starts in Augut. Therefore, weather conditions are crucial in this monitoring period as they affect not only the spring grain crops (their growth in July and harvest in August and September) but also the winter crops (the harvest of the previous year's in July and the sowing and germination of the current year's winter crops from August to October).

According to CropWatch national data, NDVI was below both the 5-year average and the previous year's level during the monitoring period. However, there were large differences between the regions. Conditions in the spring wheat producing areas (Volga, Urals and Siberia) were generally more favorable than in the winter wheat regions.

Precipitation was above average at the beginning of the period. By the end of September, there was a sharp drop in precipitation. In early and late July, as well as in late October, precipitation exceeded the level of 2019 and the 15YA. The precipitation was about 30% lower than the 15-year average and 2019 in late September and early October.

Above-average crop condition with VCIx above 0.8 was observed in Middle Volga and central black soil area as well the central and northern parts of Ural and Volga, where areas with positive NDVI departure prevailed. However, in some other regions, like northern Caucasus, crop conditions were average or below average with VCIx below 0.8 or even below 0.5, and with average NDVI or negative departures.

In the regions with positive NDVI departures the yield of the wheat crops is expected to be at or above the level of the previous year. Winter wheat, which is predominantly grown in the regions with negative NDVI departures, was harvested in July. Hence, crop conditions were generally favorable.

Regional analysis

In **South Caucasus** region, rainfall was below the 15-year average by 25%. Temperature increased by 0.9℃ compared to the 15-year average, with RADPAR up by 2% and BIOMSS up by 4%. VCIx was 0.62, the lowest value for Russia. CALF had decreased by 15% compared to the 5-year average. NDVI was mainly below the level of the 2019 and the 5-year average. The yield of winter crops is likely to be lower than in the previous year in this region.

The **North Caucasus** experienced the lowest rainfall, which was below the 15-year average by 40%. Compared to the 15-year average, temperature was rose by 1.0℃, RADPAR increased by 3% and BIOMSS increased by 1%. CALF was 4% below the 5-year average. VCIx was 0.66. Unfavorable agroclimatic conditions resulted in NDVI being below both the 5-year average and the previous year average.

In **Central Russia**, rainfall was close to the 15-year average. Compared to the 15-year average, the temperature increased by 0.4℃, RADPAR decreased by 3%, and BIOMSS dropped by 9%. CALF was at the level of the 5-year average (100%). From July to October NDVI was below the 5-year average while close or slightly above the level of the previous year. In early July and early October, NDVI was above the previous level.

In the **Central black soils region**, there was a significant decrease in rainfall, which was below the 15-year average by 37%. Both temperature (TEMP) and radiation (RADPAR) exceeded the 15-year average, by 0.6℃ and 5% respctively, while BIOMSS decreased by 1% due to unfavorable weather conditions. VCIx was 0.94 and CALF was 100%. NDVI was above the 5-year average and the previous year average in early July but then fell below the 5-year average from August to October. On account of unfavorable weather conditions, a decrease in yield can be expected in this region.

In the **Middle Volga** region, there was a decrease in rainfall by 12% relative to the 15-year average while the temperature rose by 0.1℃ and RADPAR was up 2%. BIOMSS decreased by 1% compared to the 15-year average. CALF was 96% and VCIx was 0.87. At the beginning of July, NDVI was above that of 2019 but then fell below the 5-year average for the remainder of this monitoring period.

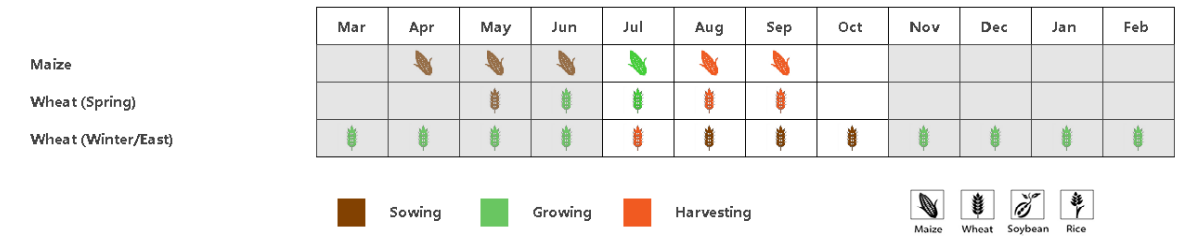
In **Ural and Western Volga** region, a major spring wheat production area, there was an increase in precipitation by 7% relative to the 15-year average, while the temperature increased by 0.7℃ and RADPAR was up by 1%. Due to favorable weather condition, BIOMSS increased by 8% compared to the 15-year average. CALF was about 99% and VCIx was 0.87. From July to August NDVI was below both the 5-year average and the previous year average while in early September it reached the 5-year average. NDVI was near the 5-year average from mid-September to October.

In **Eastern Siberia**, another major spring wheat production area, precipitation exceeded the average by 15% while temperature and RADPAR decreased by 0.1℃ and 13% respectively, compared to the 15-year average. Due to abundant precipitation and low temperature and RADPAR, BIOMSS decreased by 14% compared to average. As to the agronomic indicators, CALF was about 99%, VCIx was 0.98. Except for mid-July and early October, NDVI was near the 5-year average. Moreover, from early August to early October, NDVI was above the previous year's level. An increase in yield is expected in this region.

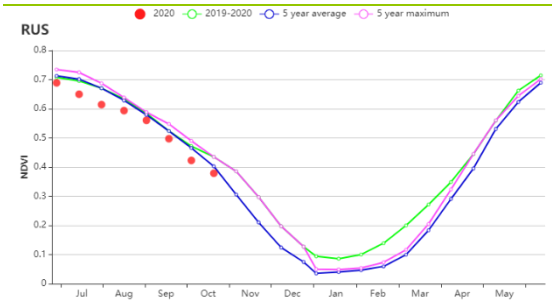
Rainfall was 33% above the 15-year average in **Middle Siberia** while temperature was only slightly higher (+0.4℃). RADPAR decreased 9% compared to the 15-year average. Unfavorable weather conditions led to a BIOMSS decrease by 10%. CALF was 99% and VCIx was 0.95. NDVI was above the 5-year average from July to September while only slightly below the average in October. An increase in yield is expected in this region.

In **Western Siberia**, there was an increase in rainfall by 22% relative to the 15-year average while the temperature rose by 0.2℃ and RADPAR was down 6%. Due to unfavorable weather conditions, the BIOMSS decreased by 2% compared to the 15-year average. CALF was 100% and VCIx was 0.86. From July to August, NDVI was below both the 5-year average and the previous year average. NDVI was near the previous year's level in September and above the 5-year average in late October.

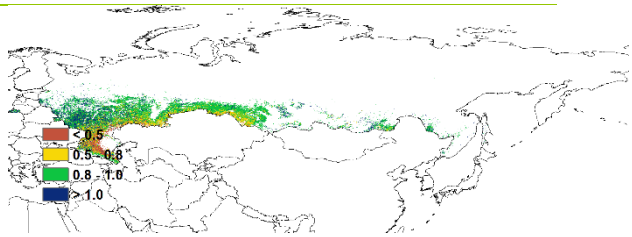
Figure 3.38 Russia's crop condition, July - October 2020



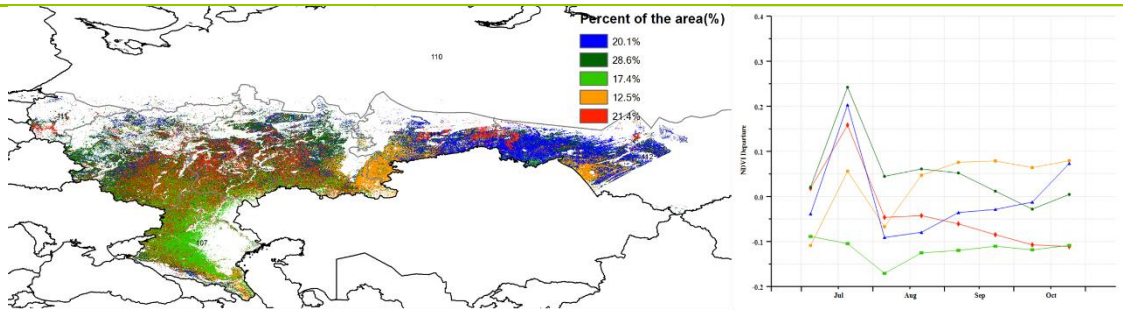
(a) Phenology of major crops



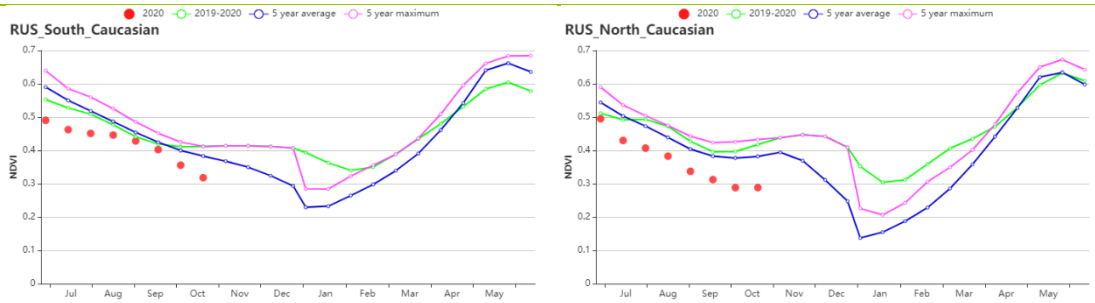
(b) Crop condition development graph based on NDVI



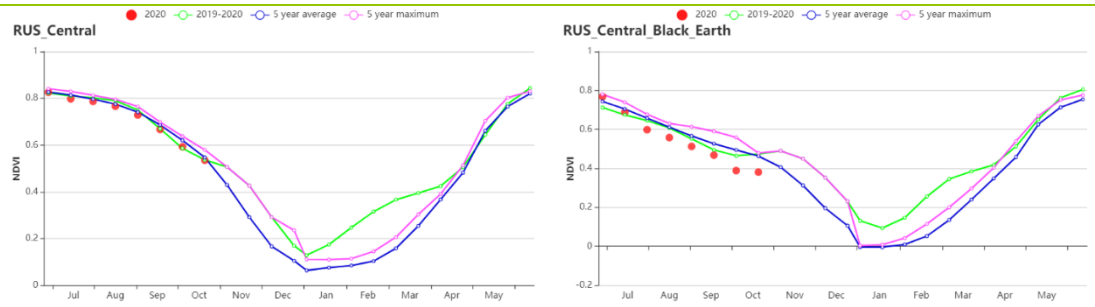
(c) Maximum VCI



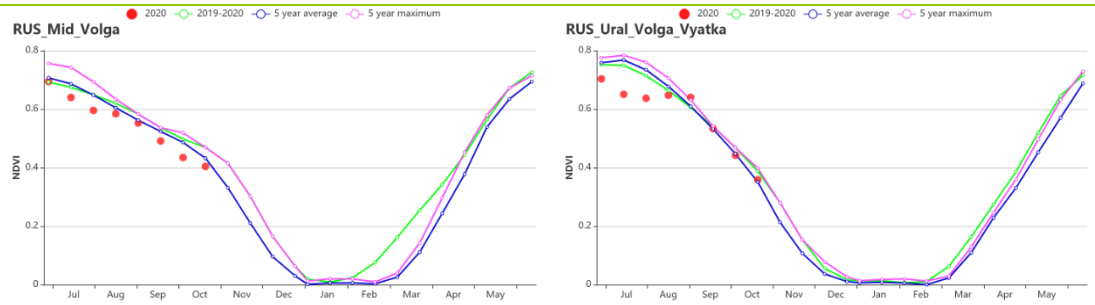
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



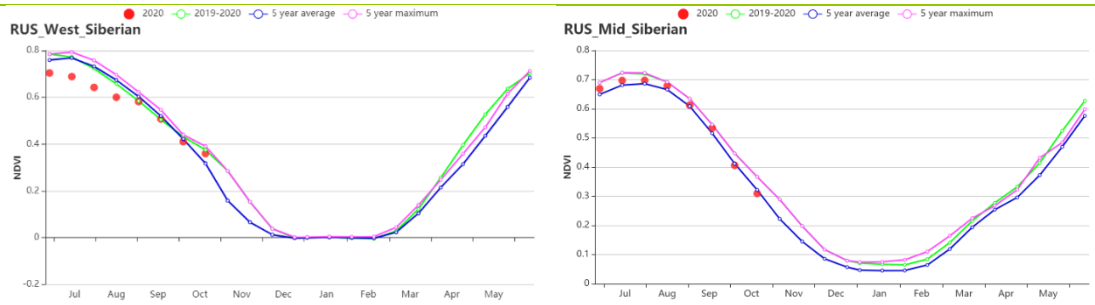
(f) Crop condition development graph based on NDVI (Southern Caucasus (left) and Northern Caucasus (right))



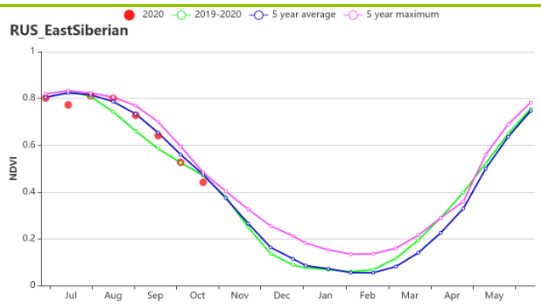
(g) Crop condition development graph based on NDVI (Central Russia (left) and Central black soils area (right))



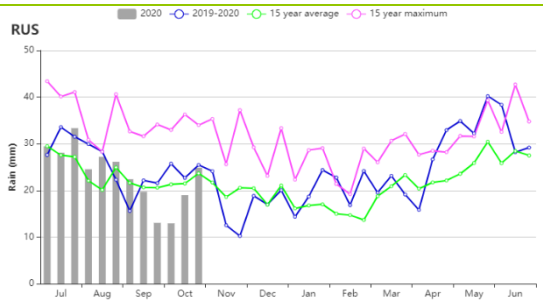
(h) Crop condition development graph based on NDVI (Middle Volga (left) and Ural and western Volga region (right))



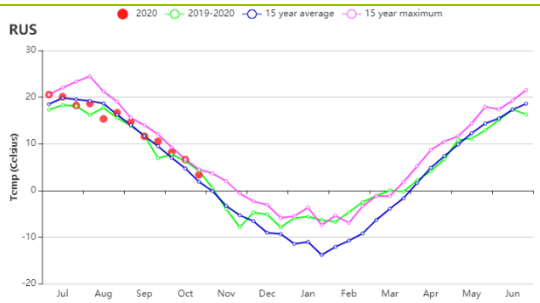
(i) Crop condition development graph based on NDVI in the Western Siberia (left) and the Middle Siberia (right)



(j) Crop condition development graph based on NDVI (Eastern Siberia)



(k) Rainfall index



(l) Temperature index

Table 3.68 Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Amur and Primorsky Krai	479	41	13.8	0.2	816	-12	356	-9
Central Russia	311	0	13.4	0.4	706	-3	283	-9
Central black soils area	153	-37	15.6	0.6	885	5	385	-1
Eastern Siberia	556	15	13.1	-0.1	759	-13	305	-14
Middle Siberia	377	33	9.3	-0.4	843	-8	288	-10
Middle Volga	240	-12	13.7	0.1	814	2	356	1
Northwest Region including Novgorod	292	-13	13.2	0.5	661	-5	257	-10
Northern Caucasus	122	-40	19.9	1.0	1074	3	536	1
Southern Caucasus	257	-25	17.9	0.9	1088	2	521	4
Ural and western Volga region	279	7	12.8	0.7	746	1	334	8
Western Siberia	328	22	12.2	0.2	758	-6	321	-2
West subarctic region	390	12	11.2	0.2	561	-8	210	-13

Table 3.69 Russia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land	Cropping Intensity	Maximum VCI

	fraction				
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Amur and Primorsky Krai	100	0	100	0	0.97
Central Russia	100	0	100	0	0.98
Central black soils area	100	0	102	2	0.94
Eastern Siberia	100	0	100	0	0.98
Middle Siberia	99	3	100	0	0.95
Middle Volga	95	-1	101	1	0.87
Northwest Region including Novgorod	100	0	100	0	0.98
Northern Caucasus	80	-4	102	-1	0.66
Southern Caucasus	67	-15	104	2	0.62
Ural and western Volga region	100	0	100	0	0.87
Western Siberia	100	0	100	0	0.86
West subarctic region	100	0	100	0	0.98

[THA] Thailand

The monitoring period covers the harvest of maize in September and the complete cycle of the main rice crop (from sowing to harvest). According to CropWatch agroclimatic indicators, Thailand experienced wet and warm weather compared to the 15YA. The rainfall (RAIN, +12%) and temperature (TEM, +0.1°C) from July to October was above average, while radiation was below average (-2%), resulting in a close-to-average biomass production potential (BIOMSS), only 1% below average. According to the NDVI development graph, crop conditions were above average until early September, but were below average after that mainly due to the cloud contamination in the satellite images. Increased rainfall provided plenty of water for the crops in this wet season. According to the NDVI departure clusters and the corresponding profiles, the crop conditions were above average except for the end of September on 44% of total arable land, mostly located in Central double and triple-cropped rice lowlands, Chaiyaphum, Nakhon Ratchasima, Phachinburi, Chachoengsao, Chonburi Nakhon Si Thammarat, Songkhla. This was confirmed by the VCIx map. The crop conditions on 21.5% of total cropland were below average throughout this monitoring period, mostly located in Western hill areas, Udon Thani and Kalasin. The crop conditions in the remaining regions were close to average in the beginning but deteriorated to below average after August. In general, favorable condition for crops was observed during the July to October period as indicated by high VCIx values at 0.97. Considering the average CALF, the crop conditions during this season are assessed as close to the average level.

Regional analysis

The regional analysis below focuses on some of the already mentioned agro-ecological zones of Thailand, which are mostly defined by the rice cultivation typology. Agro-ecological zones include Central double and triple-cropped rice lowlands (115), South-eastern horticulture area (116), Western and southern hill areas (117) and the Single-cropped rice north-eastern region (118).

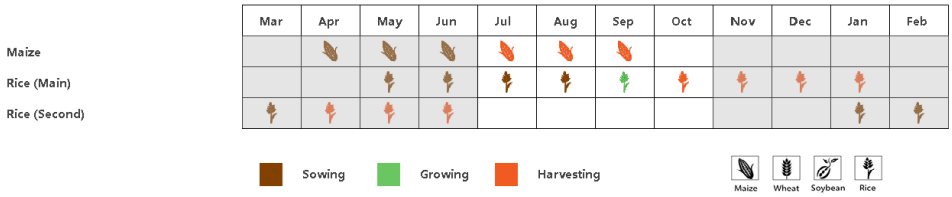
The **Central double and triple-cropped rice lowlands** is the major rice production zone of Thailand. It had received plenty of rainfall during this period. Rainfall was above average (RAIN, +37%), accompanied by average temperature (TEM, 0.0°C), while radiation was below average (RADPAR, -2%). Although rainfall was significantly above average, radiation was the limiting factor during this rainy season. As a result, the low radiation resulted in a decrease of potential production (BIOMSS, -2%). The NDVI development graph shows that crop conditions started to drop below average in September, when the crops were approaching maturity.

The agro-climatic conditions in the **South-eastern horticulture area** were the same as in the Central region**:** Rainfall was above average (RAIN, +10%), accompanied with lower radiation (RADPAR, -2%). Temperature was above average by 0.1℃. This agro-climatic condition led to a slight decrease of potential production (BIOMSS, -3%). According to the NDVI development graph, the crop condition is close to the average of recent 5years.

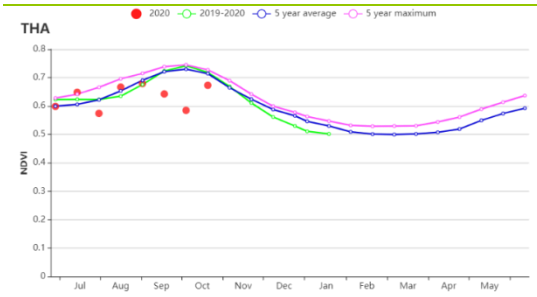
In the **Single-cropped rice north-eastern region** precipitation was above average by 7%, while temperature was above average by 0.1℃. These agro-climatic conditions accompanied with an average radiation led to a average potential production. As a result, crop conditions were above average before September but dropped to below average in September according to the NDVI development graph.

For each region, the VCIx ranging from 0.95 to 0.98 indicates that the peak season was comparable to the 5YA. Almost all cropland was cultivated during the monitoring period.

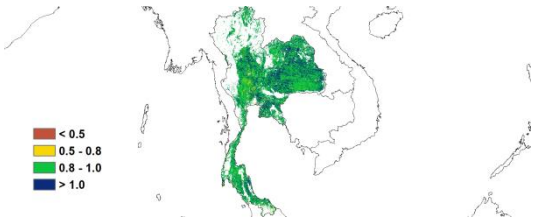
Figure 3.39 Thailand's crop condition, July - October 2020



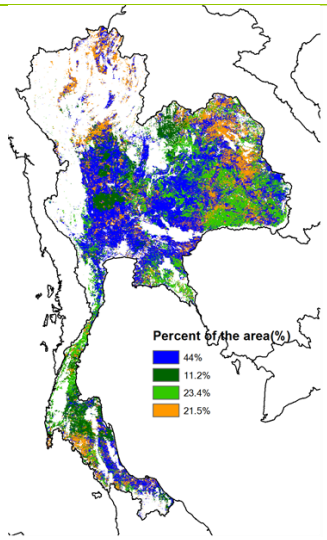
(a). Phenology of major crops



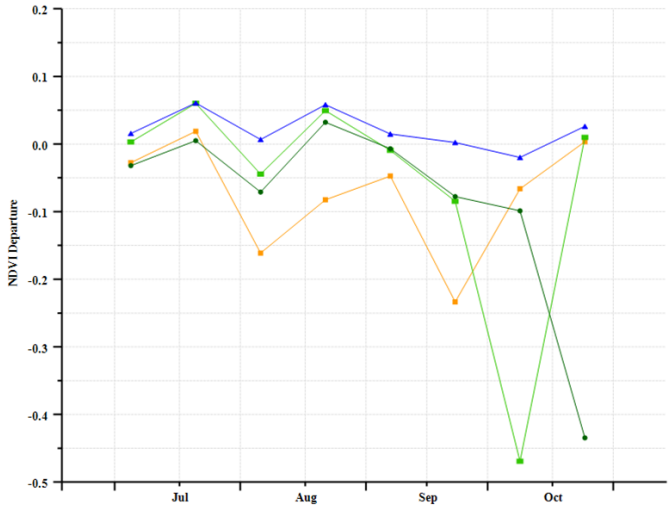
(b) Crop condition development graph based on NDVI



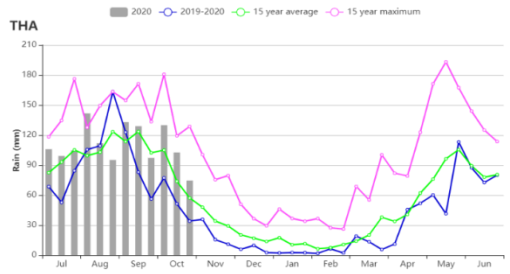
(c) Maximum VCI



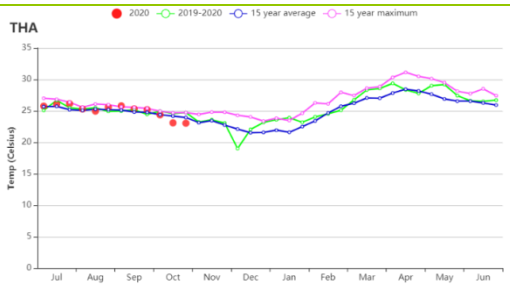
(d) Spatial NDVI patterns compared to 5YA



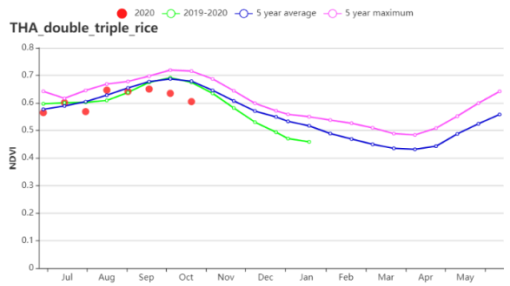
(e) NDVI profiles

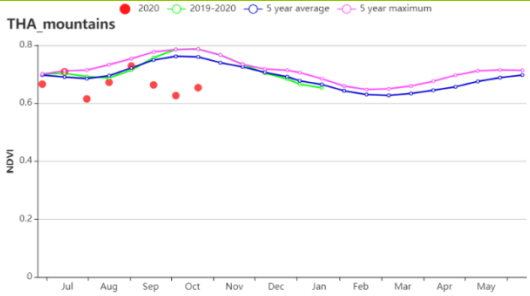


(f) Rainfall profiles



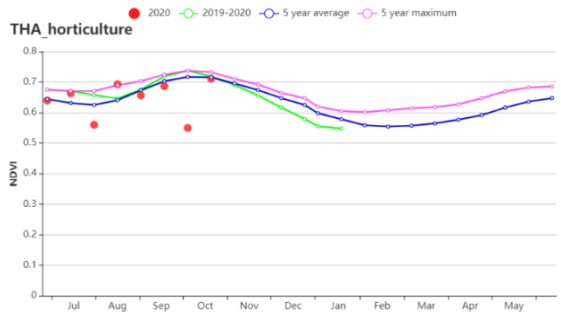
(g) Temperature profiles

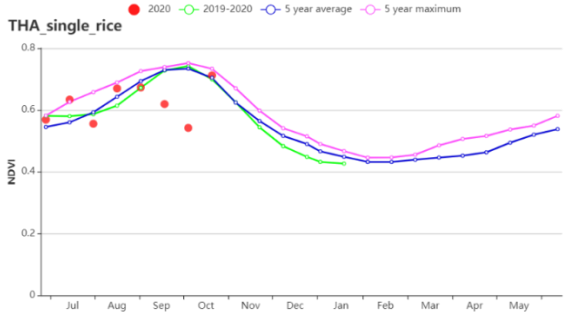




(h) Crop condition development graph based on NDVI (Central double and triple-cropped rice lowlands (left) and Western and

southern hill areas (right))





(i) Crop condition development graph based on NDVI (South-eastern horticulture area (left) and Single-cropped rice north-eastern region (right))

Table 3.70 Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central double and triple-cropped rice lowlands	1473	37	25.4	0	1042	-2	696	-2
South-eastern horticulture area	1425	10	25.8	0.1	1088	-3	742	-3
Western and southern hill areas	1231	11	24.4	0.1	1073	-3	701	-2
Single-cropped rice north-eastern region	1384	7	25.4	0.1	1084	0	724	0

Table 3.71 Thailand's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central double and triple-cropped rice lowlands	100	0	110	-12	0.95
South-eastern horticulture area	99	0	122	-7	0.98
Western and southern hill areas	100	0	120	-6	0.96
Single-cropped rice north-eastern region	100	0	107	-3	0.98

[TUR] Turkey

The reporting period covers the harvest of winter wheat (which mostly concluded in July), the growth and harvest of maize and rice, and the planting of winter wheat from September to October. Nationwide, RAIN was below average (-54%), and both TEMP (+1.1℃) and RADPAR (+2%) were above the 15YA. BIOMSS was -6% below the average. CALF was 3% up, indicating more land was cultivated.

The NDVI-based crop condition development graph indicates slightly below-average crop conditions during the whole monitoring period. The national average of VCIx was 0.78. Only limited parts of Turkey (mainly including the provinces of Kirklareli, Istanbul, Mus, Igdir, Sirnak, Tunceli, and Yozgat, etc.) experienced very promising VCIx values above 1.0, indicating that crops in those regions outperformed the best recent conditions. Most provinces located in central and western parts, such as Kirikkale, Afyonkarahisar, and Konya had low VCIx (< 0.5), which indicates below-average crop conditions.

In terms of the NDVI spatial departure clustering map, the results confirmed the spatial pattern described above. As shown by the VHIn graph, the proportion of cultivated areas experiencing minor to severe droughts was increasing to approximately 40% at the end of the monitoring period. Overall, most zones experienced some drought conditions throughout this monitoring period. Crop production is generally expected to be slightly below average.

Regional analysis

The regional analysis includes four agro-ecological zones (AEZ): **the Black Sea area**, **Central Anatolia**, **Eastern Anatolia** and **Marmara Aegean Mediterranean lowland zone**.

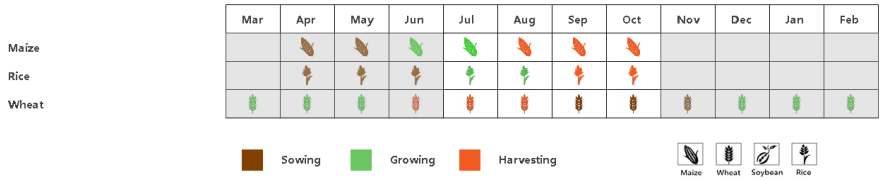
In the **Black Sea zone**, crop conditions were generally below average. The rainfall was below average (RAIN, -46%), while the temperature (TEMP) increased by 1.2℃. CALF was at average with a value of 95%, which was the highest among the four AEZs of Turkey. Cropping Intensity (CI) was at average. The average value of VCIx was high at 0.87, also the highest among all four AEZs. The crop conditions are assessed as normal.

During this monitoring period, the crop conditions were generally below average in the **Central Anatolian plateau**. This AEZ experienced the biggest rainfall deficit (RAIN, -64%) during this monitoring period. TEMP (+1.4℃) and RADPAR (+3%) were both above the 15YA. The BIOMSS index decreased slightly (-7%). Cropping Intensity (CI) was at average. The average VCIx for this region was 0.74, the lowest among the four AEZs. The cropped land area increased slightly (CALF +2%). Crop conditions are assessed as slightly below average.

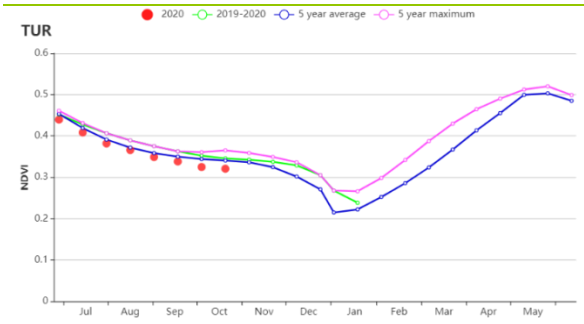
In **Eastern Anatolia**, crop conditions were above average from mid-July to early September and then dropped to below average in October. TEMP and RADPAR were 0.7℃ and 1% above the average, respectively, while the rainfall was below average (RAIN -46%). BIOMSS increased by 9%, which was the biggest positive departure among the four AEZs. The CALF increased (+8%) compared to the average. Cropping Intensity (CI) was 6% down comparing to the 5YA, which is the largest negative departure among AEZs. With VCIx at 0.85, crop output is assessed to be favorable.

As indicated by the NDVI profile, in the **Marmara Aegean Mediterranean lowland zone**, the crop conditions were below the 5YA during the whole monitoring period. RAIN was 58% below the average. The temperature was slightly above average (TEMP +1.1℃). Cropping Intensity (CI) was slightly up (+1%). VCIx was 0.75, and CALF is up 2%. Production prospects in this region are expected to be below or near average.

Figure 3.40 Turkey's crop condition, July - October 2020

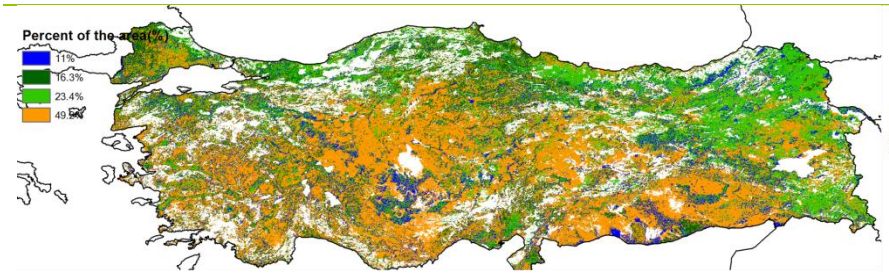


(a). Phenology of major crops

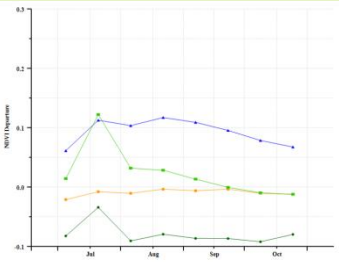


(b) Crop condition development graph based on NDVI

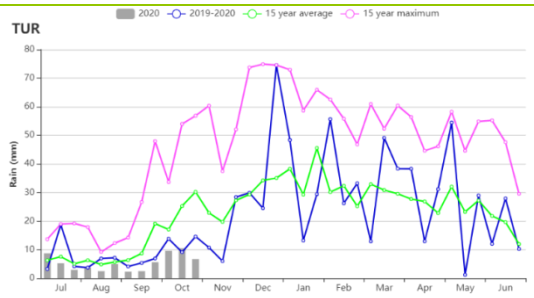
(c) Maximum VCI



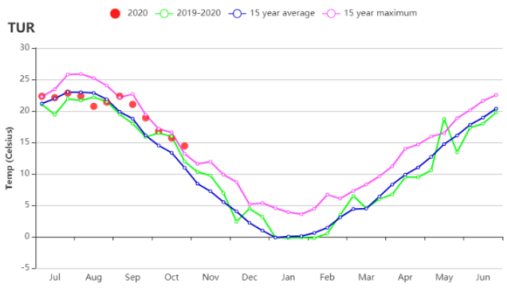
(d) Spatial NDVI patterns compared to 5YA



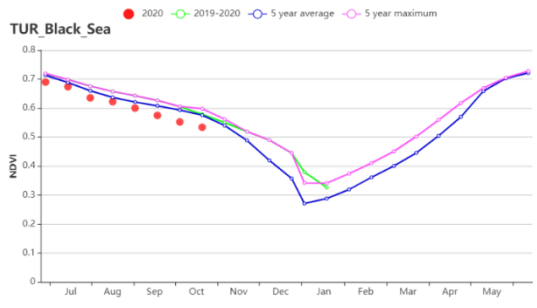
(e) NDVI profiles

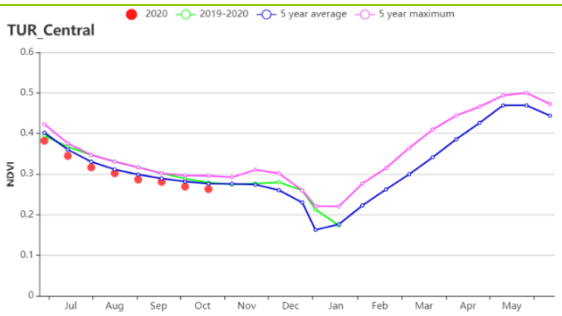


(f) Time series rainfall profile

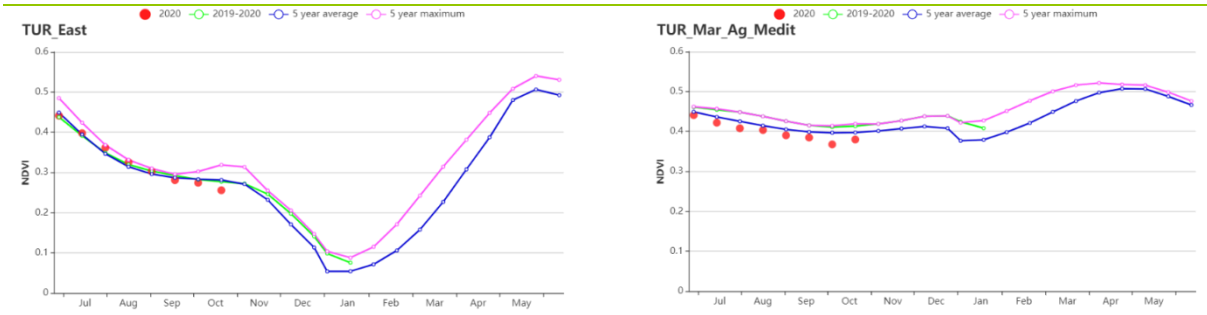


(g) Time series temperature profile

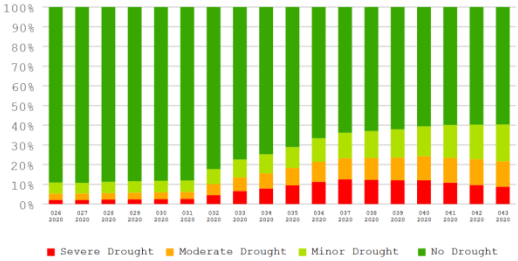




(h) Crop condition development graph based on NDVI (Black Sea region (left) and Central Anatolia region (right))



(i) Crop condition development graph based on NDVI (Eastern Anatolia region (left) and Marmara_Agean_Mediterranean lowland region (right))



(j) Proportion of VHIm categories compared with 5YA

Table 3.72 Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Black Sea region	155	-46	16.4	1.2	1164	5	495	6
Central Anatolia region	40	-64	19.3	1.4	1314	3	466	-7
Eastern Anatolia region	80	-46	18.1	0.7	1326	1	422	9
Marmara Agean Mediterranean lowland region	52	-58	22.7	1.1	1326	1	393	-16

Table 3.73 Turkey's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Black Sea region	95	0	102	0	0.87
Central Anatolia region	36	2	103	0	0.74
Eastern Anatolia region	53	8	101	-6	0.85
Marmara Agean Mediterranean lowland region	58	2	108	1	0.75

[UKR] Ukraine

In the Ukraine, the harvest of wheat took place in July, whereas the harvest of maize started in September. In that month, the winter wheat sowing started as well. The national NDVI development curve trended slightly lower than the 5-year average until the middle of October. According to agroclimatic indicators, Ukraine experienced a warmer summer, temperature (17.8℃) was 1.1 ℃ higher than the 15-year average, sunshine was normal (967 MJ/m², +2%), while rainfall was a little bit lower than the 15YA (198 mm, -3%). Based on the above situation, potential biomass was projected to be 2% higher than the 15-year average. Agronomic conditions were also favorable: nearly all cropland was cultivated (CALF, 95%,-1%), and maximum VCI reached 0.88. However, the distribution of VCIx was quite uneven. The VCIx gradually decreased from the west to the east. The lowest value (0.5) was observed for the Crimea. According to the NDVI spatial pattern, NDVI was persistently above average mainly in the western area (26.7%), while in the eastern Ukraine (20.6%) it was below average throughout this monitoring period. All in all, crop conditions were generally favorable.

Regional analysis

Regional analyses are provided for four agro-ecological zones (AEZ) defined by their cropping systems, climatic zones and topographic conditions. They are referred to **Northern wheat area** with Rivne; **Eastern Carpathian hills** with Lviv, Zakarpattia and Ivano-Frankivsk Oblasts, **Central wheat area** with the Poltava, Cherkasy, Dnipropetrovsk and Kirovohrad Oblasts; and **Southern wheat and maize area** with Mykolaiv, Kherson and Zaporizhia Oblasts.

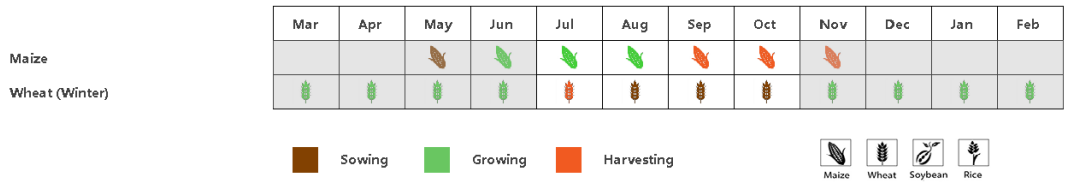
In the **Central wheat area**, rainfall was short by 14% compared to the 15YA, with higher temperature (TEMP +1.3°C) and above average radiation (RADPAR +3%). NDVI had reached the 5 year maximum level in July, and then pretty much followed the trend of last year. BIOMSS was 5% above average, CALF reached 100% and VCIx was satisfactory (0.92).

Similar conditions prevailed in **Northern wheat area**, which had suffered from a rainfall deficit (-8%). However, NDVI trended near the 5 year maximum values. CropWatch estimated BIOMSS at 3% above average. Overall, crop conditions were favorable for this region.

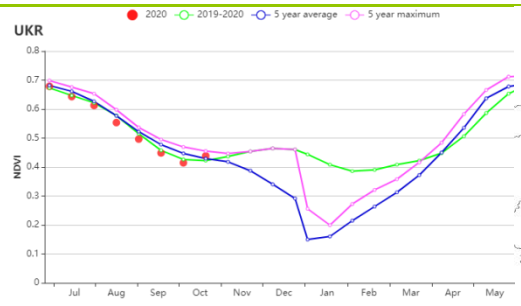
Eastern Carpathian hills received more rainfall as compared to 15-year average (317 mm, +12%), temperature was normal (15.4 °C) while radiation was 1% lower than average. Potential biomass was predicted to be slightly below average (-2%). CALF and VCIx were favorable. All in all, conditions were favorable for this region.

The **Southern wheat and maize area** showed average conditions during the monitoring period. Weather was favorable: rainfall and temperature were above average and radiation increased by 4% compared to the average. This area had good CALF (90%) but relative moderate VCI (0.77), which was lower than other AEZs and the NDVI profile remained below average throughout the monitoring period. In summary, the overall situation was just fair for this region.

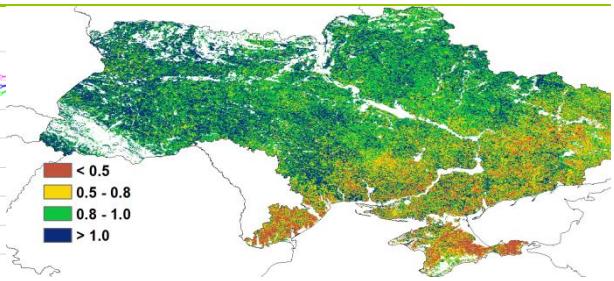
Figure 3.41 Ukraine's crop condition, July- October 2020



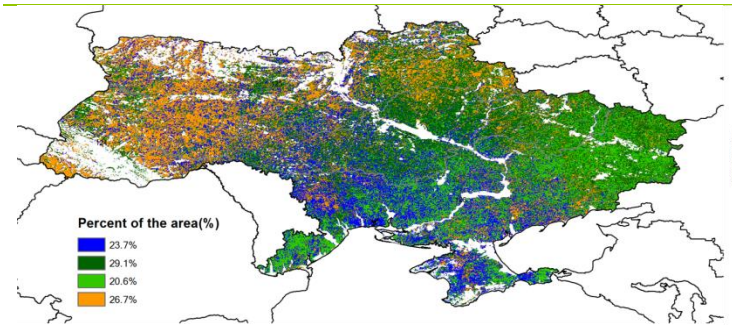
(a). Phenology of major crops



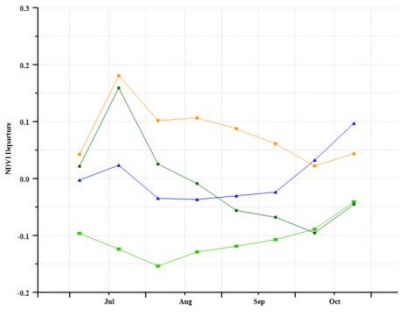
(b) Crop condition development graph based on NDVI



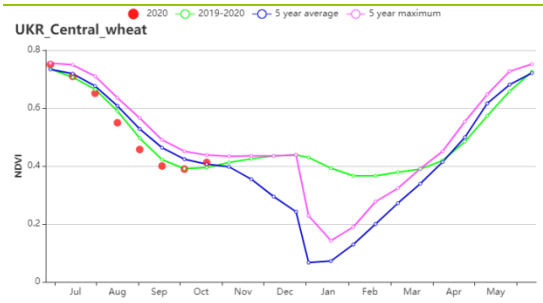
(c) Maximum VCI

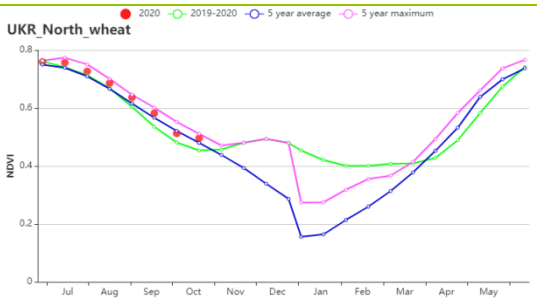


(d) Spatial NDVI patterns compared to 5YA

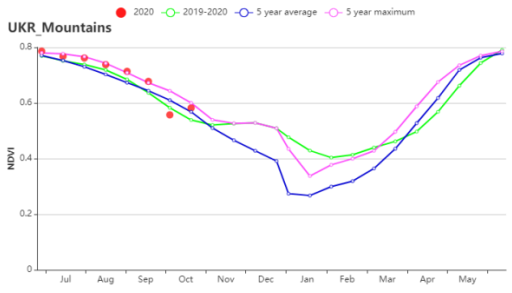


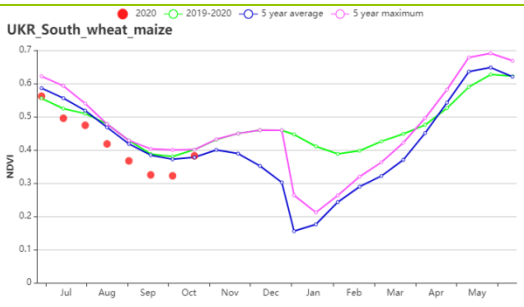
(e) NDVI profiles



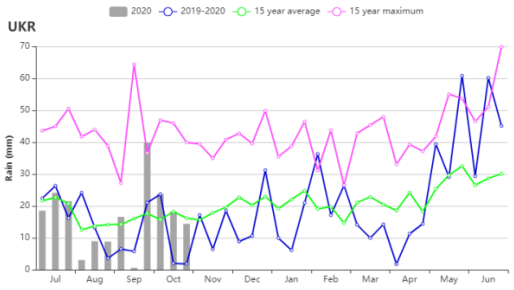


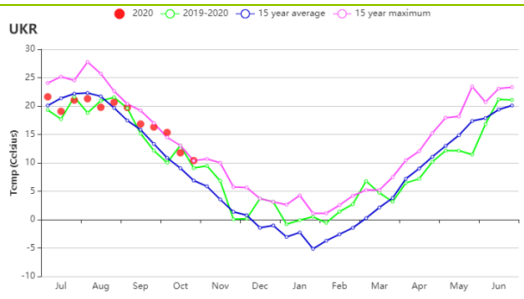
(e) Crop condition development graph based on NDVI (Central wheat area(left) Northern wheat area(right))





(f) Crop condition development graph based on NDVI (Eastern Carpathian hills(left) Southern wheat and maize area(right))





(g) Rainfall profile (left) and temperature profile (right)

Table 3.74 Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, - July- October 2020

Region	RAIN	TEMP	RADPAR	BIOMSS

	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central wheat area	160	-14	18	1.3	972	3	477	5
Eastern Carpathian hills	317	12	15.4	0.5	944	-1	408	-2
Northern wheat area	212	-8	16.6	1.1	901	1	421	3
Southern wheat and maize area	165	3	19.6	1.2	1036	3	519	1

Table 3.75 Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July- October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central wheat area	100	0	100	-1	0.95
Eastern Carpathian hills	100	0	102	2	0.97
Northern wheat area	100	0	102	2	0.96
Southern wheat and maize area	99	0	105	-1	0.85

[USA] United States

This monitoring period (July to October 2020) covers the main growing season and harvest period of the following summer crops: soybean, maize and rice. Sowing of winter wheat started in September. As reported in the August CropWatch bulletin, conditions for planting and establishment of the summer crops were favorable, with a good supply of soil moisture until July. Close to average rainfall helped sustain crop growth during the grain filling phase. Slightly drier conditions in September and October provided good conditions for harvest. All in all, crop conditions for cereals were favorable.

During this monitoring period, close-to-average agro-climatic condition occurred and precipitation, temperature and radiation were 6%, 0.1℃, 0% below the 15YA. The potential biomass was 3% below the average due to reduced precipitation. During this monitoring period, the southeastern regions of the United States received above-average precipitation, while total rainfall was below average in the Corn Belt, Northern Plains and Western United States. California (-85%) was most affected, followed by Idaho (-32%), Minnesota (-30%), North Dakota (-35%), South Dakota (-39%), Iowa (-22%), Michigan (-15%) and Ohio (-19%). However, these deficits occurred mostly during the period from mid-September to mid-October (Figure 2). The fraction of cropland impacted by drought conditions increased from 25% in July to about 40% in late-October. However, drier-than-normal conditions had little impact on yield as the crops approached maturity in September. Drier-than-normal weather actually improved harvest conditions.

The great spatial heterogeneity in precipitation had caused significantly variation in crop conditions. The NDVI departure profile and cluster map shows that above-average crop conditions were widely observed in the southeastern USA, while average crop conditions were generally observed in the northern plains, northern Corn Belt, and western part of the country starting in September. Crops don't require much water anymore in September as they are reaching maturity. Dry conditions during that month provide good conditions for harvest. Therefore, drops in NDVI in September had no negative impact on yield. A VCIx value higher than 0.8 also indicates that the crops in the southern corn belt were in good conditions. Although California suffered from severe precipitation shortages, its crop conditions were close to average, which may be attributed to developed irrigation infrastructures. Compared with the last 5 years, the cropped arable land fraction and the cropping intensity were both 1% below the average.

Considering the lower water requirements of the crops in September and October, CropWatch concluded that below-average precipitation and signs of drought conditions during these months had little impact on final crop yields and crop conditions in the United States were generally favorable.

Regional analysis

During this monitoring period, the biggest challenge for crop growth is insufficient precipitation during July and August. According to the distribution of crops in this current season, the analysis in this section focuses on the Corn Belt, Northern Plains, Northwest, Lower Mississippi, Southeast and Southern Plains.

Corn Belt

This is the most important corn and soybean producing area in the United States. It includes Illinois, Iowa, Minnesota, Wisconsin, Ohio and Michigan. Compared with the 15YA, this area experienced slightly below average precipitation during the monitoring period with below-average rainfall (-16%) and temperature (-0.6℃) and slightly above-average radiation (+1%). Significantly below-average precipitation occurred in late August and September. In Iowa, total rainfall was 30% below the average. Fortunately, crops reached the maturity stage in September, so that reduced rainfall had little impact on crop yields. The crop condition development graph based on NDVI indicates that the crops were at their peak in late July and early August. NDVI subsequently dropped faster than usual, but this had no impact on crop yields, as maize reaches physiological maturity in mid-September. CropWatch assessed the crop conditions as

favorable.

Lower Mississippi

This is the most important rice producing area and an important soybean producing area in the United States. It includes Arkansas, Louisiana, Mississippi and Missouri. The agro-climatic conditions in the lower Mississippi were close to the average with average rainfall (+ 3%) and temperature (-0.4°C), while the average PAR was 3% lower than the 15YA. The observed crop conditions were at average levels during the monitoring period. The VCIx value reached 0.95, which also confirmed the favorable crop growth conditions in this region.

Northwest

This is an important winter wheat producing area in the United States, including Washington (Rain, -7%) and Idaho (Rain, -22%). In the current season, this area experienced below-average precipitation, especially in Idaho. Compared with the 15YA, rainfall was 21% below average, temperature was 0.5℃ above average and PAR was 1% above average. The time series of rainfall shows that the rainfall in the northwestern region was significantly lower than average in July, August, and early September. Fortunately, the main crops in the area (winter wheat and barley) were harvested in July or early August and largely avoided the adverse effects of water stress. The NDVI development profile indicates that the crop conditions were close to the 5 year average until late September and crop conditions were average as well.

Northern Plains

This is the most important spring wheat and sunflower producing area in the United States and the second most important corn and soybean producing area. It includes North Dakota (Rain, -35%), South Dakota (Rain, -39%), Nebraska (Rain, -13%) and Montana (Rain, -4%). This monitoring period covers the grain filling stages of spring wheat and the flowering and grain filling stages of maize and soybean. This region had benefitted from slightly above-average precipitation during the April to July period. Compared with the 15YA, the northern plains had experienced drier weather conditions, with rainfall and temperature both lower than the 15YA (-19% and -0.1℃ respectively). During the period of mid-September to early October, the Northern Plains experienced a rainfall deficit. Spring wheat was harvested in August and the water shortage had no impact on spring wheat. Maize and soybeans reach maturity in September and they were barely impacted by the drier-than-usual conditions. CALF was at 0.86, 6% higher than the 5YA. All in all, crop conditions were favorable for this region

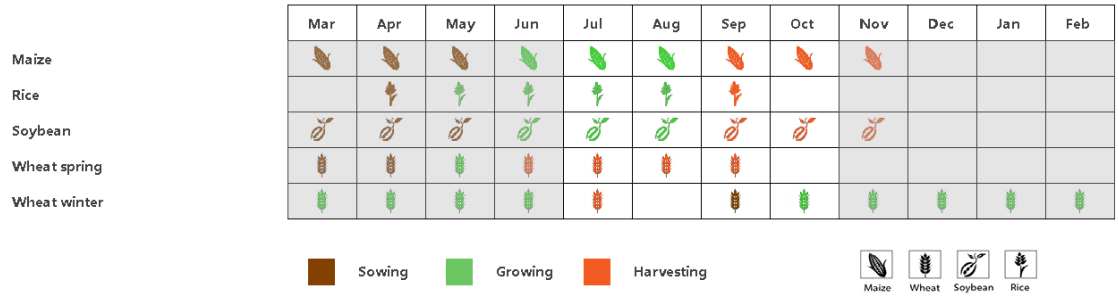
Southeast

This is an important cotton production area in the United States, including Georgia, Alabama and North Carolina. During the monitoring period, the agro-climatic conditions in this region were favorable. Compared with the 15 YA, rainfall was 9% higher, temperature 0.2℃ lower and PAR 3% below average. Rainfall helped sustain vigorous crop growth, and the VCIx value reached 0.94. In general, the crop growth conditions were favorable in the region

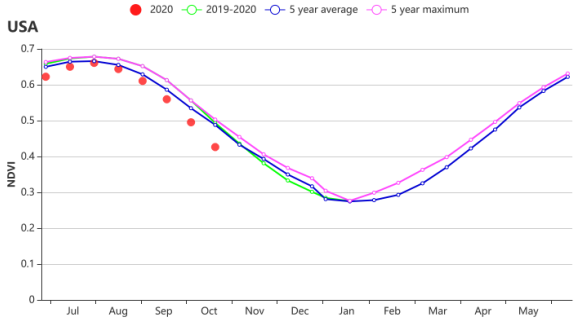
Southern Plains

This is the most important winter wheat, sorghum and cotton producing area in the United States. It includes Kansas, Oklahoma, Texas, and eastern Colorado. Texas is the largest cotton producing state in the United States. During this monitoring period, the southern plain experienced normal weather: Compared to the 15YA, rainfall did not deviate from the average, and temperatures were 0.5 ºC below average and PAR 1% below average. Winter wheat was completely harvested at the beginning of July, and this monitoring period covers the grain filling period of sorghum, and setting bolls and harvest of cotton. The development profile of NDVI shows that the crop conditions were significantly below average. CALF was 8% below average. All in all, crop conditions were slightly below average. However, they varied greatly within the region, as shown in Figure 6. Especially the Texas pan handle and Colorado suffered from drought conditions.

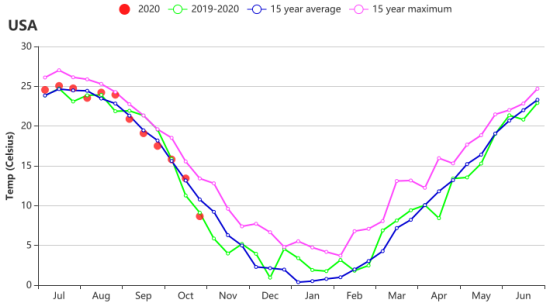
Figure 3.42 United States' crop condition, July - October 2020



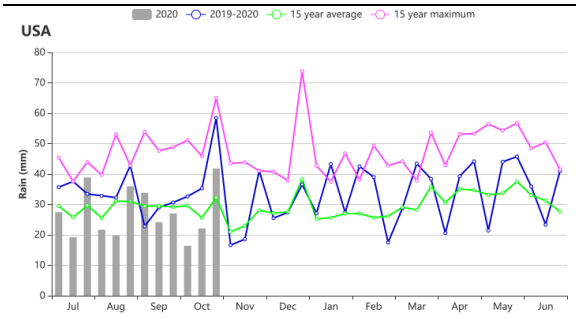
(a). Phenology of major crops



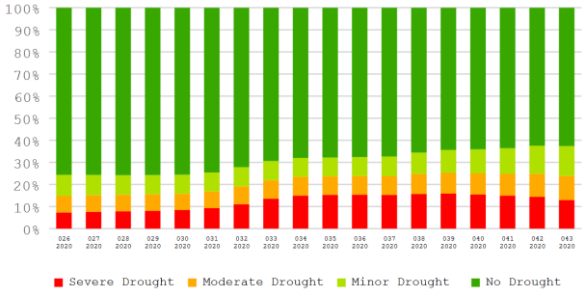
(b) Crop condition development graph based on NDVI_USA



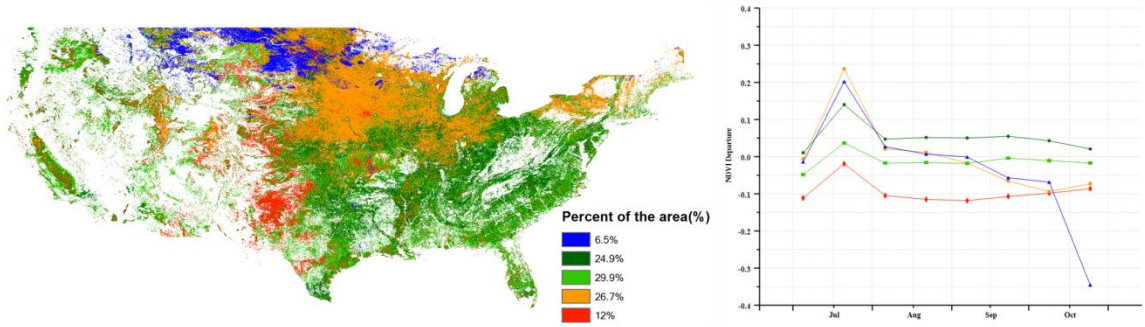
(c) Temperature development graph



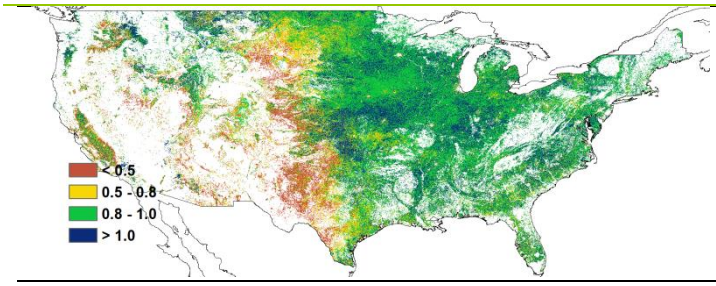
(d) Rainfall development graph



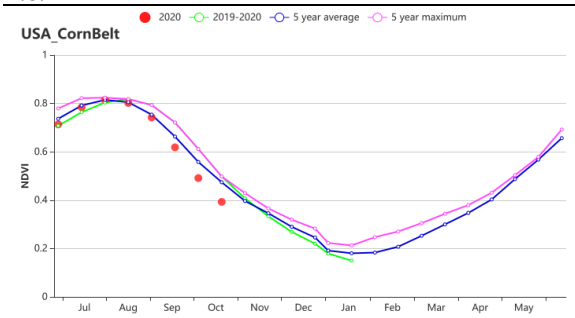
(e)Dynamic change of drought categories

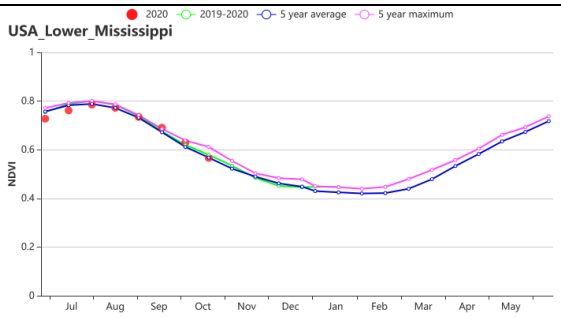


(f) NDVI departure clustering and its development profile

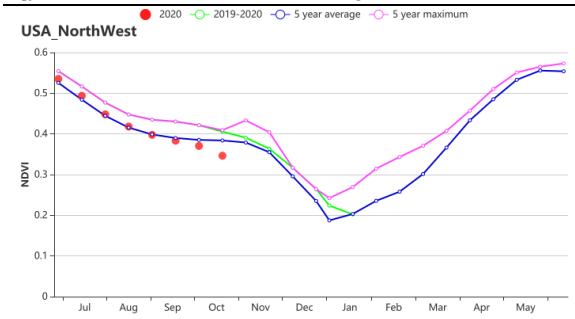


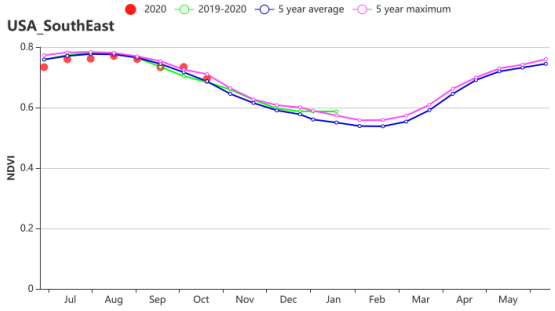
(g) Maximum VCI



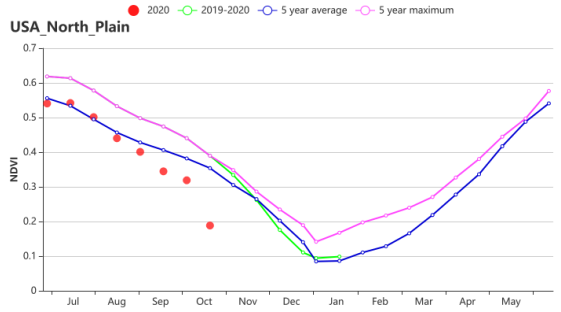


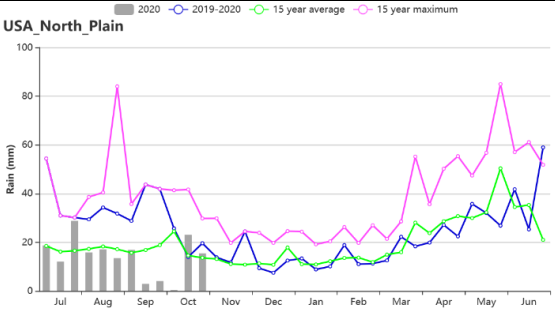
(j) Crop condition development graph based on NDVI of Corn Belt(left) and lower Mississippi(right)



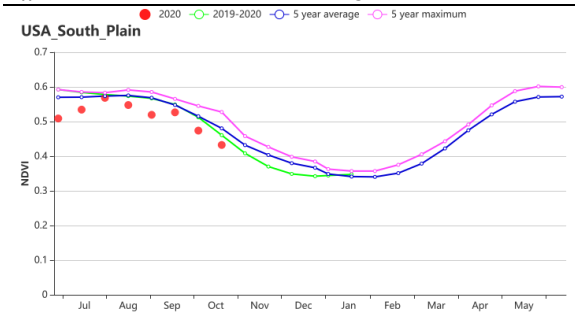


(j) Crop condition development graph based on NDVI of NorthWest(left) and SouthEast(right)





(l) Crop condition development graph based on NDVI(North Plain) and Rainfall time series



(n) Crop condition development graph based on NDVI(South Plain)

Table 3.76 United States' agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July2020 to October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	RAIN
	Current (mm)	Departure	Current (°C)	Departure	Current (mm)	Departure	Current (gDM/m^2)	Departure
California	9	-84	21.5	1.6	1414	1	336	-21
Corn Belt	257	-16	18.0	-0.6	1100	1	583	2
Lower Mississippi	504	3	24.0	-0.4	1144	-3	710	-3
North-eastern areas	131	-21	15.5	0.5	1202	1	454	-5
Northwest	169	-19	16.7	-0.1	1185	2	571	1
Northern Plains	560	9	24.1	0.2	1158	-3	731	-1
Southeast	150	-43	20.5	1.0	1341	3	514	-15
Southwest	354	0	23.3	-0.5	1211	-1	697	-4
Southern Plains	9	-84	21.5	1.6	1414	1	336	-21

Table 3.77 United States' agronomic indicators by sub-national regions, current season's values and departure, July2020 to October 2020

Region	Cropped arable land fraction		Maximum VCI	Cropping Intensity	
	Current (%)	Departure from 5YA (%)	Current	Current	Departure from 5YA (%)
California	45	8	0.74	103	-1
Corn Belt	100	0	0.96	100	0
Lower Mississippi	100	0	0.95	100	0
North-eastern areas	72	7	0.86	100	0
Northwest	86	6	0.80	103	-3
Northern Plains	100	0	0.94	100	-3
Southeast	37	-8	0.61	102	1
Southwest	80	-8	0.78	105	-1
Southern Plains	100	0	0.96	103	-2

[UZB] Uzbekistan

This report covers the harvest of winter wheat and maize. Sowing of winter wheat started in September.

The crop conditions for the country were generally favorable and peaked at above-average levels in August, according to the NDVI development graph. The national average VCIx was 0.93, and the cropped arable land fraction increased by 14%. Among the CropWatch agroclimatic indicators, TEMP and RADPAR were below average (−1.5° C, and -5%), while RAIN increased by 4%. The agro-climatic conditions resulted in an increase of BIOMSS by 27% compared to the recent fifteen −year average. The NDVI cluster graphs and profiles show generally positive NDVI departures, i.e., conditions were better than average and VCIx was higher from July to October covering most provinces of Samarkand, Kashkadarya on about 38% of the cropland. Only about 11% experienced below-average conditions.

Overall, the crop conditions are estimated as favorable.

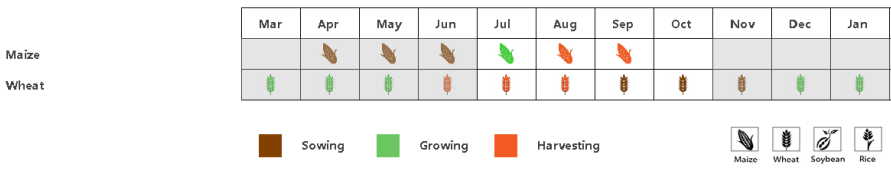
Regional analysis

In the rainfed Eastern hilly cereals zone, the main wheat production region of the country, NDVI was near average from July to early August and above average from the end of August until early October. RAIN was slightly above average (+7%), and RADPAR and TEMP were below average (−5% and -1.6° C). The combination of these factors resulted in a BIOMSS increase (+38%) compared to the 15YA average. The maximum VCI index was 1.00, while the cropped area increased by 24% compared to the five-year average. In short, crop condition was favorable in this zone.

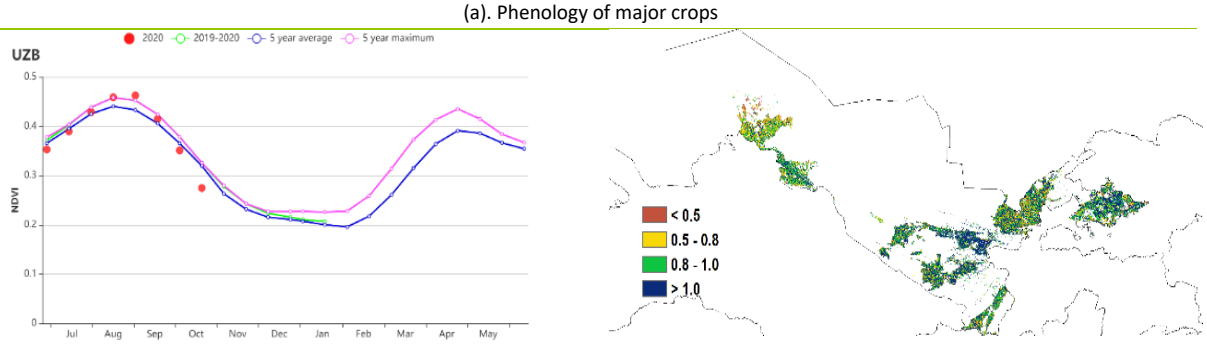
In the Irrigated Aral Sea cotton zone, the crop conditions were the least favorable among the three regions, however, they were still close to average. This zone does usually not receive any significant summer rains, so the shortage of rainfall (RAIN -82%) had no impact on crop production, as all the cotton is irrigated. The maximum VCI index was 0.83 while the cropped arable land increased by 4%. Overall, crop prospects were normal.

The crops in the Central region experienced the most favorable conditions according to the NDVI development graph. NDVI values exceeded the 5YA for most of the monitoring period. Average TEMP was 22.6°C, 1.2°C below the 15YA and RADPAR was also below average (-3%). The above average estimate for biomass (BIOMSS +5%) was in agreement with the NDVI values. Overall, the maximum VCI at 0.96 and the positive departure of the CALF (+13%) indicated favorable conditions in this region. Above average production is estimated for this region.

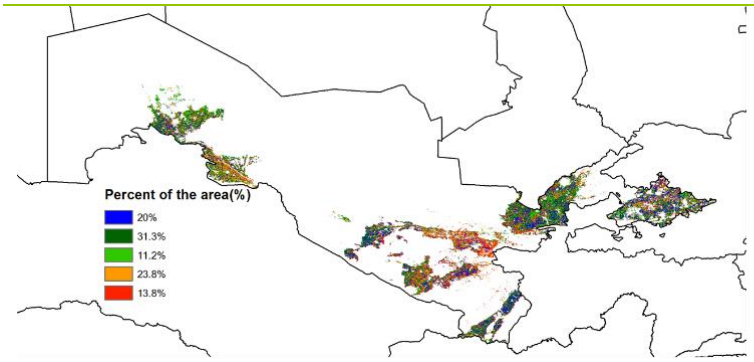
Figure 3.43 Uzbekistan's crop condition, July - October 2020



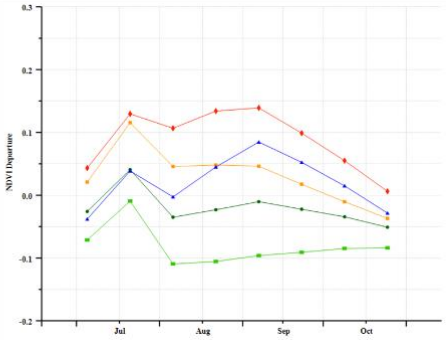
(a). Phenology of major crops



(b) Crop condition development graph based on NDVI

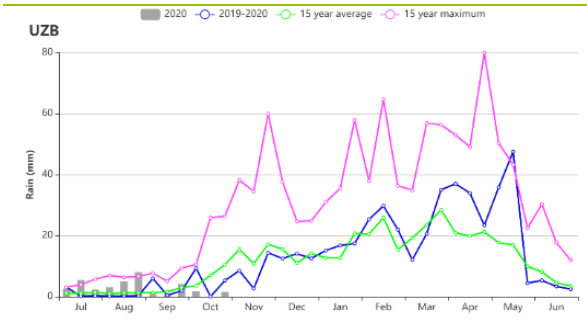


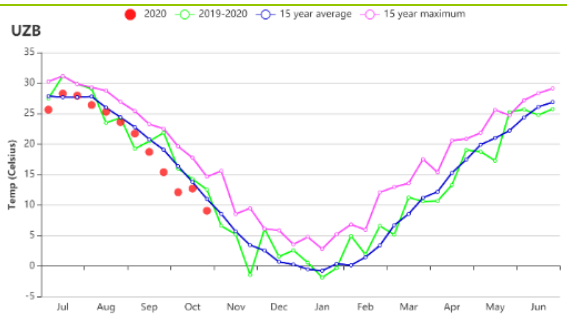
(c) Maximum VCI



(d) Spatial NDVI patterns compared to 5YA

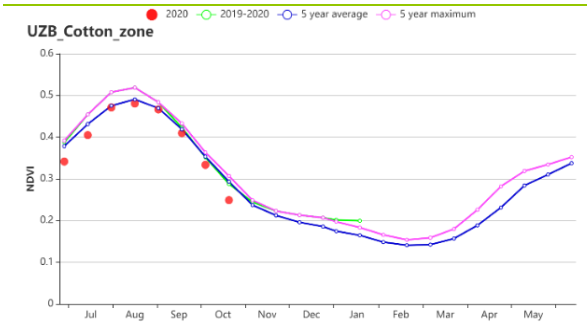
(e) NDVI profiles

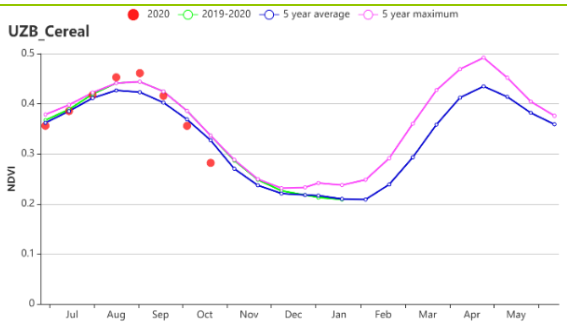




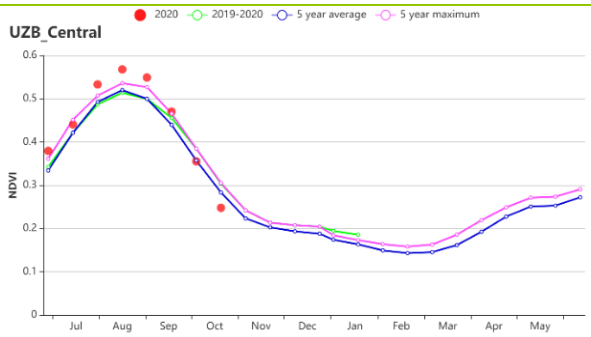
(f) Rainfall profiles

(g) Temperature profiles





(h) Crop condition development graph based on NDVI Aral Sea cotton region (left) Eastern hilly cereals region (right)



(i) Crop condition development graph based on NDVI Central region with sparse crops

Table 3.78 Uzbekistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Central region with sparse crops	4	-68	22.6	-1.2	1296	-3	293	5
Eastern hilly cereals zone	39	7	20.4	-1.6	1307	-5	382	38

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Aral Sea cotton zone	3	-82	22.5	-0.8	1261	-3	279	-11

Table 3.79 Uzbekistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Central region with sparse crops	85	13	100	0	0.96
Eastern hilly cereals zone	68	24	125	7	1.00
Aral Sea cotton zone	75	4	100	0	0.83

[VNM] Vietnam

This report summarizes the rice production conditions in Vietnam in the reporting period. Summer and autumn rice harvesting has been completed, while late rice is still in its growing season. Precipitation for the country was nearly 13% higher as compared to the 15YA. South Central Coast (+25%) and Northern Vietnam (+21%) are the two regions that received the highest precipitation, alleviating the drought conditions which were observed during the previous reporting period. Apart from precipitation, temperature (+0.2 °C) and RADPAR (-1%) were slightly above average.

Crop condition development based on NDVI was significantly lower than the 5YA. Apart from the Red River Delta and the North West region, all the regions had a similar pattern of NDVI, starting close to but below average and staying below average until October. The drops in October might have been due to cloud cover in the satellite images or floods caused by typhoons. The VCIx was generally above 0.8, except for the South Central Coast and the coastal provinces of the Mekong Delta where VCIx was low. The CALF was stable as compared to the recent five-year average. Vietnam was hit by a series of typhoons in October. Most of the rice had been harvested by then. Overall, due to slightly unfavorable crop conditions and stable cropped areas, crop outputs are estimated to be slightly below normal.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, several agro-ecological zones (AEZ) can be distinguished for Vietnam: North Central Coast (202), North East (203), Red River Delta (204), South East(205), South Central Coast (206), North West (207), Central highlands (208), Mekong River Delta (209).

During this reporting period, the rainy season rice crop cultivation in **the North Central Coast** passed through 3 phases: sowing, growing and harvesting. RAIN was 21% above average, while the temperature was 24.1°C, an increase by 0.5°C as compared to the 15YA. RADPAR was below average (-2%) and BIOMASS was above average (+ 6%). The crop conditions were below average from July to September. Overall, VCIx was 0.94 and CALF was close to average, indicating moderate conditions in this region.

In the **North West**, the average rainfall was 21% above average and TEMP was also higher (+0.2°C) as compared to the 15YA. RADPAR was below average (-4%). In general, the climate condition pattern showed a small departure from the 15-year baseline. BIOMSS was above average (+ 2%) and the VCIx was in the range of 0.8 to 1. The NDVI profiles in the region showed spatial variations, and the values of this indicator decreased between July and September. CALF reached 100%. Generally, the crop conditions were close to average.

In the R**ed River Delta**, RAIN (+9%) and TEMP (+0.1°C) were above average and the VCIx was 0.92. RADPAR (-6%) and BIOMSS (-6%) were below the 15-year average. The crop condition development graph based on NDVI fluctuated greatly from 0.3 to 0.7. CALF increased by 1%. Overall, this region had below average crop conditions.

In the **South East**, total rainfall was 1553 mm, 2% below 15YA. Temperature was 25.4°C (+0.3°C). RADPAR was higher than average (+2%). BIOMSS was above average (+2%) as well. The crop condition graph based on NDVI presented some below-average values. Overall, VCIx (0.95) and CALF (+1%) indicated normal conditions in this region.

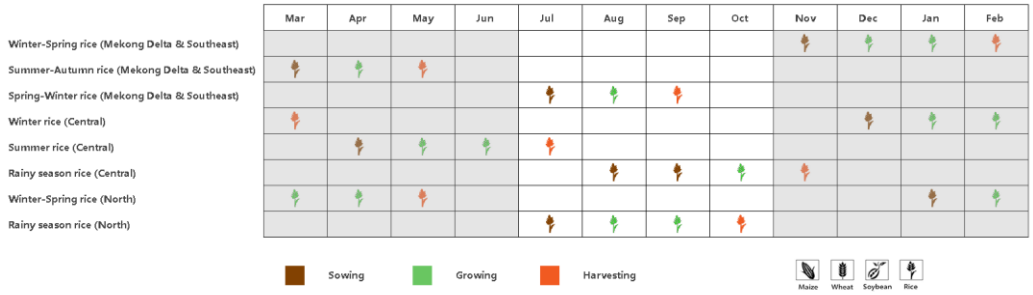
During this reporting period, the summer-autumn rice crop in the **South Central** Coast reached maturity. Most of the crop was harvested before the typhoons hit the region. RAIN was 25% above average, while

TEMP was 23.7°C (0.4°C) and RADPAR (+4%) were above average. BIOMSS was also above average (+4%). The crop conditions were below average from July to September. VCIx (0.89) and CALF (96%), in combination with the other CropWatch indicators, presented generally favorable crop conditions.

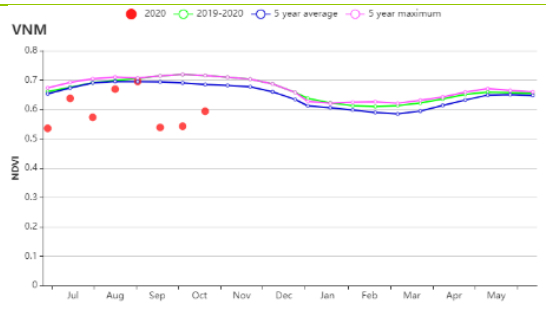
The summer-autumn rice crop in the **Central Highlands** passed through 2 phases: sowing and growing. RAIN was 3% above average and TEMP was 22.8°C (+0.2°C) as compared to the 15YA. RADPAR was above average (+12%). Despite the big reduction in rainfall, BIOMSS was above average (+9%). The crop conditions were below average. Overall, high VCIx (0.98) and stable CALF (100%) indicated normal conditions in this region.

During this reporting period, the Spring-Winter rice crop in the **Mekong River Delta** had reached maturity and got harvested in October. RAIN (+7%) and TEMP (+0.1℃) were above average. RADPAR stayed near average (0%) and BIOMSS was slightly below average (-1%). The crop condition graph based on NDVI was below average during the previous monitoring period and stayed below average during this period as well. The poor water supply from the Mekong River continued to have a detrimental effect on rice production in the delta. VCIx (0.88) and CALF (86%) indicated unsatisfactory conditions in this region.

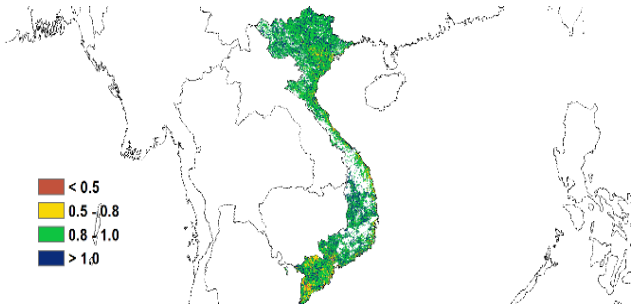
Figure 3.44 Vietnam's crop condition, July-October 2020



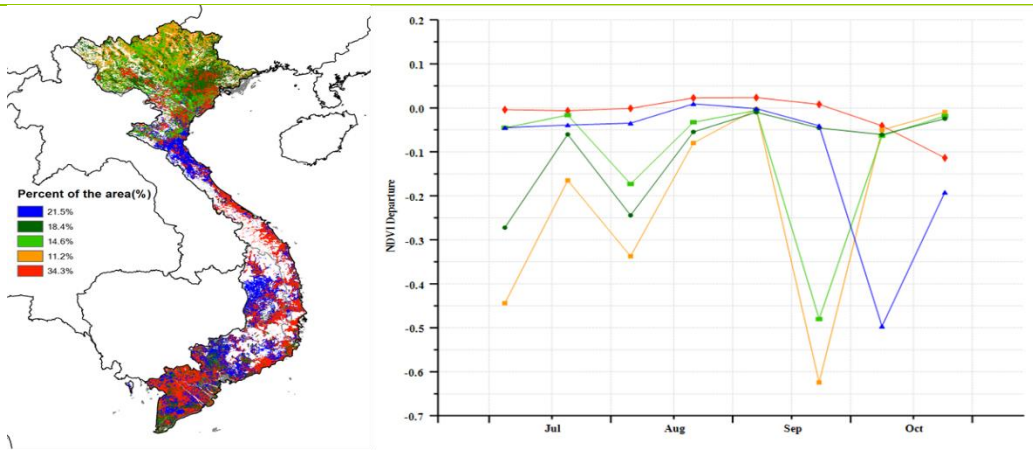
(a). Phenology of major crops



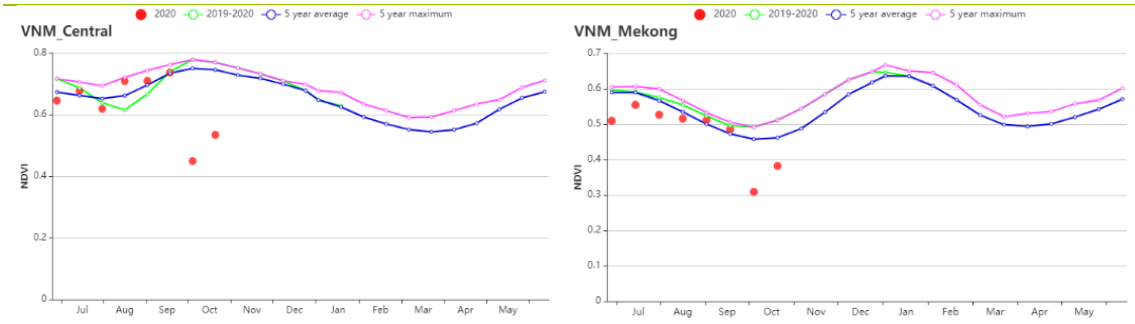
(b) Crop condition development graph based onNDVI



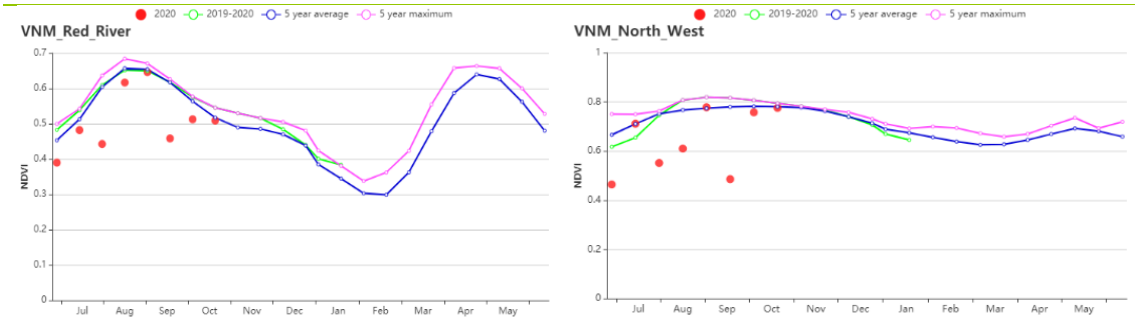
(c) Maximum VCI



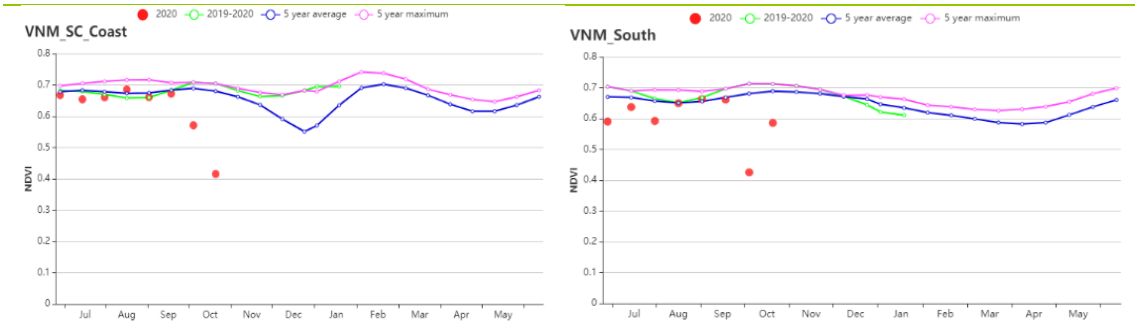
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



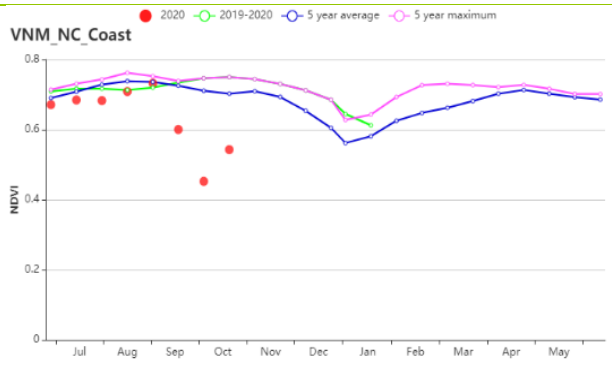
(f) Crop condition development graph based on NDVI Central Highlands Vietnam (left), and Mekong River Delta (right).



(g) Crop condition development graph based on NDVI North West Vietnam (left), and Red River Delta (right).



(h) Crop condition development graph based on NDVI South Central Coast Vietnam (left), and South East Vietnam (right).



(i) Crop condition development graph based on NDVI North Central Coast Vietna

Table 3.80 Vietnam's agro-climatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure from 15YA (%)	Current (gDM/m^2)	Departure from 15YA (%)
Central Highlands	1555	3	22.8	0.2	1105	9	685	10
Mekong River Delta	1428	7	26.9	0.1	1194	0	818	-1
North Central Coast	1689	21	24.1	0.5	1041	-2	671	0
North East	1784	21	23.3	-0.1	1014	-8	641	-7
North West	1490	21	21.9	0.1	1016	-4	606	-3
Red River Delta	1587	9	26.4	0.1	1088	-6	735	-6
South Central Coast	1579	25	23.7	0.4	1097	4	701	4
South East	1553	-2	25.4	0.3	1160	2	781	2

Table 3.81 Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July-October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current	Departure from 5YA (%)	Current(%)	Departure from 5YA(%)	Current
Central Highlands	100	0	108	-15	0.98
Mekong River Delta	86	-1	174	2	0.88
North Central Coast	98	0	131	-1	0.94
North East	100	0	138	10	0.97
North West	100	0	112	-8	0.98
Red River Delta	97	1	146	-4	0.92
South Central Coast	96	0	136	-4	0.89

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current	Departure from 5YA (%)	Current(%)	Departure from 5YA(%)	Current
South East	**96**	**1**	**110**	**-16**	**0.95**

[ZAF] South Africa

Wheat is planted mainly between mid-April and mid-June in the winter rainfall areas (Mediterranean zone), under rainfed conditions (no irrigation). In the Dry Highveld and Bushveld maize areas, which receive summer rains, it is planted between mid-May and the end of July. In that zone, wheat is grown under rainfed and irrigated conditions. Wheat in the Mediterranean zone reach maturity in September and harvest concludes in October. In the other zones, harvest takes place around December or January. Sowing of the summer crops, such as maize and soybeans starts in October, when the first significant rains start to fall.

This report covers the main growing period of wheat. Nationwide, rainfall was 90 mm, 20% below the 15YA. The average temperature was 14 °C, a decrease by 0.6 °C from the 15YA. The estimated biomass was 4% below the average. Total cropped area was 27%. It had declined by 2% and the maximum VCI was at 0.72. The NDVI development graph shows that at the national level, the values were close to the average for the whole monitoring period. The spatial distribution of NDVI profiles shows a mixed pattern among the regions: 6.7% of the cropland, mostly located in the Western Cape (blue area) had positive anomalies. In the Eastern Cape, negative anomalies were observed (red areas 8.5%) and hardly any NDVI departures were observed in the regions of Free State, Mpumalanga, Gauteng and Kwazulu Natal.

Regional analysis

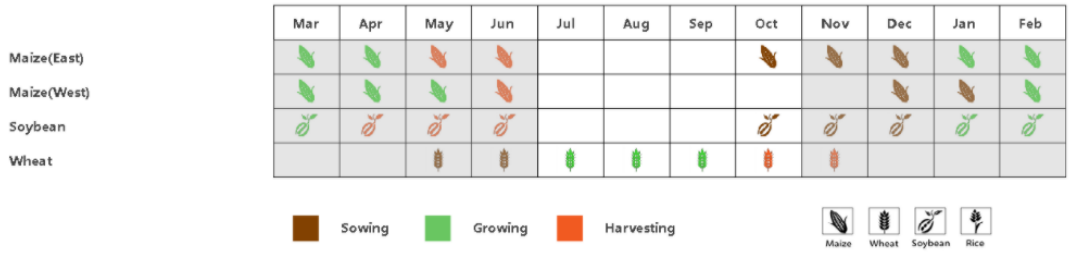
The analysis will focus on the main production zones: **Mediterranean**, **Humid Cape Fold Mountains and Dry Highveld**, **Bushveld maize zones**.

In the Mediterranean zone, the rainfall was 267mm, 25 % below the 15YA, the temperature was 12 °C with 0.6 °C of departure below the 15YA, and the radiation was 971 MJ/m^2 (+2%). This resulted in a biomass estimate of 339 gDM/m2 (-2%). CALF increased 3% and VCIx was 0.88. Moreover, this region is cultivated with a single cropping system, and cropping intensity was at the 5-year average (CI). From July up to October, the NDVI development trended above the 5year maximum. Crop conditions were favorable in this region.

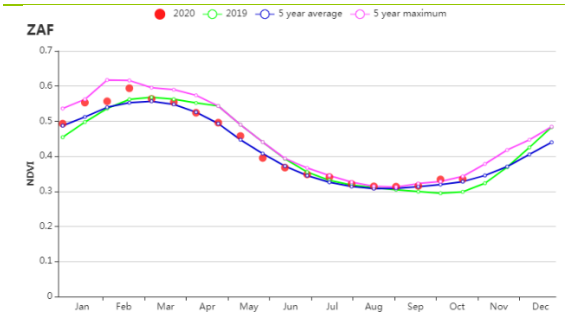
The **Humid Cape Fold mountain zone** recorded 142 mm of rainfall (-32%), and the temperature was 15 °C (-0.4°C). The observed radiation was slightly above average (+1%) and biomass slightly below (-3%). CALF remained stable at 73 (no departure). At the same time, this region is cultivated with a mixture of single and double cropping system, and cropping intensity was below the 5-year average (CI, -1%). The NDVI development graph shows that the condition remained close to the average for the whole period.

In the **Dry Highveld and Bushveld maize areas**, the rainfall was 67 mm (-25%), the temperature (-0.6 °C) and radiation (-2%) were below average. Accordingly, the estimated biomass was also below average (-4%). CALF increased by 4 %. Moreover, this region is cultivated with a single cropping system, and cropping intensity was lower than the 5-year average (CI, -1%). NDVI profile in this main maize production region was slightly below the average from July until October, while the maximum vegetation condition observed was at 0.72.

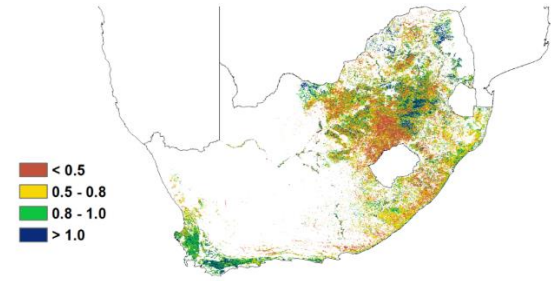
Figure 3.45 South Africa's crop condition, July - October 2020



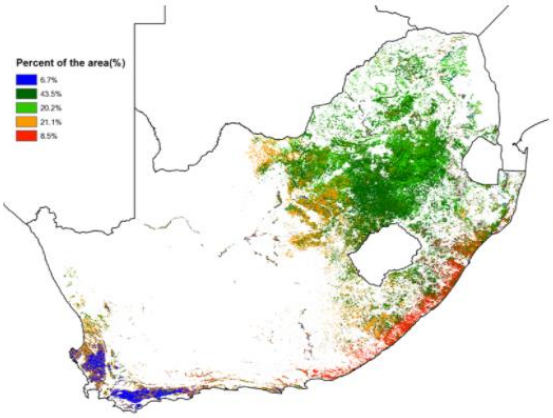
(a). Phenology of major crops



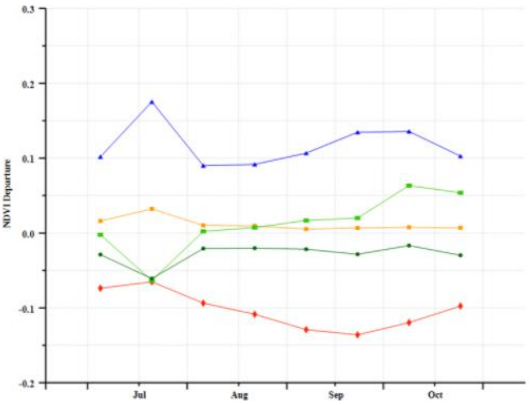
(b) Crop condition development graph based on NDVI



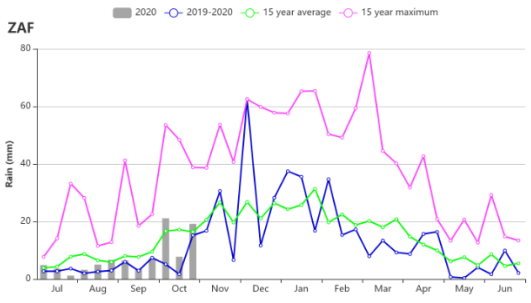
(c) Maximum VCI



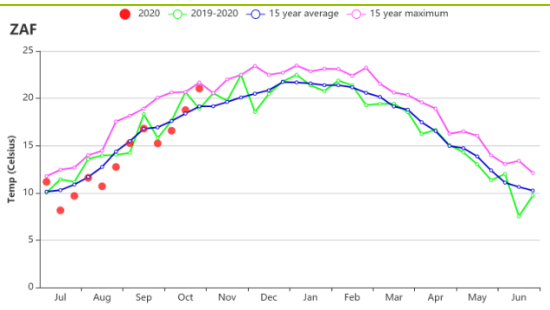
(d) Spatial NDVI patterns compared to 5YA



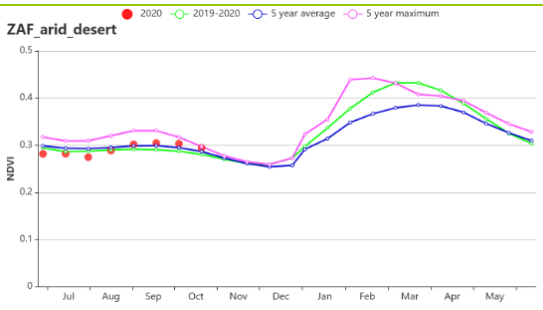
(e) NDVI profiles

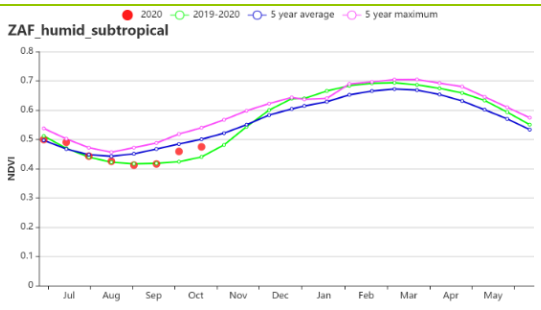


(f) Rainfall profiles

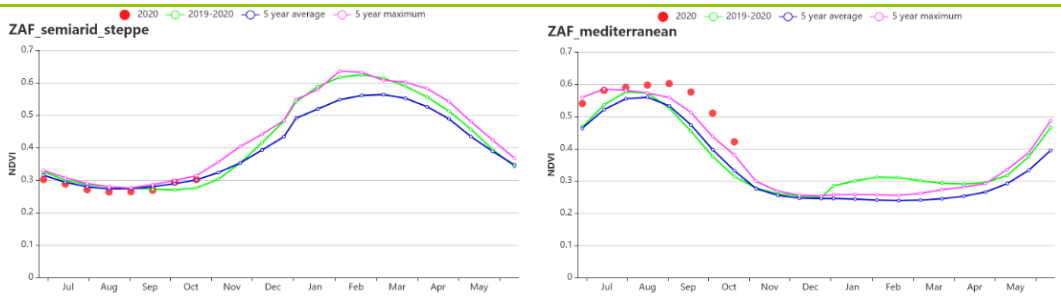


(g) Temperature profiles





(h) Crop condition development graph based on NDVI (Arid desert (left) and Humid Cape Fold Mountains (right))



(i) Crop condition development graph based on (Dry Highveld and Bushveld (left) and Mediterranean Zone (right))

Table 3.82 South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Humid Cape Fold Mountains	142	-32	15.0	-0.4	965	1	379	-3
Mediterranean Zone	267	25	12.2	-0.6	971	2	339	-2
Dry Highveld and Bushveld	67	-25	14.0	-0.6	1145	-2	377	-4

Table 3.83 South Africa's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction		Cropping intensity		Maximum VCI
	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Humid Cape Fold Mountains	73	0	103	-1	0.66
Mediterranean Zone	86	3	100	0	0.88
Dry Highveld and Bushveld	12	4	100	-1	0.72

[ZMB] Zambia

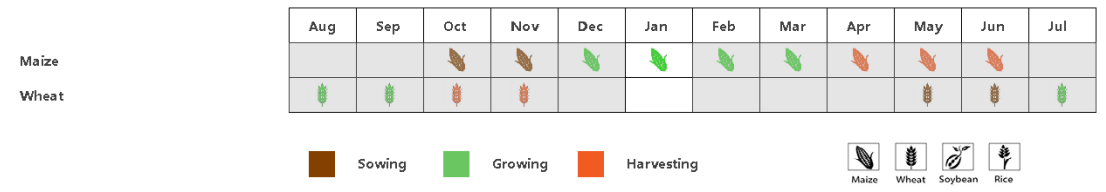
The period covers the end of the irrigated dry-season crops and the onset of the rainfed season. Key irrigated crops are predominately wheat, green maize, horticultural crops and vegetables. Irrigated wheat was harvested in late September into October. While the monitoring quarter is in the dry season, recorded rainfall was 19 mm (-3%). Average temperature of 21.5℃ and average radiation of 1339 MJ/m2 (-4%) caused a slight increase in biomass production estimates of 349 gDM/m2 (+3%). The cropped arable land fraction (CALF) was 39% resulting mainly from irrigated areas as indicated by the maximum VCI of 0.70. Overall, conditions for the irrigated crops were favorable.

Regional Analysis

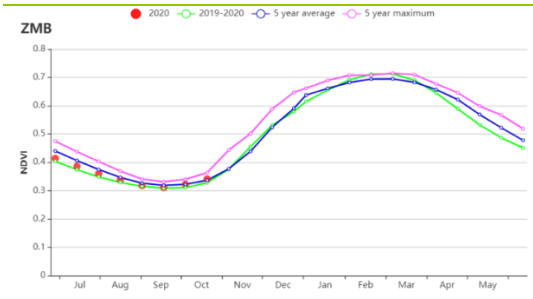
Based on regional analyses of the agro-ecological region, rainfall received in all the agro-ecological zones was above the 15 year average except for the western semi-arid zone where the departure was negative (-62%). The temperature varied from 21.2℃ to 22.0℃ with negligible departure from the 15YA. The radiation in all agro-ecological zones was more than 1300 MJ/m2 (+4%) and resulted in positive BIOMSS departures except in the Luangwa-Zambezi Rift Valley (-1%). A similar pattern was observed for the Cropped Arable Land Fraction (CALF) with highest CALF for Northern High Rainfall Zone (79%, +1%) and lower values in the other zones: Luangwa-Zambezi Rift Valley (14%, -53%), Central-East South and Plateau (26%, -14%) and the Western Semi-Arid Plateau (41%, -17%). The vegetation health index (max VCI) was lowest in Luangwa-Zambezi Valley (VCIx 0.53).

The weather outlook for the next quarter indicates a higher-than-normal probability of above-average cumulative rainfall, which portrays favourable yield prospects for the 2021 cereal crops.

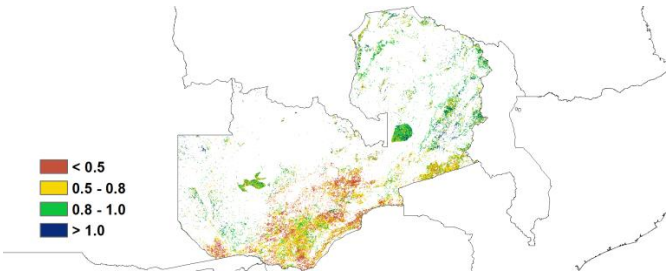
Figure 3.46 Zambia's crop condition, July - October 2020



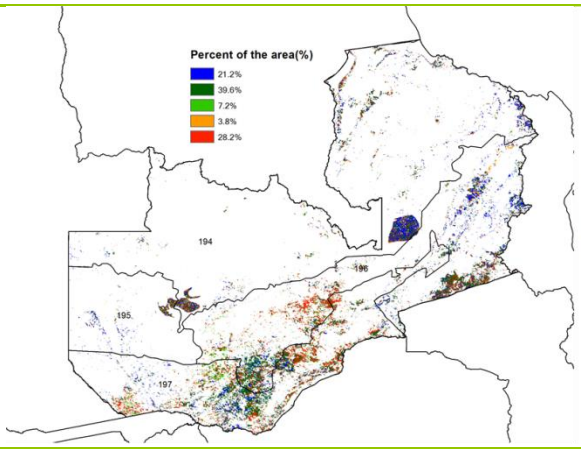
(a). Phenology of major crops

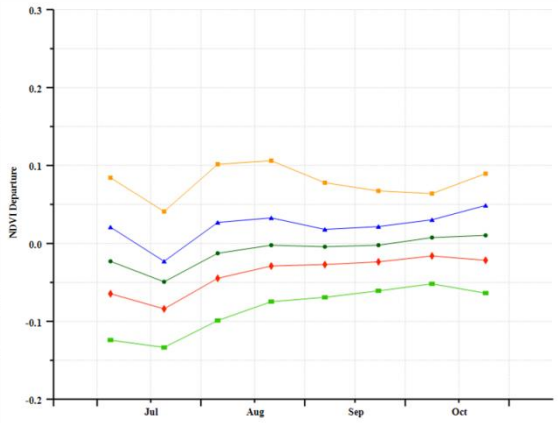


(b) Crop condition development graph based on NDVI

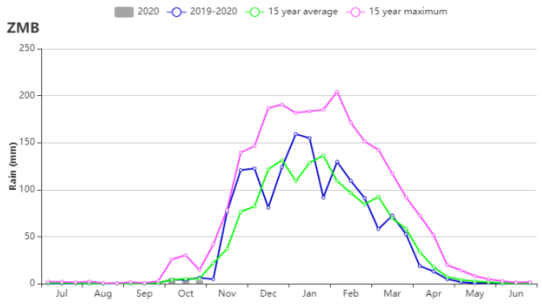


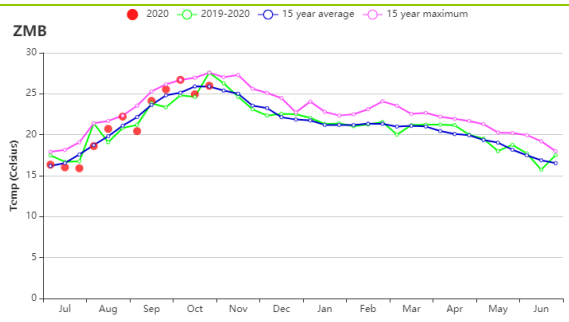
(c) Maximum VCI



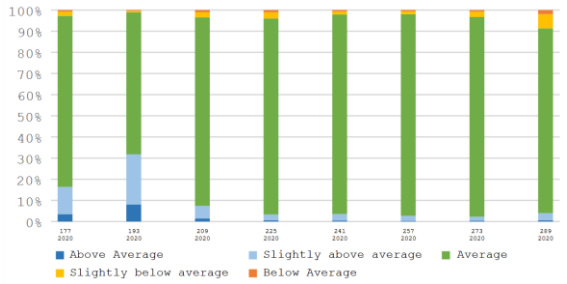


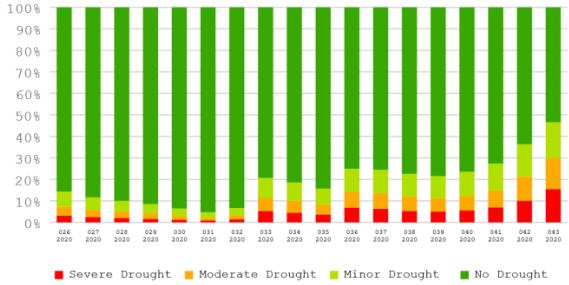
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(f) Rainfall profiles (g) Temperature profiles





(h) Proportion of NDVI anomaly categories compared with 5YA (i) Proportion of VHIx categories compared with 5YA

Table 3.84 Zambia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July - October 2020

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
Western semi-arid plain	4	-62	22	0.1	1348	-4	300	17
Northern high rainfall zone	32	1	21.2	-0.1	1361	-3	400	6
Central-Eastern and Outhern Plateau	14	24	21.5	0	1319	-4	359	0
Luangwa Zambezi Rift VAlley	10	33	21.5	0.1	1338	-4	291	-1

Table 3.85 Zambia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, July - October 2020

Region	Cropped arable land fraction	Cropping intensity	Maximum VCI

	Current (%)	Departure (%)	Current (%)	Departure (%)	Current
Western semi-arid plain (AEZ IIb).	**41**	**-17**	**100**	**0**	**0.73**
Northern high rainfall zone (AEZ III).	**79**	**1**	**109**	**4**	**0.85**
Central-eastern and southern plateau (AEZ IIa).	**26**	**-14**	**100**	**0**	**0.7**
Luangwa Zambezi rift valley (AEZ I).	**14**	**-53**	**100**	**-1**	**0.57**