# Chapter 3. Core countries

## 3.1 Overview

*Chapter 1 and 2 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**

The current section provides a short overview of prevailing conditions among the major exporters of maize, rice, wheat and soybeans, conventionally taken as the countries that export at least one million tonnes of the covered commodities. Just 20 countries include the top 10 exporters with the United States and Argentina exporting all four crops and Brazil, Ukraine and Russia exporting three of them each.

**Maize**: Harvest in the northern hemisphere was completed by last October. Its production conditions were discussed and summarized in the November 2019 bulletin. In the southern hemispheres, maize planting started at the beginning of the rainy season in November and December. In Brazil, however, most maize is sown as a second crop towards the end of the rainy season, after soybean harvest in February. The dry conditions in September and October delayed planting of soybean. This in turn may delay harvest of soybean and subsequent sowing of maize. However, rainfall situation during soybean harvest and sowing of the 2nd maize crop in February are important factors as well, determining the yield potential for the 2nd maize crop. Full season maize was sown in October. In Argentina, the second largest maize exporter, closely followed by Brazil in 3rd position, growth conditions are favorable. High production is expected for both countries. In Eastern and South Africa moisture availability is good. However, excessive rainfall may have caused prolonged periods of excessive soil moisture and leaching of nitrates. Fall army worm continues to be a threat for maize production in Africa, as well as South Asia. Growth conditions for irrigated winter maize in India as well as Bangladesh have been favorable.

**Rice**: Harvest of rainfed rice in China, Pakistan, India, Bangladesh and South-East Asia was completed by December. Conditions for rice were favorable for China and South Asia, although cyclone Bulbul caused damage to rice in the Delta region of Bangladesh and West Bengal in India in November 2019. Planting of irrigated winter rice will start in India and Bangladesh in February. The South-East Asian countries were hit by drought conditions in this monitoring period, which caused slight yield losses for Vietnam, Cambodia, Laos and Thailand. Rice production in the Philippines and Indonesia was also negatively impacted by droughts.

**Wheat**: The drought conditions in Australia had limited its wheat yields. Wheat in Argentina also suffered from periodic drought effects, especially in the south, whereas conditions in the north were more favorable. Overall production seems to be comparable to last year's. Brazil, where wheat production concentrated in its two most southern states, Paraná and Rio Grande do Sul, is another important wheat producer in the southern hemisphere. As in Argentina, the conditions for wheat growth were mixed. In the northern hemisphere, most (winter) wheat is sown in October and November. Conditions were generally favorable for wheat sowing and the early establishment of wheat in western and southern Europe. Eastern Europe, as well as the Ukraine suffered from below-average rainfall during this monitoring period. Thus, conditions for sowing were generally favorable, but subsequent development may have been hampered somewhat. In the more northern regions, wheat hibernates during the winter months. Conditions during spring green up in March and April will mainly determine the production potential for winter wheat in those regions. In the Middle East, South Asia, mainly Pakistan and India, as well as China conditions for wheat are favorable. However, locusts may pose a threat to wheat production on the Arabian Peninsula, Iran and Pakistan (See chapter 5.2 on Disaster Events for a more indepth discussion). The south of the USA is also benefitting from above-average rainfall. However, the northwest is experiencing drier than normal conditions. Conditions for the winter wheat growing regions in Canada are normal. Rainfall is below average in Morocco, limiting the production potential of wheat and barley.

**Soybean**: Soybeans are predominantly grown during the respective summer months in both hemispheres. Brazil is about to overtake the USA as the leading soybean producer. China, which does not export soybean, is third. Argentina is fourth, but its production is only about 20% of that of Brazil. Other important soybean producers are Paraguay, Canada and Uruguay. Thus, current crop conditions in South America are highly relevant for the soybean market. Lack of rainfall hampered timely sowing of soybean in South America. However, rainfall conditions have turned to normal levels in the meantime. This is reflected in the BIOMSS map, which shows generally above-average production levels in the soybean producing regions of South America.

## 3. Weather anomalies and biomass production potential changes

### 3.1 Rainfall (Figure 3.1)

Severe drought conditions continued until the onset of the rainy season in Australia, Indonesia, and parts of the Amazon rainforest. In Brazil and Indonesia, these drought conditions were used to set devastating fires in order to clear land for the production of soybeans and palm oil for export. Below average rainfall (>=-30 to <-10%) continued to be observed for Turkey and Georgia. Between October 2019 and January 2020, i.e, the current reporting period, the rainfall situation improved for South Australia, most of Brazil, the Pampas in Argentina, Colombia, Portugal and Italy. Noteworthy are the Cerrado and Pantanal regions of Brazil, where, after a delayed start of the rainy season, rainfall returned to normal levels. Most of South-East Asia continued to be affected by a rainfall deficit. It continued to be severe not only for Philippines and Indonesia, but Cambodia, Thailand and Laos got hit in this period as well. Abundant rainfall starting in late December brought some relief to this region. Other regions that became rainfall deficient during this monitoring period were the Northwest of the United States, Saskatchewan in Canada, Honduras, Columbia, Venezuela, the Maghreb and a large stretch from Eastern Europe and Southern Russia to the Central Asian countries. Countries with severe deficits were Romania, the Ukraine and Morocco.

Areas where rainfall was much above average (>=30%) included the northwest, Mexico, most of the central and eastern States in the USA, South-west of Europe, countries and islands along the eastern Mediterranean coast, the Sahara, East Africa and South Asia. In India and Pakistan, the abundant monsoon rains finally ceased in late October.

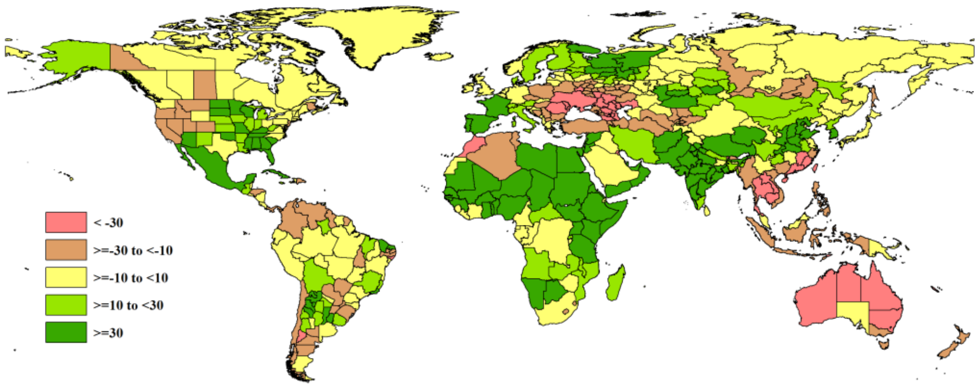



**Figure 3.1 National and subnational rainfall anomaly (as indicated by the RAIN indicator) of October 2019 to January 2020 total relative to the 2005-2019 average (15YA), in percent.**

### 3.2 Temperature anomalies (Figure 3.2)

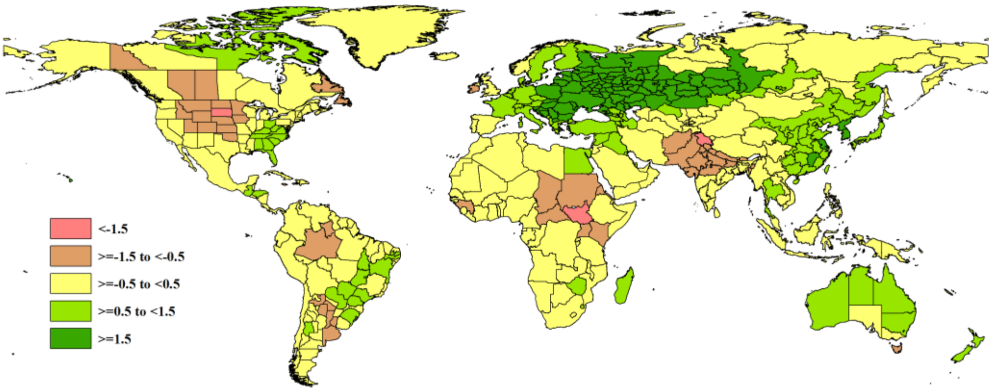



**Figure 3.2 National and subnational temperatute rainfall anomaly (as indicated by the RAIN indicator) of October 2019 to January 2020 average relative to the 2005-2019 average (15YA), in °C**

Colder-than-normal temperatures were observed in north-eastern Argentina, the heart of the Amazon basin, the Midwest and central-northern states of the USA, Saskatchewan and Alberta in Canada, Central Africa, as well as Pakistan and northern India. These colder temperatures did not negatively impact crop production. Moderately above average temperatures (0.5 to 1.5 ºC) were observed for most of Australia, eastern China, central and northern Europe and the countries bordering the eastern shores of the Mediterranean Sea, the East-coast of the USA, as well as eastern portions of Brazil. Large positive departures in the excess of 1.5ºC were observed for Eastern Europe and a large portion of Russia from its western border to central Siberia, as well as Kazakhstan. Warmer temperatures limit the depth and duration of snow cover and advance the phenological development of winter wheat. These conditions increase the risk of frost damage in case of cold snaps.

### 3.3 RADPAR anomalies (Figure 3.3)

Higher solar radiation increases photosynthesis and thus crop production potential and yields. Above-average conditions were recorded for Brazil, Colombia, Venezuela, Central America and the Western United States, the Maghreb, South-East Africa, Eastern Europe, the Ukraine, Turkey, north-east China as well as South-East Asia and Australia. The Pampas in Argentina, Peru, Ecuador, Mexico, Eastern halves of USA and Canada, Western Europe, East Africa and South Asia, as well as southern China were affected by below-average radiation. The impact of lower radiation in the northern hemisphere on crop production is negligible, since most crops are in the vegetative phase or hibernate. The situation is similar for the southern hemisphere, where the crops are sown at the beginning of the rainy season only, which typically starts in November. One exception is winter wheat in southern Africa and Argentina, where it is sown in June/July and harvested in December and January, thus the grain-filling phase fell into this period. However, in Argentina, soil moisture, which was favorable this season, is generally more limiting than solar radiation.

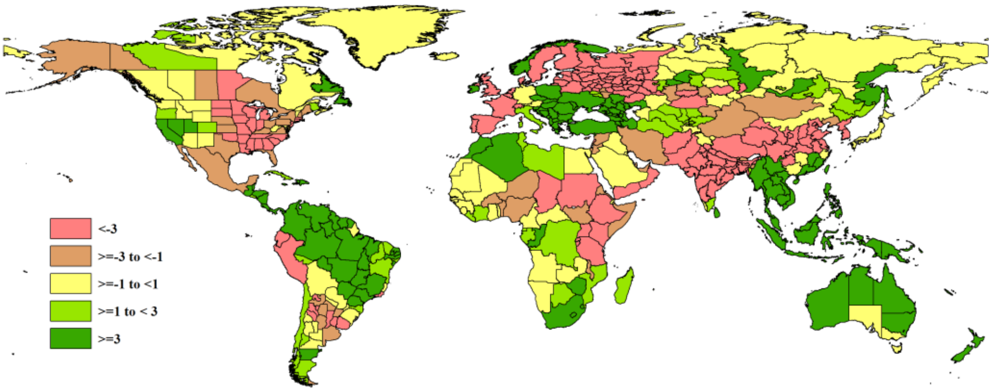



**Figure 3.3 National and subnational sunshine anomaly (as indicated by the RADPAR indicator) of October 2019 to January 2020 total relative to the 2005-2019 average (15YA), in percent.**

### 3.4 Biomass accumulation potential BIOMSS (Figure 3.4) and agro-climatic indices

The BIOMSS indicator is controlled by temperature, rainfall and solar radiation. In some regions, rainfall is more limiting, whereas in other ones, mainly the tropical ones, solar radiation tends to be the limiting factor. For parts of Brazil and the Pampas, the BIOMSS estimates were up or mixed. Mexico benefitted from the increased rainfall. In some regions, like the Sahel, the Horn of Africa and India, the monitoring period covered the grain-filling phase of the cereals, which were predominantly harvested in October and November. Yield of these crops may have benefitted from favorable conditions. In the other regions, such as Eastern China, Eastern Europe and Southern Russia, and the Middle East, the monitoring period covered the sowing phase of the winter crops. Good conditions for BIOMSS production help the plants get well established.

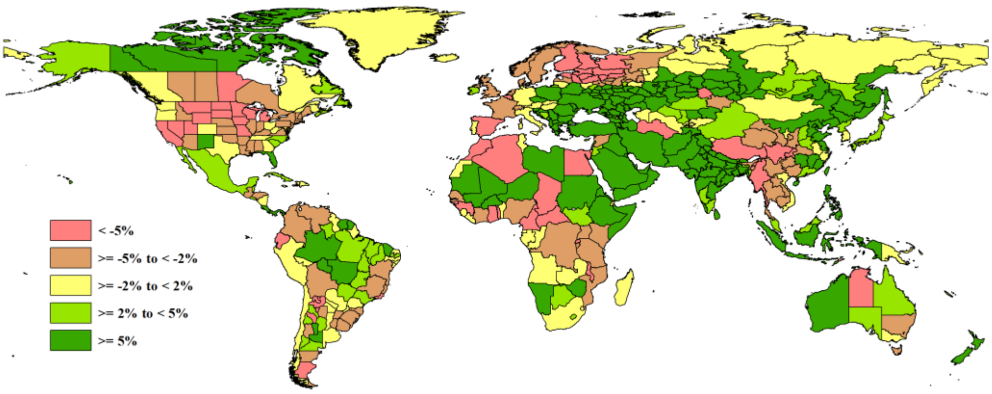



**Figure 3.4 National and subnational biomass production potential anomaly (as indicated by the BIOMSS indicator) of October 2019 to January 2020 total relative to the 2005-2019 average (15YA), in percent.**

## 3.2 Country analysis

This section presents CropWatch analyses for each of 42 key countries (China is addressed in Chapter 4). The maps and graphs refer to crop growing areas only: (a) Phenology of major crops; (b) Crop condition development based on NDVI over crop areas at national scale, comparing the October 2019 - January 2020 period to the previous season and the five-year average (5YA) and maximum; (c) Maximum vegetation condition index over arable land (VCI) for October 2019 - January 2020 by pixel; (d) Spatial NDVI patterns up to October 2019 - January 2020 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 agroecological zones (AEZ) within a country, again comparing the October 2019 - January 2020 period to the previous season and the five-year average (5YA) and maximum.

Refer to Annex A for additional information about indicator values by country. Country agricultural profiles are posted on www.cropwatch.com.cn/htm/en/bullAction!showBulletin.action

Figures 3.5 - 3.45; Crop condition for individual countries ([AFG] Afghanistan to [ZMB] Zambia) including agroecological zones (AEZ) from October 2019 - January 2020.

# [AFG] Afghanistan

Rice is the main cereal crop harvested in Afghanistan during the reporting period. Winter wheat started to be planted in October in the northern border provinces (to be harvested in May). RAIN was 194 mm (+43%), but both RADPAR and TEMP were below average (RADPAR at 746 MJ/m2, down 5%; TEMP 3.8°C, down 0.7°C). The favorable weather conditions resulted in 21% higher BIOMSS than average. In January, precipitation was higher than average and close to the 15 years maximum. The agro-climatic conditions were favorable, and the significant increase of rainfall will benefit the crop growth after the winter period.

**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.

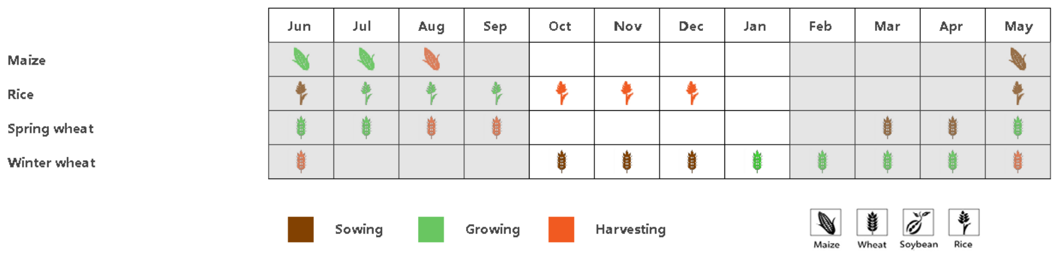
RAIN in the Central region with sparse vegetation was 158 mm (+44%), TEMP was -1.0°C (-1.0°C), and RADPAR was average at 768 MJ/m2. BIOMSS increased by 12% and indicated the good weather condition for vegetation in this region.

The Dry region recorded 162 mm of RAIN, 83% above average, TEMP (-0.7° C ) and RADPAR（-6%）were below average. The favorable agro-climatic condition resulted in an increase of BIOMSS by 52%

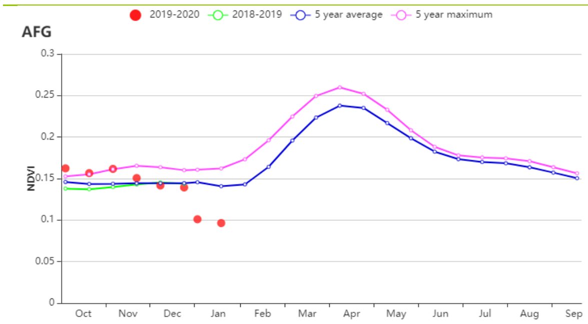
In the Mixed dry farming and irrigated cultivation region, the following indicator values were observed: RAIN 245 mm, +27%; TEMP 2.5°C, -0.5°C; RADPAR 681 MJ/m2, -5%. The combination of indicators resulted in BIOMSS being close to average. CALF was 7% in this area.

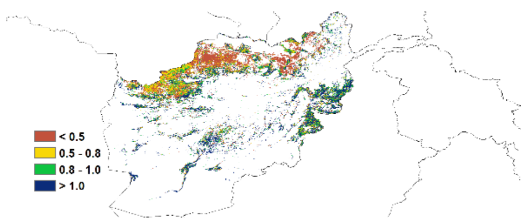
Mixed dry farming and grazing region recorded 155 mm of RAIN, 54% above average. TEMP was 5.0° C , 0.6℃ lower than average, and the RADPAR was 769 MJ/m2, 3% below average.

**Figure 3.5 Afghanistan's crop condition, October 2019 - January 2020**



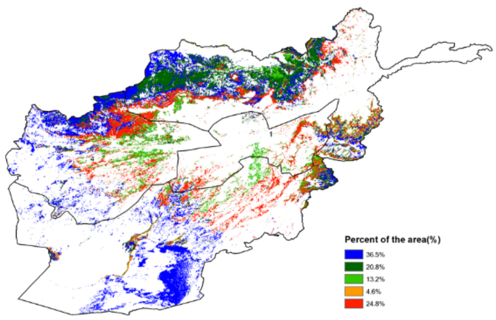

(a). Phenology of major crops

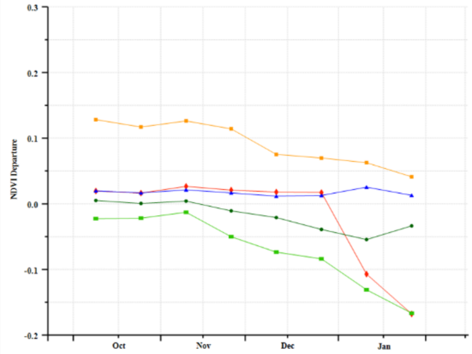



(b) Crop condition development graph based on NDVI

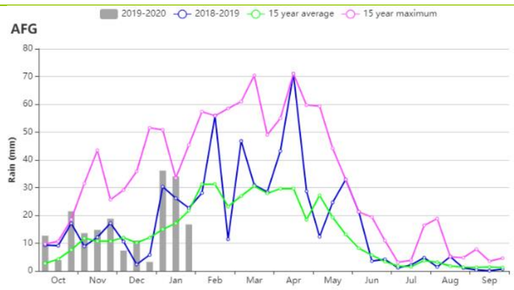
(c) Maximum VCI

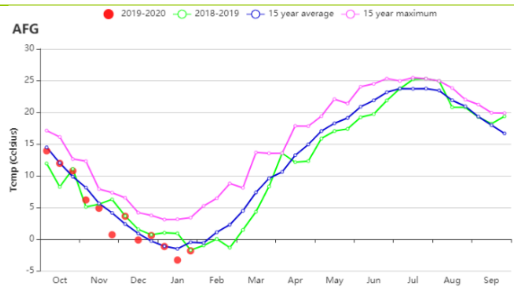



(d) Spatial NDVI patterns compared to 5YA

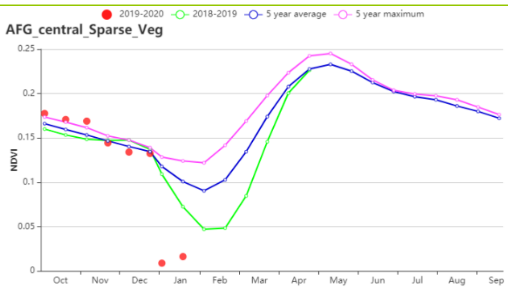
(e) NDVI profiles

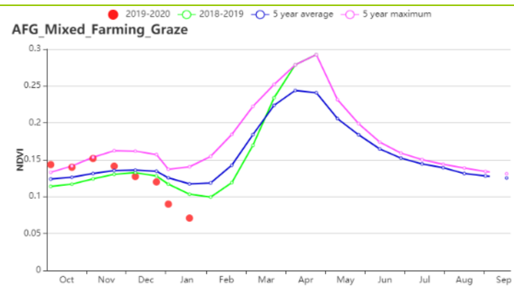


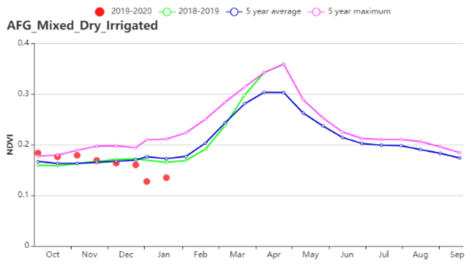

(f) Rainfall profiles

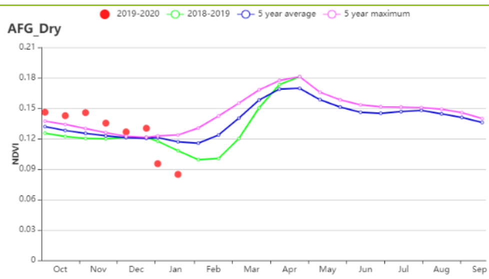
(g) Temperature profiles




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




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

**Table 3.1 Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Central region with sparse vegetation | 158 | 44 | -1 | -1 | 768 | -5 |
| Dry region | 162 | 83 | 6.9 | -0.7 | 817 | -6 |
| Mixed dry farming and irrigated cultivation region | 245 | 27 | 2.5 | -0.5 | 681 | -5 |
| Mixed dry farming and grazing region | 155 | 54 | 5 | -0.6 | 769 | -3 |

**Table 3.2 Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Central region with sparse vegetation | 121 | 12 | 4 | - | 0.97 |
| Dry region | 190 | 52 | 2 | - | 0.59 |
| Mixed dry farming and irrigated cultivation region | 127 | -1 | 7 | - | 0.65 |
| Mixed dry farming and grazing region | 127 | 12 | 0 | - | 0.66 |

# [AGO] Angola

The October 2019 - January 2020 monitoring period covers the first half of the main growing season in Angola, which lasts until March. During this period, maize and rice are in the vegetative stages. Wheat harvest was completed by late October 2019. Nationwide, the agroclimatic parameters showed diverse patterns. Both rainfall and radiation increased by about 20% and 1% respectively, and the temperature recorded a slight decrease by about 0.2ºC from the fifteen-year average. Above-average rainfall occurred in late December 2019 and early January 2020, supplying crops with enough water during the critical plant developmental stages. The favourable agroclimatic conditions led to slightly above-average BIOMASS (+2%). Above the past five-year-average conditions were also observed in CALF (+10%) and maximum VCI was close to 0.95.

Analyzing the NDVI profiles, it is noticeable that conditions were below average in October but improved to average by January. The provinces of Zaire, Cuandocubango and northern areas of Huila counting to 61.5% of the total cropped area showed positive NDVI anomalies. On the other hand, negative NDVI anomalies were verified in the provinces of Cunene and the southern regions of Huila, about 38.5% of the total cropped area. Overall, the crop conditions are close to average.

**Regional Analysis**

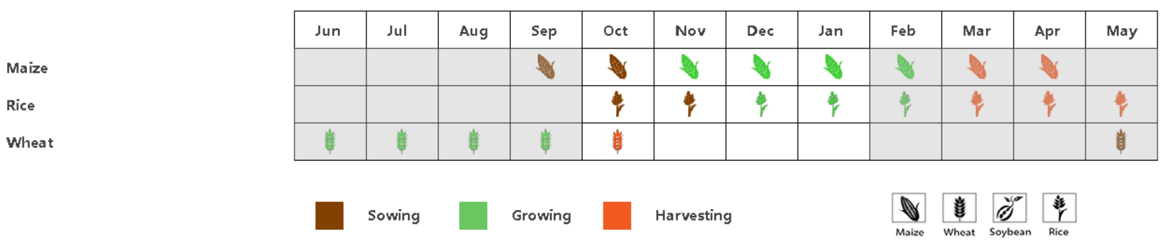
CropWatch subdivides Angola into five zones based on cropping systems, climatic zones, and topography. They are referred to as the Arid zone, Central Plateau, Humidzone, Semi-arid zone, and Sub-humid zone.

The crop condition development graph based on NDVI for the different agroecological regions reveals that most of the period was characterised by below-average crop conditions. The maximum VCIx in all zones was located between 0.93 and 0.98. In the Arid Zone, rainfall (RAIN +70%) increased while both temperature and radiation decreased by 0.1ºC 4%, respectively. Their combined effect led to an increase in biomass by about 9%. The CALF also recorded a significant boost by about 67%.

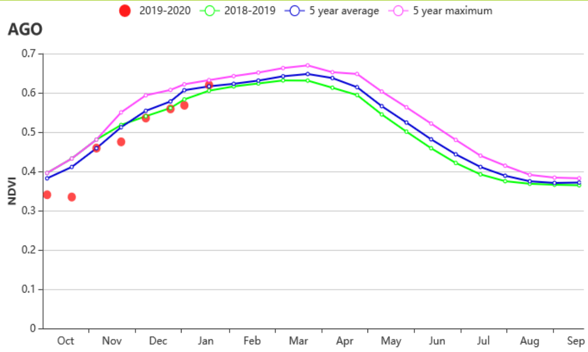
The central plateau experienced an increase in both rainfall and radiation by 23% and 2% respectively. Temperature decreased by about 0.3ºC. In this region, while the biomass decreased (BIOMASS -8), the CALF increased by 7%. Increases in both rainfall (RAIN +6%) and radiation (RADPAR +3%) were also verified in the Humid zone. This region recorded a slight decrease in temperature by 0.2ºC. At the meantime, the Biomass decreased by about 7% and CALF was about the average.

In the Semi-arid zone, both rainfall and temperature increased by about 23% and 0.1ºC, respectively, and the radiation remained about the average. In this region, the potential biomass increased by 6%. CALF also recorded an increase of 19%. The Subhumid zone recorded an increase in rainfall by 16%; the temperature decreased by about 0.3ºC and radiation also increased by 2%. In the agronomic indicators, an increase of 2% was verified on CALF.

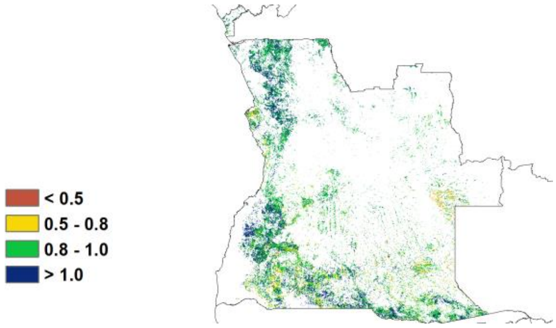
**Figure 3.6 Angola's crop condition, October 2019 - January 2020**



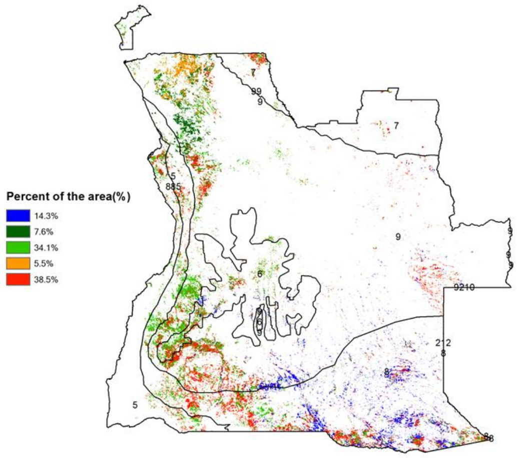

(a). Phenology of major crops



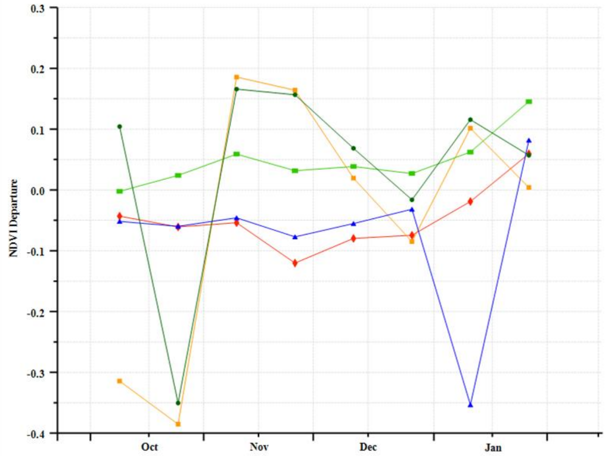

(b) Crop condition development graph based on NDVI



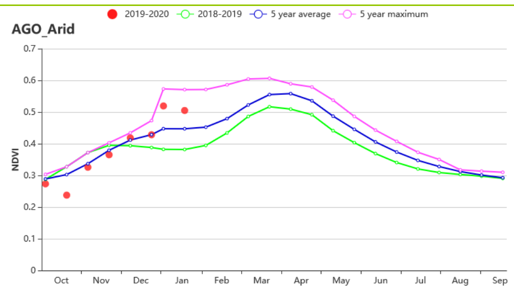

(c) Maximum VCI



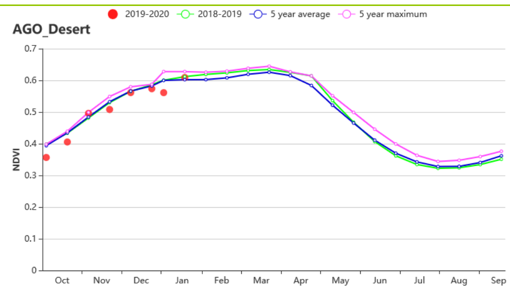

(d) Spatial NDVI patterns compared to 5YA



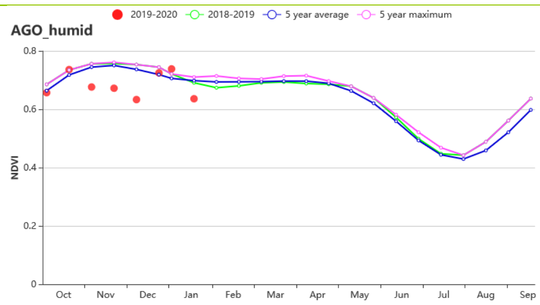

(e) NDVI profiles



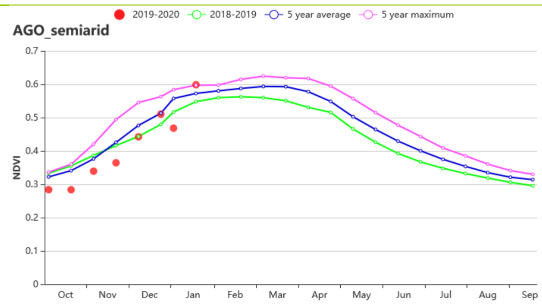

(f) Crop condition development graph based on NDVI- Arid zone



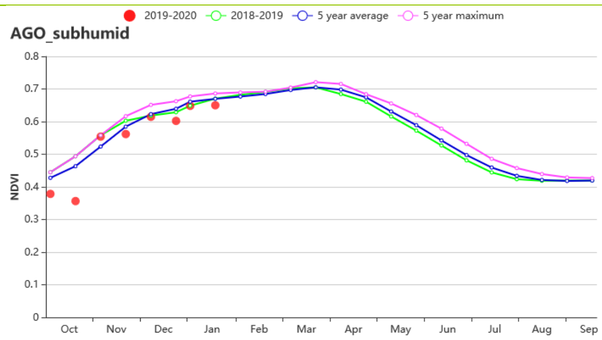

(g) Crop condition development graph based on NDVI - Central Plateau



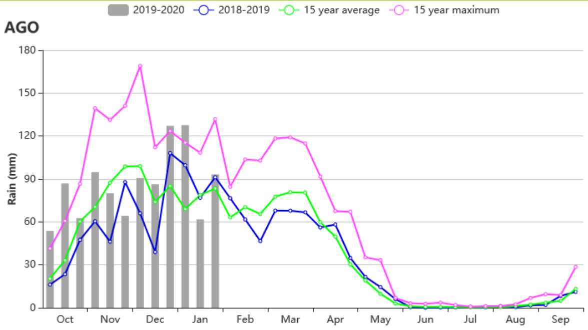

(h) Crop condition development graph based on NDVI- Humid zone

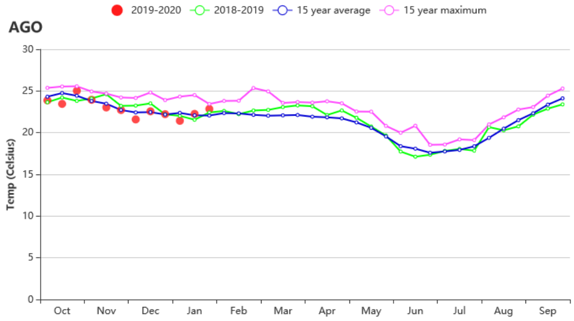



(i) Crop condition development graph based on NDVI - Semi-arid zone




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




(k) National time-series rainfall profiles (l) National time-series temperature profiles

**Table 3.3 Angola agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Arid Zone** | 623 | 70 | 25.3 | 0.1 | 1322 | -4 |
| **Central Plateau** | 1401 | 23 | 18.8 | -0.3 | 1162 | 2 |
| **Humid zone** | 1450 | 6 | 22.0 | -0.2 | 1175 | 3 |
| **Semi-Arid Zone** | 751 | 23 | 24.4 | 0.1 | 1305 | 0 |
| **Sub-humid zone** | 1164 | 16 | 22.4 | -0.3 | 1206 | 2 |

**Table 3.4 Angola agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Arid Zone** | 867 | 9 | 84 | 67 | 0.93 |
| **Central Plateau** | 574 | -8 | 97 | 7 | 0.94 |
| **Humid zone** | 701 | -7 | 100 | 0 | 0.98 |
| **Semi-Arid Zone** | 847 | 6 | 97 | 19 | 0.95 |
| **Sub-humid zone** | 734 | 0 | 99 | 2 | 0.95 |

# [ARG] Argentina

The reporting period covers the harvesting of wheat, the main growing season of maize and rice, as well as the sowing for early and late soybean (Figure 3.7.a). For the whole country rainfall showed a positive anomaly of 15%. Temperature was 0.5°C below average and RADPAR fell 2%. BIOMSS showed a decrease of 1% compared to average. Overall, crop conditions were favorable during the monitoring period.

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 profiles 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.

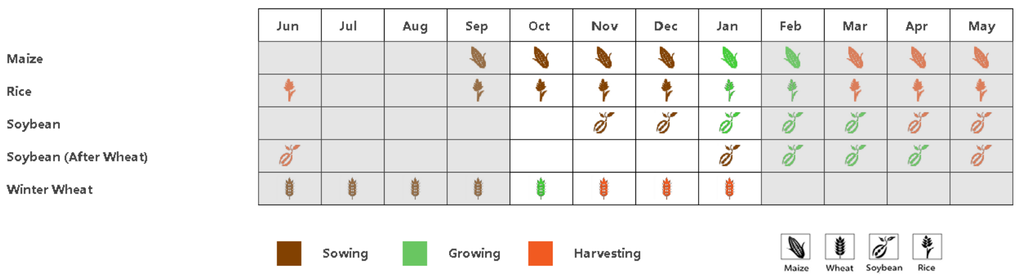
During the monitoring period, the rainfall of Argentina's four main agro-ecological zones was above average: Chaco (+ 17%), Mesopotamia (+ 2%), Humid Pampas (+ 12%), and Subtropical highlands (+ 36%) . However, both TEMP and PADPAR were lower than the 15-year average. Only Humid Pampas had increased BIOMSS by 1%, while Chaco (-2%), Mesopotamia (-4%), and Subtropical highlands (-10%) all decreased. Compare with the average of previous years, the CALF of Chaco (+ 6%) and Humid Pampas (+ 2%) increased. Only Subtropical highlands (-1%) decreased relative to the average. The VCIx in general showed good crop condition, with VCIx values of the four agro-ecological zones greater than 0.8.

BIOMSS increased in the Humid Pampas due to the previous abundant rainfall, and CALF increased by 2%, potentially favorabl for wheat production. The increase of rainfall in Chaco, Mesopotamia, and Subtropical highlands was not compensated for by the decrease in temperature and sunshine, resulting in a decrease in BIOMSS. For Chaco, CALF had increased by 6%. Therefore, we conclude that the wheat production for the Chaco region was fair, while crop production in Mesopotamia and Subtropical highlands might decrease.

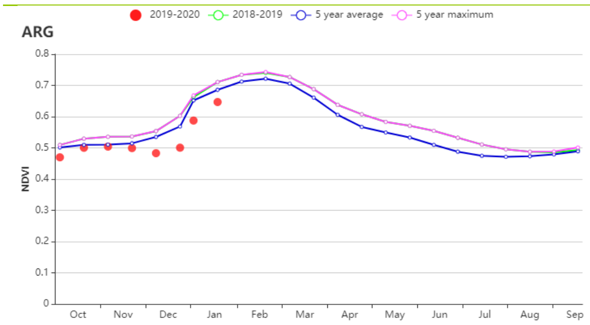
From the graph of Argentina NDVI development (Figure 3.7.b), the values of the earlier period (October-November 2019) were close to the average of previous years, while they were significantly lower than the 15-year average in the later period (December 2019 - February 2020).

In general, although wheat production in the Mesopotamia and Subtropical highlands had decreased in the earlier period, crop production had increased in Humid Pampas which accounts for most of the crop area. Therefore, the wheat production in Argentina was better than the corresponding period of previous years. However, growth of summer crops during December and January was sub-par.

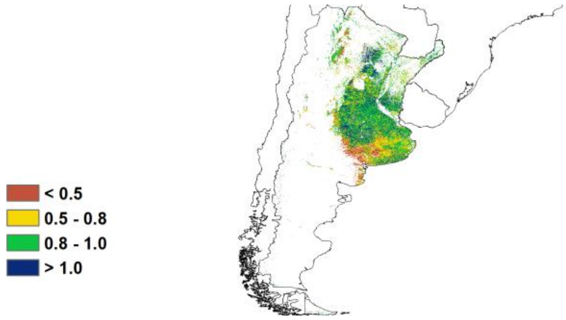
**Figure 3.7 Argentina's crop condition, October 2019 - January 2020**



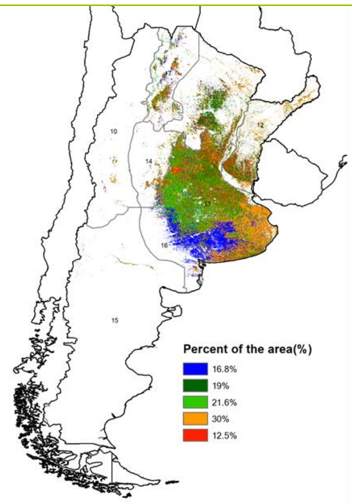

(a). Phenology of major crops



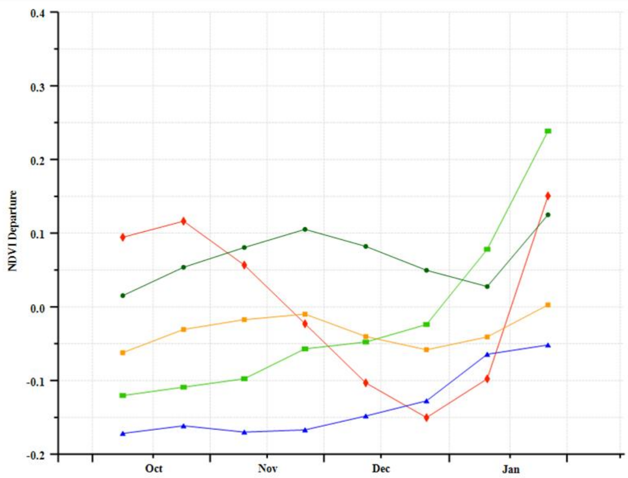

(b) Crop condition development graph based on NDVI



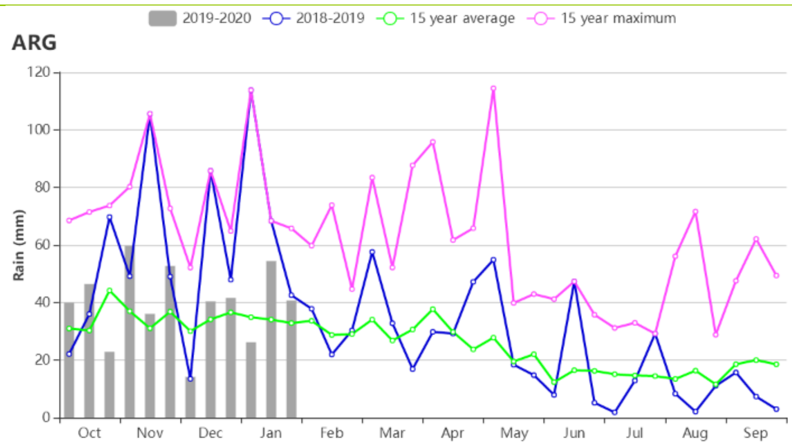

(c) Maximum VCI



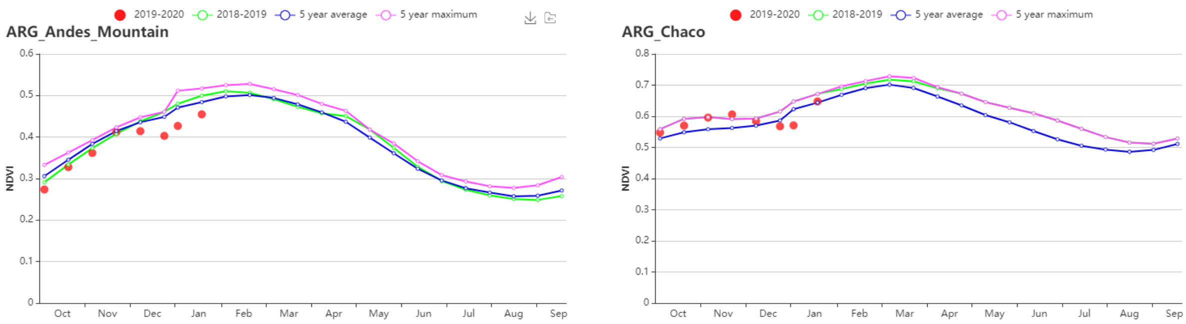

(d) Spatial NDVI patterns compared to 5YA



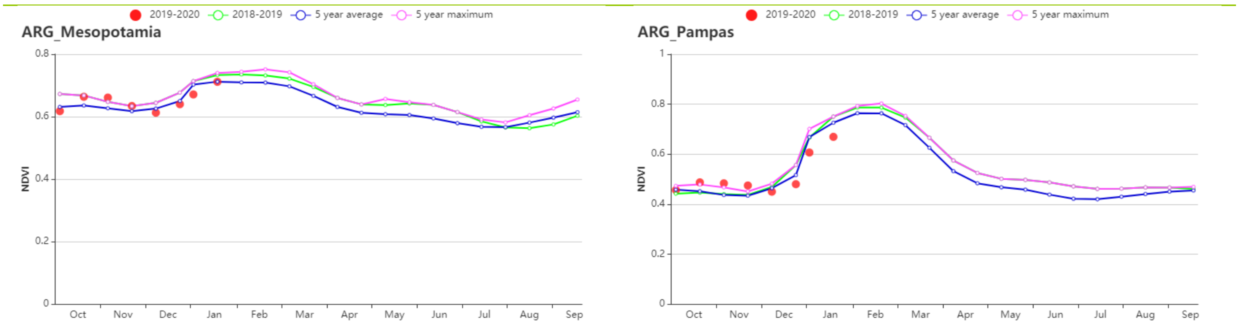

(e) NDVI profiles



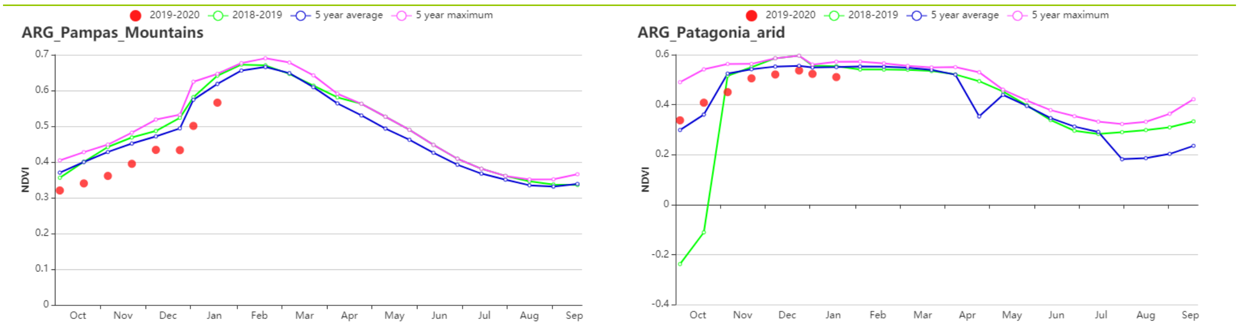

(f) Rainfall profiles



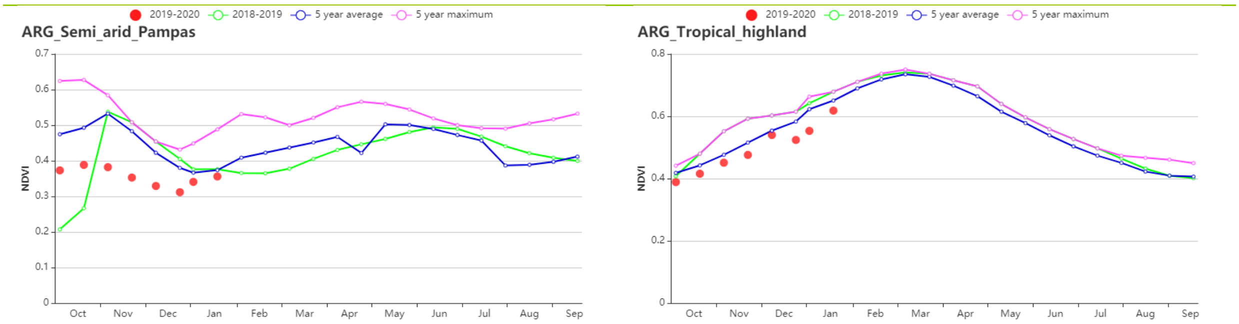

(g) Crop condition development graph based on NDVI (NDVI_Andes (left) and Chaco (right))




(h) Crop condition development graph based on NDVI (NDVI_Mesopotamia (left) and Humid Pampas (right))




(i) Crop condition development graph based on NDVI (NDVI_Pampas hills (left) and Arid part of Patagonia (right))




(j) Crop condition development graph based on NDVI (NDVI_Dry Pampas (left) and Subtropical highlands (right))

**Table 3.5 Argentina's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - Jaunary 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Andes | 442 | 74 | 16.5 | 0.2 | 1629 | -4 |
| Chaco | 607 | 17 | 24.3 | -0.8 | 1334 | -2 |
| Mesopotamia | 585 | 2 | 22.7 | -0.4 | 1384 | -3 |
| Humid Pampas | 315 | 12 | 20.9 | -0.5 | 1472 | -3 |
| Pampas hills | 306 | 29 | 21.9 | -0.1 | 1532 | -1 |
| Arid part of Patagonia | 200 | -13 | 10.7 | -0.2 | 1439 | 3 |
| Dry Pampas | 151 | -18 | 20.5 | -0.5 | 1584 | 1 |
| Subtropical highlands | 936 | 36 | 21.9 | -0.4 | 1314 | -4 |

**Table 3.6 Argentina's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | Cropped arable land fraction | Maximum VCI |
|---|---|---|---|

| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
|---|---|---|---|---|---|
| **Andes** | 706 | 0 | 63 | -3 | 0.84 |
| **Chaco** | 852 | -2 | 99 | 6 | 0.95 |
| **Mesopotamia** | 830 | -4 | 100 | 0 | 0.93 |
| **Humid Pampas** | 834 | 1 | 98 | 2 | 0.85 |
| **Pampas hills** | 898 | 4 | 90 | 15 | 0.81 |
| **Arid part of Patagonia** | 461 | 0 | 84 | 4 | 0.92 |
| **Dry Pampas** | 877 | 8 | 51 | -46 | 0.57 |
| **Subtropical highlands** | 777 | -10 | 90 | -1 | 0.80 |

# [AUS] Australia

The main crops of Australia are wheat and barley, which are planted mainly from May to July and harvested from October to January. The monitored time period thus covers the harvest of wheat and barley. Based on spatial NDVI patterns and profiles, the crop condition was average from October to November, but dropped to below average in December and January. To be more detailed: the south-eastern part of Queensland, eastern and south-eastern parts of New South Wales, the northern part of Victoria, the small part of South Australia, and south-western West Australia all show poor crop conditions with VCIx below 0.5. Rainfall was reduced by -45%, accompanied by hotter temperatures (+0.7℃) and higher RADPAR (+7%). The potential accumulated biomass kept stable (+1%). However, the south-western part of Victoria showed above average condition from October to December with VCIx above 0.8, accounting for only about 13.7% of the cropland. The CALF fell significantly by 29% below the recent 5-year average.

The national temperature profile showed average levels from October to the middle of December, 2019. The temperature returned to above average levels afterwards, except for some short periods with below average condition, i.e., during the middle of October, 2019, the beginning of November, 2019 and the end of January, 2020. The national rainfall profile showed below average levels until early January, except for average conditions during the beginning of November. Starting in mid January 2020, rainfall reached average levels.

Combining the agronomic and agroclimatic indicators, CropWatch estimates that crop production is below average for this season in Australia.

**Regional analysis**

This analysis covers five agro-ecological zones (AEZ) for Australia, namely the South-eastern wheat zone, South-western wheat zone, Arid and semi-arid zone, Wet temperate and subtropical zone, and Sub-humid subtropical zone.

The crop condition in the **South-eastern wheat zone**, showed average crop condition from October to the beginning of December, 2019 and dropped to below average after then. For the central and north-eastern parts of this agro-ecological region, the VCIx mainly stayed in the range below 0.5 with CALF decreasing by 54%, possibly due to the decreased rainfall (-38%) , compared to the last 15-year average. Below average production is likely.

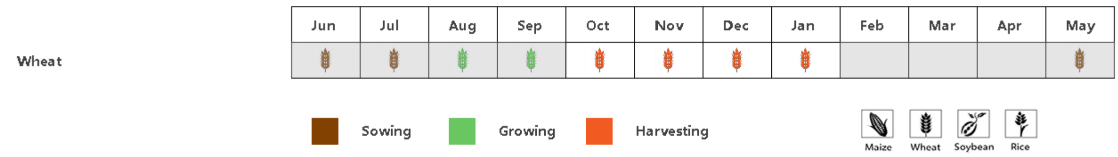
The crops in the **South-western wheat zone** showed below average condition at this period of harvesting. The VCIx reached only 0.61 with CALF down 23%, possibly resulting from the apparently decreased rainfall (-57%), relatively high temperature (0.8℃) and RADPAR (7%), compared to the last 15-year average. Below average production is expected.

Crop condition in the **Arid and semi-arid zone** was generally below average possibly due to the below average rainfall -41%, temperature +0.8℃, RADPAR 8% and BIOMASS -12%. With VCIx at 0.60 and a CALF decreasing by 6%, below average crop condition is likely.

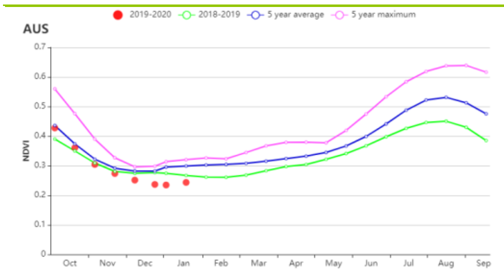
The **Wet temperate and subtropical zone** showed average condition before the middle of October but the crop condition dropped sharply to below average after then until the end of the monitoring period, possibly due to the decreased rainfall (-43%), relatively high temperature (0.6℃) and RADPAR (9%), compared to the last 15-year average. The VCIx of 0.62 also indicated a below average condition with CALF decreasing further by 17%.

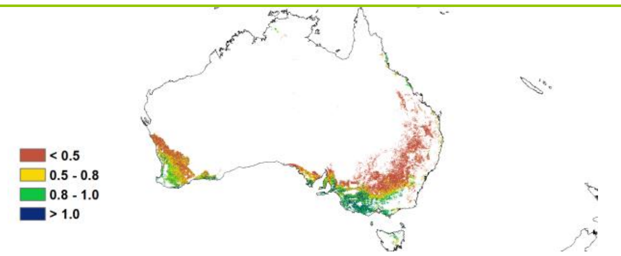
Crop conditions in the **Sub-humid subtropical zone** were below average throughout the season, due to below average rainfall (-54%) and hot temperatures (1.4℃ above average). RADPAR was 10% above average. BIOMASS was reduced by 5%. Furthermore, CALF dropped by 96% and VCIx is 0.11, indicating very poor production for this AEZ.

**Figure 3.8 Australia's crop condition, October 2019 - January 2020**



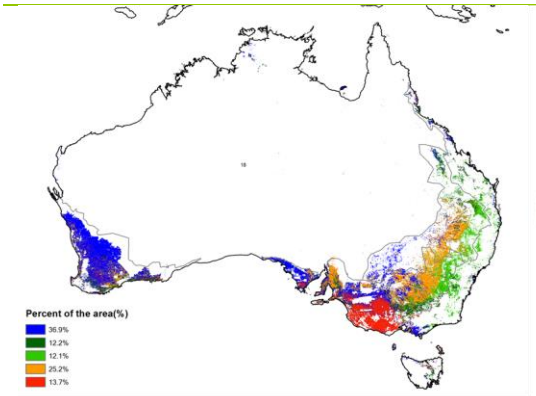

(a). Phenology of major crops

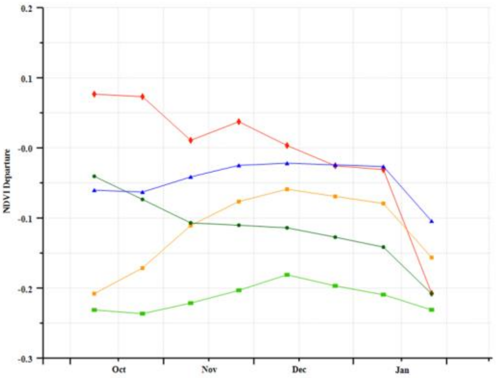



(b) Crop condition development graph based on NDVI

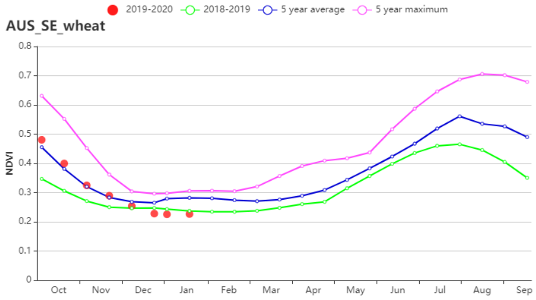
(c) Maximum VCI

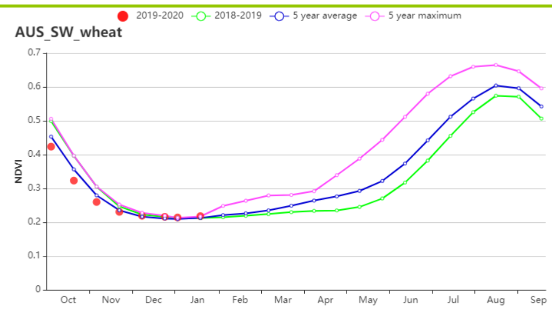


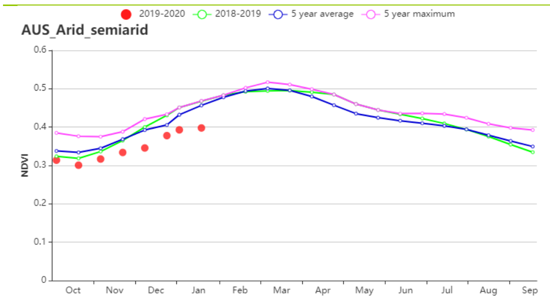

(d) Spatial NDVI patterns compared to 5YA

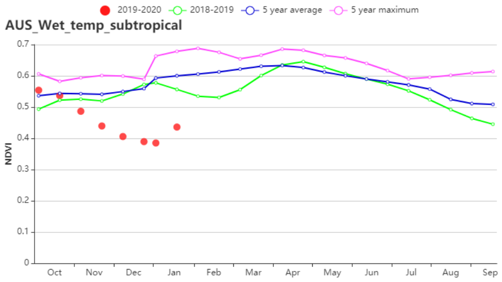
(e) NDVI profiles



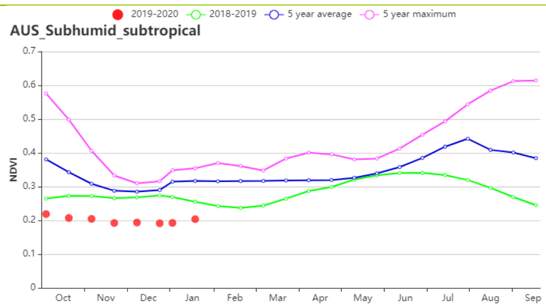




(f) Crop condition development graph based on NDVI (Southeastern wheat zone (left) and Southwestern wheat zone (right))

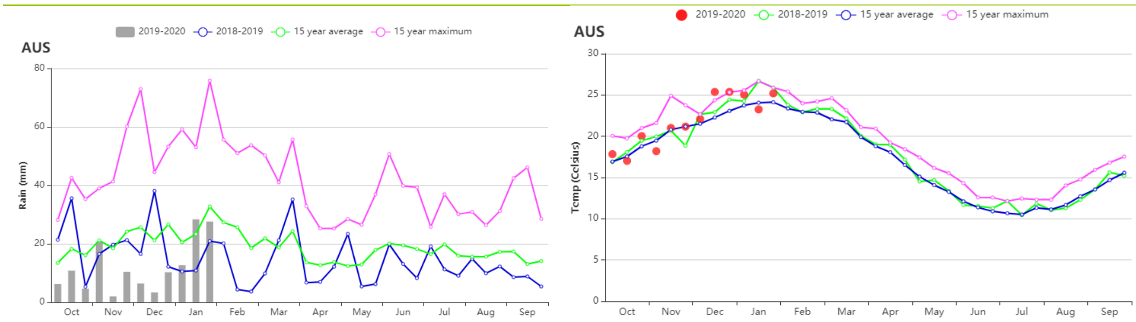



(g) Crop condition development graph based on NDVI (Arid and semi-arid zone (left) and Wet temperate and subtropical zone (right))




(h)Crop condition development graph based on NDVI (Subhumid subtropical zone)




(i)Time series rainfall profile (left) and temperature profile (right))

**Table 3.7 Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Southeastern wheat zone | 115 | -38 | 20.3 | 0.1 | 1523 | 3 |
| Southwestern wheat zone | 48 | -57 | 20.3 | 0.8 | 1619 | 7 |
| Arid and semiarid zone | 375 | -41 | 28.7 | 0.8 | 1467 | 8 |
| Wet temperate and subtropical zone | 210 | -43 | 20.0 | 0.6 | 1528 | 9 |
| Subhumid subtropical zone | 119 | -54 | 25.6 | 1.4 | 1657 | 10 |

**Table 3.8 Australia's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Southeastern wheat zone | 766 | 1 | 54 | -21 | 0.56 |
| Southwestern wheat zone | 813 | 8 | 47 | -23 | 0.61 |
| Arid and semiarid zone | 724 | -12 | 53 | -6 | 0.60 |
| Wet temperate and subtropical zone | 780 | 5 | 80 | -17 | 0.62 |
| Subhumid subtropical zone | 833 | -5 | 2 | -96 | 0.11 |

AFG AGO ARG AUS **BGD** BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

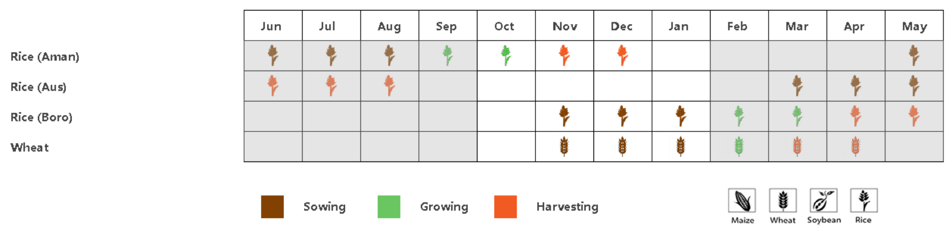
# [BGD] Bangladesh

During the reporting period, the growing and harvesting of Aman rice and the sowing of irrigated dry season Boro rice and wheat were the main farming activities. The country recorded 306 mm of rainfall, which is above the average by 17%. Most rainfall occurred between October and the beginning of November. Both temperature and RADPAR were below average by 0.2°C and 5% respectively. The overall biomass accumulation potential (BIOMSS) exceeded the five-year average by 26%, while the crop arable land fraction (CALF) was 2% above average. Increasing BIOMSS and CALF can be attributed to good rainfalls. The national NDVI profile was above the recent 5-year average in October until the first of November, and then it dropped below the average until the end of December. Later in January, it rose above the average. The NDVI spatial pattern shows that 4.6% of the cultivated area was above the 5YA, 52.1% was below the 5YA, and 43.3% was above the average except for late December and January. In the Sylhet basin, the spatial NDVI profile during October exceeded not only the 5YA but also the 5YM. During the rest of the season, it was average except for late December. Over other zones, the spatial NDVI profile was above the average in October and then dropped to the average during November and December. Later in the season, it surpassed the average. Over the whole country, the VCIx mostly ranged from 0.8 to 1. All CropWatch indicators, as well as the VCIx map, indicate favorable crop conditions nationwide.

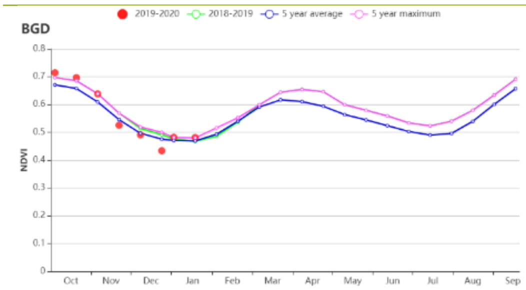
**Regional analysis**

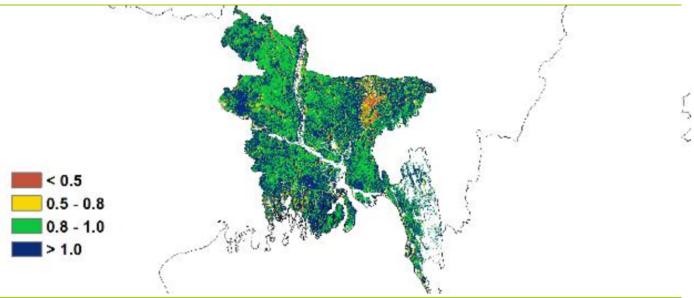
Bangladesh includes four Agro-ecological zones (AEZ) referred to hereafter as **Coastal region**, **Gangetic plain, the Hills and the Sylhet basin**. The coastal region recorded 299 mm of rain (+14%). Average temperature was 21.9°C (+0.1°C). RADPAR was 2% below the average. BIOMASS and CALF exceeded the 5YA by 33% and 2% respectively, while the VCIx at 1.05 indicates good crop conditions. The Gangetic plain received 284 mm of rainfall (+34%). Both temperature and RADPAR were below the averages, by 0.4°C and 6% respectively, while BIOMSS and calf were above the average by 30% and 2% respectively. The VCIx of 1.00 indicates favorable crop conditions. In the Hills, the precipitation and temperature were below average by 14% and 0.1°C respectively, while RADPAR was just 0.2% above the average. The BIOMASS was 15% above the 5YA. The CALF did not change relative to the 5YA, and VCIx was as high as 1.05, which indicates good crop conditions. The Sylhet basin recorded 331 mm of rainfall, 22% above average. Temperature and RADPAR were below the average by 0.1°C and 6% respectively, while BIOMSS and CALF were above the average by 24% and 3% respectively. The VCIx was 0.98 indicating suitable crop conditions.

**Figure 3.9 Bangladesh's crop condition, October 2019 - January 2020.**

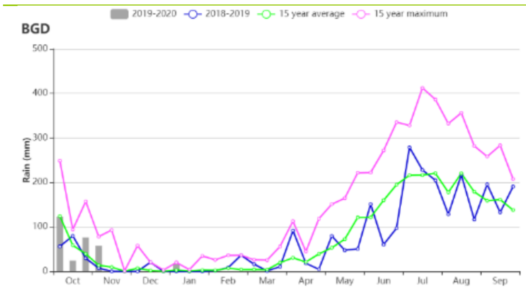


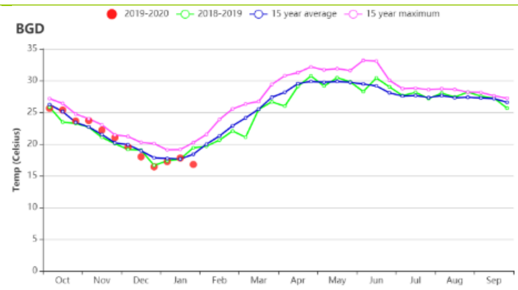

(a). Phenology of major crops



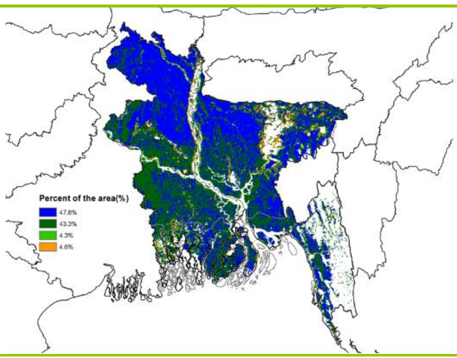



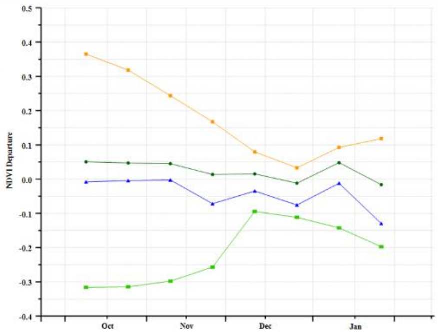

(b) Crop condition development graph based on NDVI (c) Maximum VCI



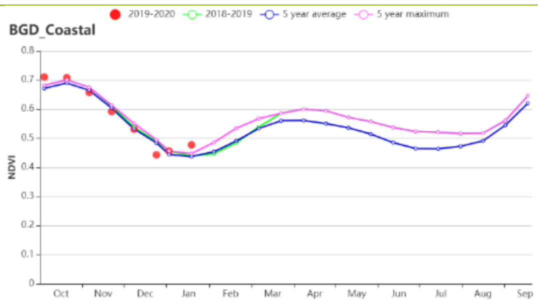



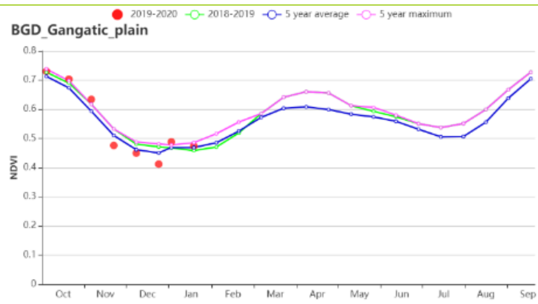

(d) Rainfall Index (e) Temperature Index



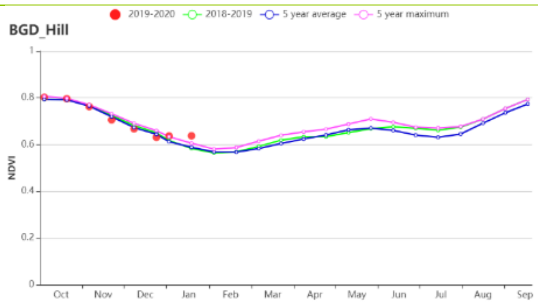



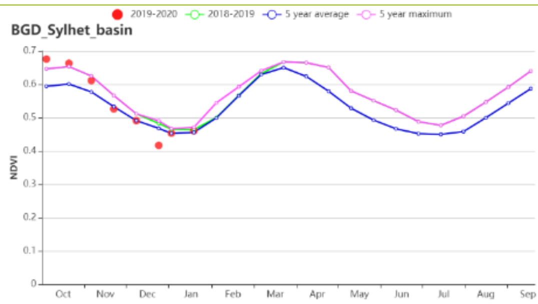

(f) Spatial NDVI patterns compared to 5YA (g) NDVI profiles




(k) 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 3.9 Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Coastal region | 299 | 14 | 21.9 | 0.1 | 1017 | -2 |
| Gangetic plain | 284 | 34 | 20.4 | -0.4 | 911 | -6 |
| Hills | 299 | -14 | 20.4 | -0.1 | 1025 | 0.2 |
| Sylhet basin | 331 | 22 | 20.5 | -0.1 | 910 | -6 |

**Table 3.10 Bangladesh's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Coastal region | 447 | 33 | 93 | 2 | 1.05 |
| Gangetic plain | 423 | 30 | 97 | 2 | 1.00 |
| Hills | 416 | 15 | 99 | 0 | 1.02 |
| Sylhet basin | 400 | 24 | 91 | 3 | 0.98 |

# [BLR] Belarus

Winter wheat, which was sown in October, is the major crop in the field during this monitoring period. Agro-climatic conditions were generally stable as compared to average, except for a slight rainfall deficit but with very sunny weather (RAIN 240 mm or -15%, TEMP 3.9℃ or +3.2°C above average, RADPAR 155 MJ/m2 equivalent to a -5%). Nearly all the arable land was cropped (CALF at 99%) and the maximum vegetation condition index (VCIx) was high (0.90). As a result, weather based projected biomass increased by 19%. At the national level, NDVI was below average in October, but started to exceed the 5YA and maximum in November. According to the spatial distribution maps, VCIx was satisfactory in most areas of the country (>0.8). NDVI fluctuated very widely over the country; across most central region (48.1% of cropped area), the value persistently increased from -0.1 in October to 0.2 by the end of January. Crop conditions were generally favorable for Belarus.

**Regional analysis**

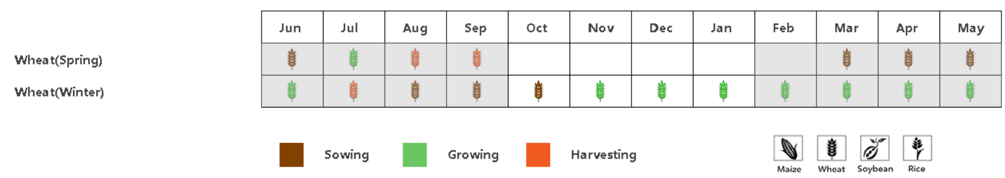
Based on cropping system, climatic zones and topographic conditions, regional analyses for three agro-ecological zones (AEZ) are provided, including Northern Belarus (028), Central Belarus (027) and Southern Belarus (029).

**Northern Belarus** (Vitebsk, northern area of Grodno, Minsk and Mogilev) was slightly lower than average for rainfall (-3%), but with increased temperature (+3.4°C) and deficit radiation (-14%). Biomass production is estimated to be 5% higher than 15YA. Agronomic indicators show very satisfactory values: 100% for CALF and 0.88 for VCIx. Crop condition is good.

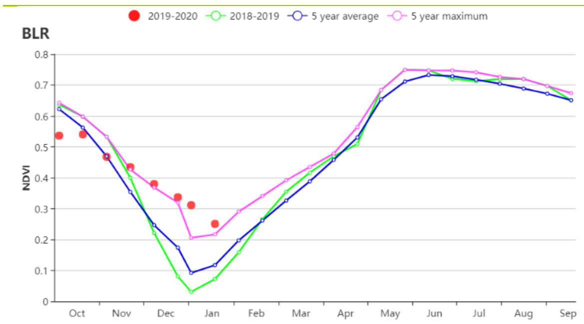
In **Central Belarus**, the regions of Grodno, Minsk and Mogilev recorded rainfall 20% lower than reference values, and higher temperature (+3.1°C) and lower radiation (-2%). The BIOMSS is projected to increase by 24%. Fully cropped arable land (CALF at 99%) and a VCIx value of 0.88 show good prospects for winter crops. NDVI curve also showed a recovering trend since January. In summary overall situation was favorable for winter crops.

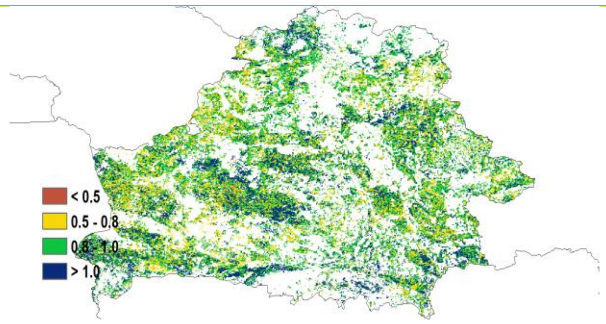
The **Southern Belarus** (southern halves of Brest and Gomel regions) experienced the same agro-climatic condition as Northern and Central area. Lower rainfall (-33%) has not adversely affected the crops. Other favorable agro-climatic conditions (TEMP +2.9°C; RADPAR +6%) and favorable agronomic indicators (CALF 98%, VCIx 0.95 and BIOMSS up 33%) as well as rapidly recovering NDVI should ensure satisfactory crop production.

**Figure 3.10 Belarus's crop condition, October 2019 - January 2020**



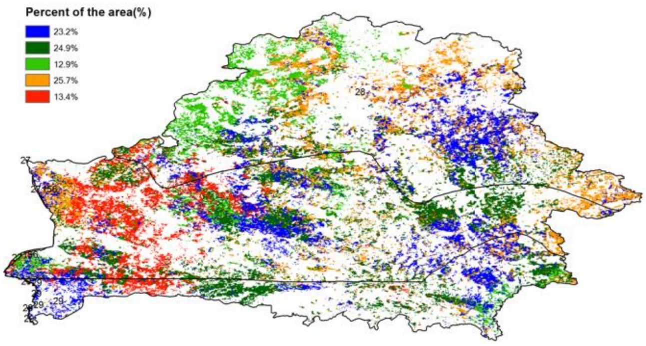

(a). Phenology of major crops



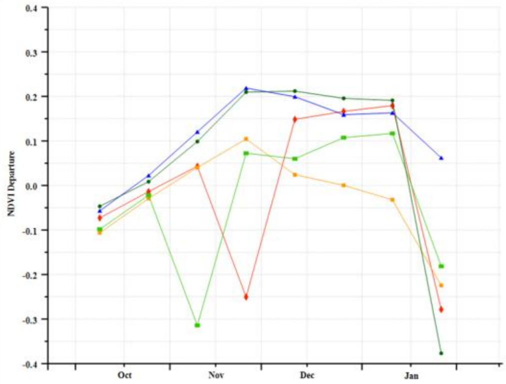




(b) Crop condition development graph based on NDVI

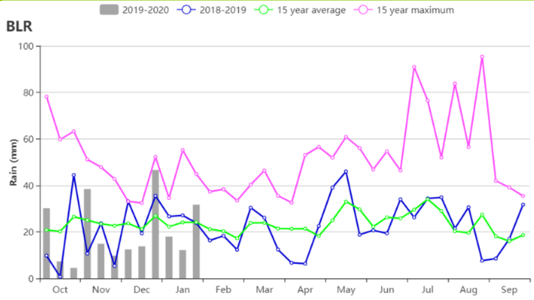
(c) Maximum VCI



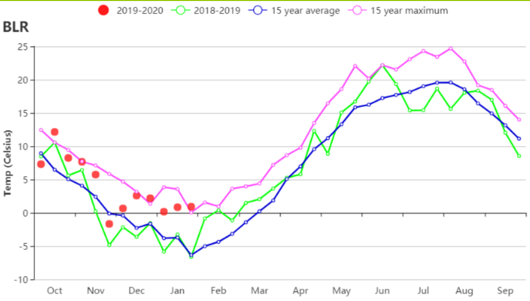

(d) Spatial NDVI patterns compared to 5YA



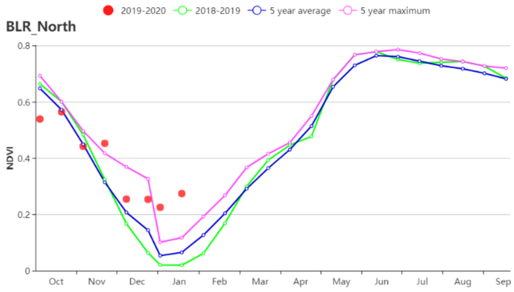

(e) NDVI profiles



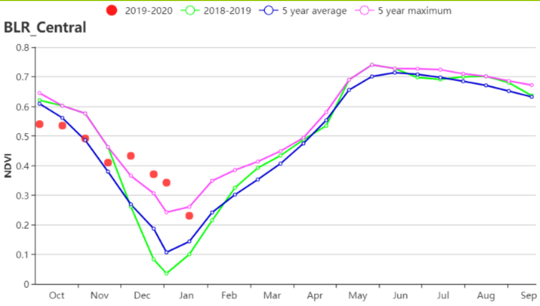

(f)Rainfall time series



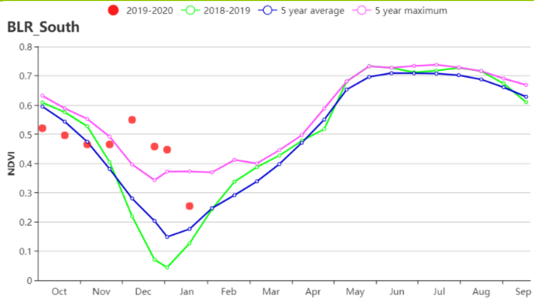

(g) Temperature time series




(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 3.11 Belarus's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020.**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Center** | 223 | -20 | 4.2 | 3.1 | 167 | -2 |
| **North** | 279 | -3 | 3.4 | 3.4 | 126 | -14 |
| **South-west** | 177 | -33 | 4.4 | 2.9 | 202 | 6 |

**Table 3.12 Belarus's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020.**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Center | 40 | 24 | 99 | 1 | 0.89 |
| North | 28 | 5 | 100 | 0 | 0.88 |
| South-west | 50 | 33 | 98 | 1 | 0.95 |

# [BRA] Brazil

The reporting period covers the sowing to early growth stages of maize, rice and soybean and the harvest of maize in the North-East. The harvest of wheat in Central to Southern Brazil was concluded by the end of December. Generally, crop conditions in Brazil were slightly below average compared to the previous five years.

Nationwide, agro-climatic indicators show close to average conditions with 2% lower rainfall, 0.3℃ higher temperatures and RADPAR up 4% as compared to the average. Average weather conditions resulted in close to average potential biomass, 1% above average according to the simulation model. Seasonal temperature profiles present generally above average values except for early and late January. Rainfall and temperature are strongly correlated: In early and late January, rainfall was above average, whereas temperatures were below average. As for the spatial variation, significant differences among the agricultural states were observed: rainfall departures ranged from -41% in Alagoas to +67% in Rio Grande Do Norte. Large positive departures were also observed in some major agricultural States including Ceara (Northeast) with 66% above average. However, rainfall was 25% below average in Rio Grande Do Sul and 12% below average in Mato Grosso Do Sul. The temperatures in most major agricultural states were above average except for Mato Grosso and Ceara where temperature remained near average. Similar patterns were identified for radiation with above average RADPAR in all 9 major agricultural states except for Rio Grande do Sul. Rio de Janeiro is the only state where below average (-5%) radiation were observed. The insufficient radiation in Rio de Janeiro resulted in the largest negative BIOMSS departure (-11%) although the state received the highest rainfall (1536mm, +33% above average). Large BIOMSS departures were also observed in Rio Grande do Sul (-6%), where below average rainfall limited crop growth, and in Ceara (+8%) where it benefitted from above average rainfall.

The national NDVI development profile for Brazil presents slightly below average values throughout the reporting period. According to the NDVI departure clustering maps and profiles, below average conditions were mostly located in Rio Grande do Sul and Northeast coastal areas after mid-November. Scattered areas in Mato Grosso Do Sul and western Parana also presented below average crop conditions throughout the monitoring period. Those areas mentioned above coincided with the areas with relatively low VCIx values (below 0.8). National VCIx is 0.94 and CALF is 2% above average. Significant below average potential biomass in Rio Grande do Sul also confirmed the poor situation. In this major wheat producing state, the adverse weather conditions and below average BIOMSS indicate that below average wheat yields resulted.

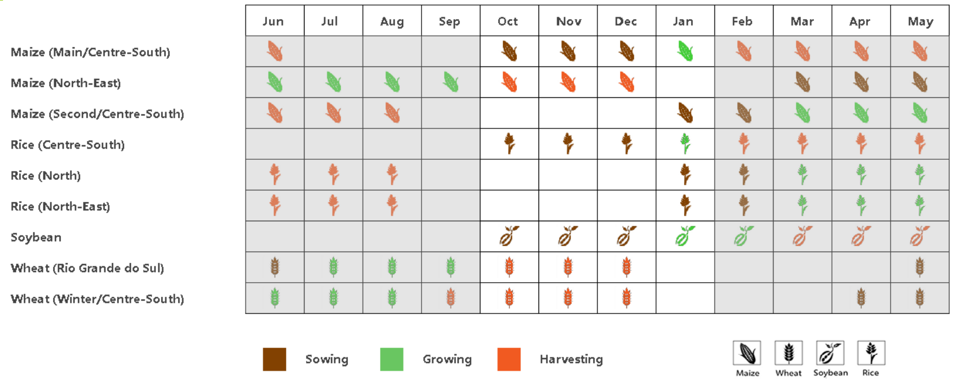
**Regional analysis**

Based on 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, Subtropical rangeland zone, mixed forest and farmland, and the Nordeste. Over the recent reporting period, 4 zones received below average rainfall, including Central Savanna, Mato Grosso, Parana Basin and Southern subtropical rangelands which might hamper the early development of summer crops; while Nordeste, and Southern subtropical rangelands received above average rainfall, and rainfall in Amazonas as well as Northeastern mixed forest and farmland were close to average. Amazonas and Mato Grosso are the only two zones with below average temperatures. Radiation in most of AEZs was above average except for southern subtropical rangelands with 1% lower RADPAR. By integration of rainfall, temperature and radiation, achievable biomass is simulated and compared to the last 15YA. Large BIOMSS departures were only identified in Mato Gross with 6% above average mainly due to the above average radiation, and in Southern subtropical rangelands with 10% below average, because rainfall was 15% below average. The Nordeste zone presents the largest positive departure from 5YA of CALF at 81%. Meanwhile, Southern subtropical rangelands and Nordeste present lowest VCIx at 0.78 and 0.80 respectively while all other six AEZs present higher VCIx with values larger than 0.90.

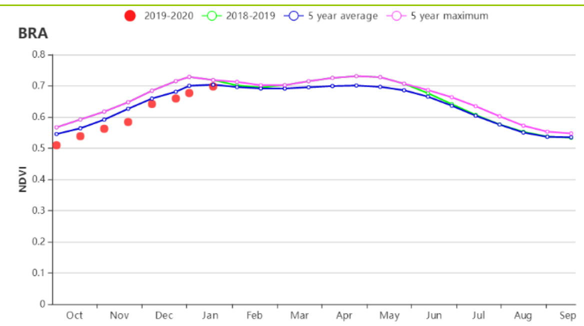
Normal or favorable conditions in Central Savanna, Mato Grosso, Nordeste, and Parana Basin resulted in average to slightly above average crop condition as indicated by the NDVI based crop development profiles in the four zones. Since summer crops in those four zones are still at the early development stage, CropWatch will keep track on the meteorological conditions and crop progresses.

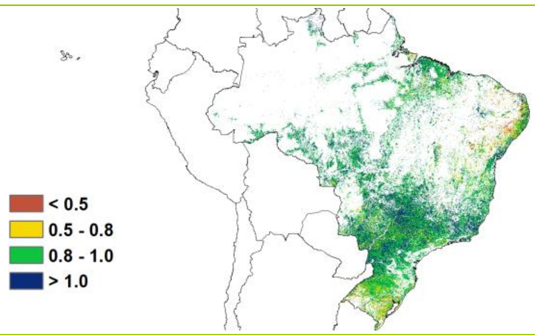
Below average NDVI values as reflected by the crop development graphs were identified in Amazonas, Coast, Northeastern mixed forest and farmland, and Southern subtropical rangelands. Among the four zones mentioned here, Southern subtropical rangelands represent the key agricultural producing area with wheat as the dominant crop. Low rainfall in Southern subtropical rangelands potentially hampered the grain-filling in the end of growing season but it was beneficial for the wheat harvest. Considering the average CALF and low VCIx value in the zone, CropWatch assesses wheat production prospects over the four zones as below average, following the same trend as reported in the November 2019 Bulletin.

**Figure 3.11 Brazil's crop condition, October 2019 - January 2020**



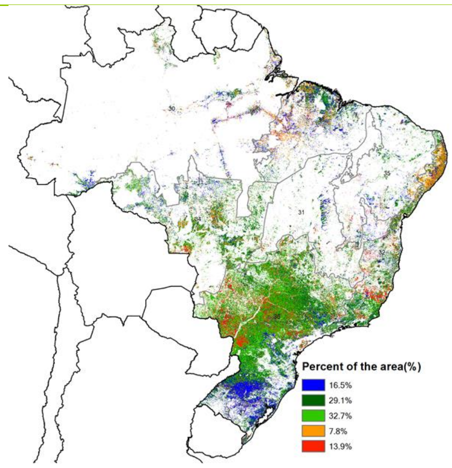

(a). Phenology of major crops

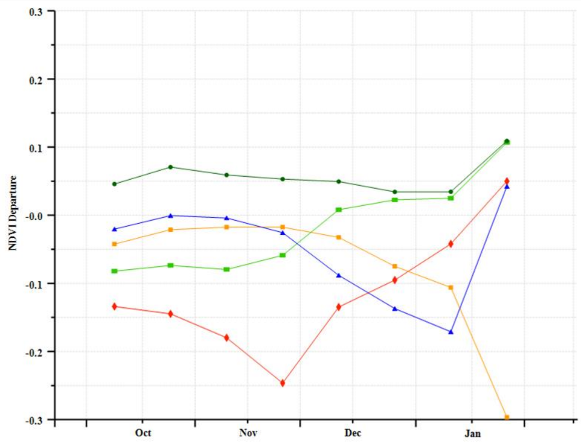



(b) Crop condition development graph based on NDVI

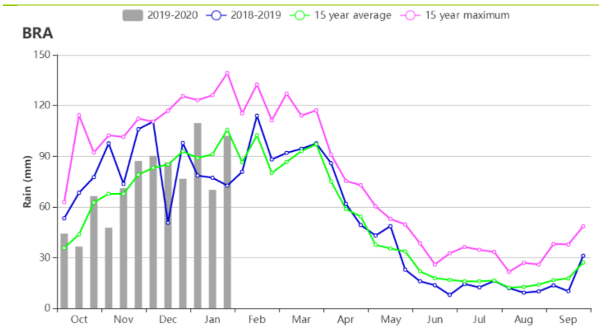
(c) Maximum VCI

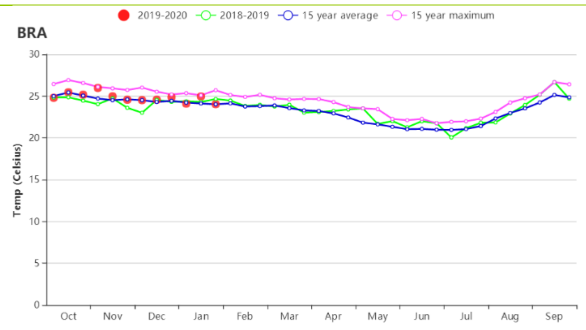


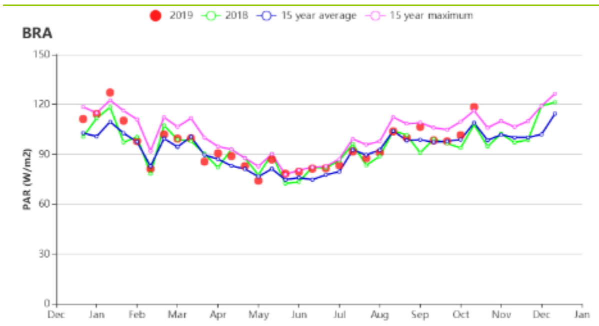

(d) Spatial NDVI patterns compared to 5YA

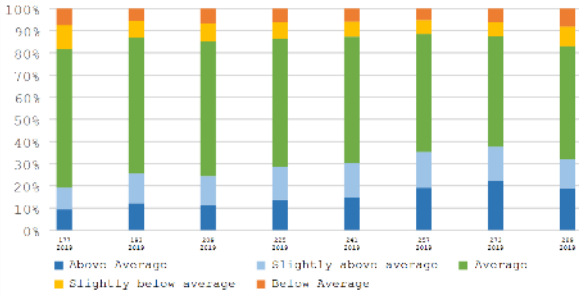
(e) NDVI profiles



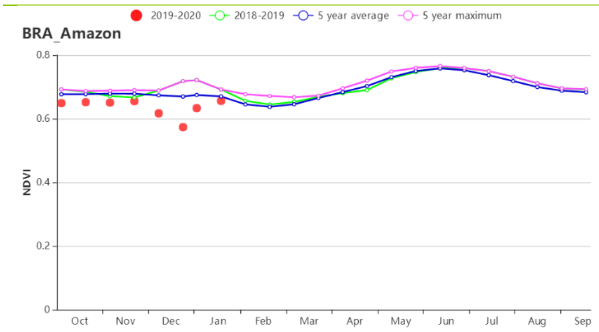



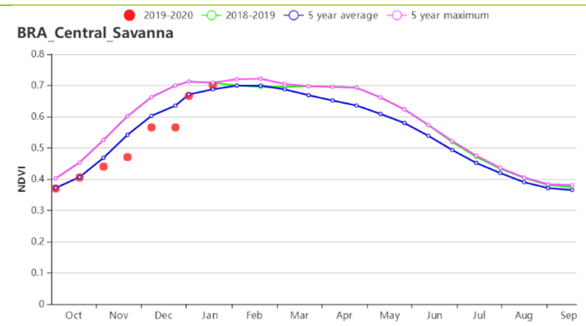

(f)Time series profile of rainfall (g)Time series profile of temperature



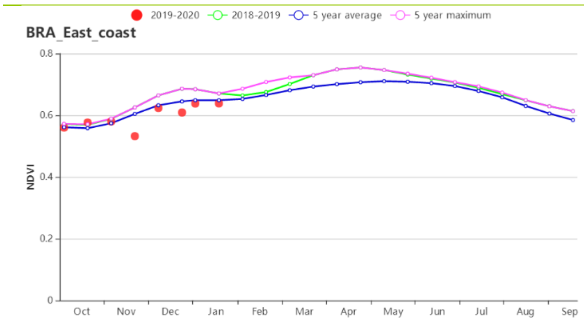



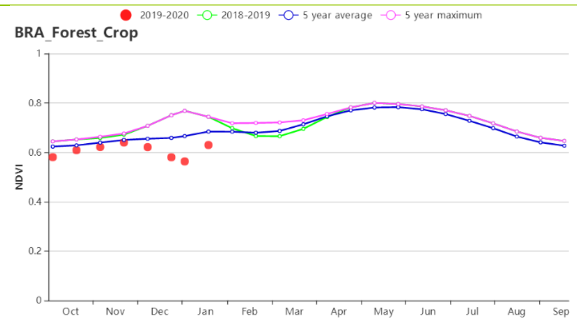

(h)Time series profile of rainfall (i) (i) Potential Biomass departure from 5YA



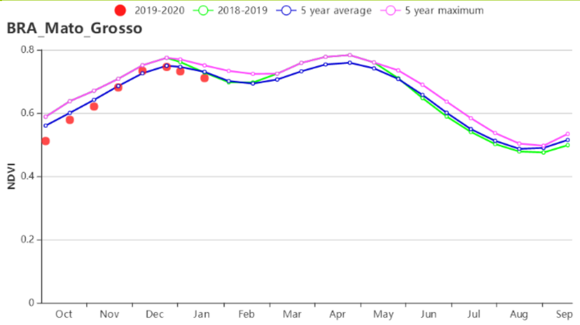



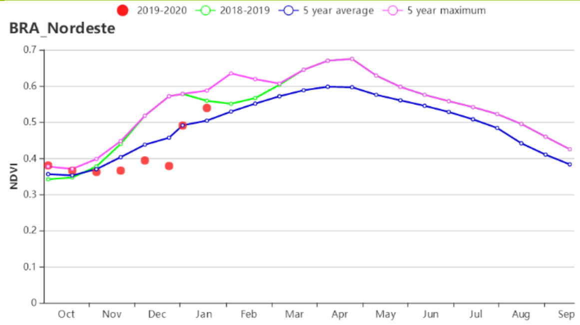

(j) Crop condition development graph based on NDVI ((Amazonas) (left) and (Central Savanna) (right))



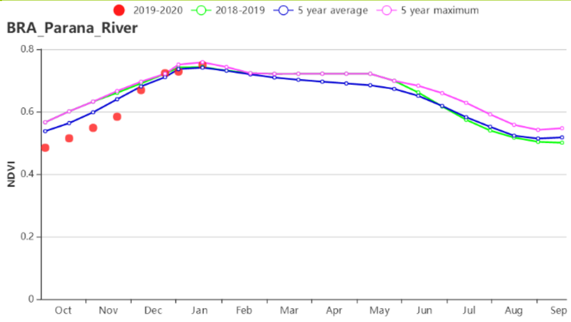



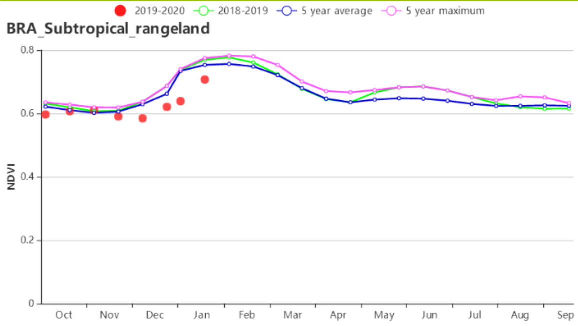

(k) Crop condition development graph based on NDVI (Coast (left) and Northeastern mixed forest and farmland (right))



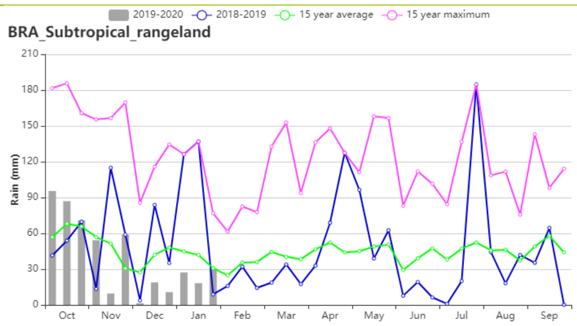




(l) Crop condition development graph based on NDVI (Mato Grosso region (left) and Nordeste (right))




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




(n) Time series of rainfall profile of Southern subtropical rangelands

**Table 3.13 Brazil's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Amazonas | 910 | 2 | 26.1 | -0.4 | 1218 | 5 |
| Central Savanna | 870 | -7 | 25.4 | 0.7 | 1296 | 3 |
| Coast | 855 | 17 | 23.2 | 0.2 | 1274 | 2 |
| Northeastern mixed forest and farmland | 714 | 1 | 26.7 | -0.1 | 1248 | 4 |
| Mato Grosso | 1191 | -3 | 25.4 | 0.0 | 1226 | 8 |
| Nordeste | 288 | 16 | 26.8 | 0.4 | 1383 | 2 |
| Parana basin | 976 | -5 | 23.3 | 0.6 | 1344 | 4 |
| Southern subtropical rangelands | 483 | -15 | 22.3 | 0.7 | 1387 | -1 |

**Table 3.14 Brazil's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Amazonas | 818 | 3 | 100 | 1 | 0.97 |
| Central Savanna | 826 | 1 | 99 | 5 | 0.92 |
| Coast | 795 | -3 | 97 | 4 | 0.94 |
| Northeastern mixed forest and farmland | 846 | 4 | 99 | 1 | 0.94 |
| Mato Grosso | 822 | 6 | 100 | 0 | 0.97 |
| Nordeste | 822 | -1 | 81 | 34 | 0.80 |
| Parana basin | 833 | 1 | 100 | 0 | 0.96 |
| Southern subtropical rangelands | 776 | -10 | 100 | 0 | 0.78 |

AFG AGO ARG AUS BGD BLR BRA **CAN** DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [CAN] Canada

The current reporting period covers the harvest of summer crops, including maize and soybean, as well as the sowing and early growth of winter wheat in Canada. Situation of summer crops was reported in last bulletins, so that the following section focuses on crop condition of winter crops. In general, below average crop conditions were observed for the Prairies, while average conditions prevailed for the Saint Lawrence basin.

The agro-climatic conditions were dominated by the snow and cold weather in this monitoring period. All the agro-climatic indicators were more or less below average (RAIN -3%, TEMP -0.4°C, RADPAR -1%), which was unfavorable to the replenishment of soil moisture of winter wheat and led to the drop of the potential biomass (-5%). In the Prairies region, Alberta (-5%) and Saskatchewan (-19%) suffered from the shortage of precipitation. This led to a drop in potential biomass (Alberta -8%, Saskatchewan -7%). In Manitoba, precipitation was above average (+9%), but its potential biomass was 22% lower than the average, due to a low RADPAR (-12%). The negative departure of NDVI confirmed the negative impact of the agro-climatic conditions on wheat growth in the Prairies. The agro-climatic conditions indicated a relatively poor start of winter crops in the Canadian Prairies, while in the Saint Lawrence basin, conditions were more favorable.

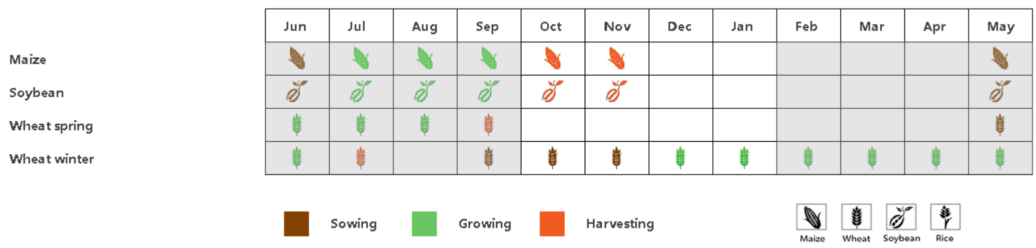
**Regional analysis**

The **Prairies** (area identified as 53 in the NDVI clustering map) and **Saint Lawrence basin** (49, covering Ontario and Quebec) are the major agricultural regions.

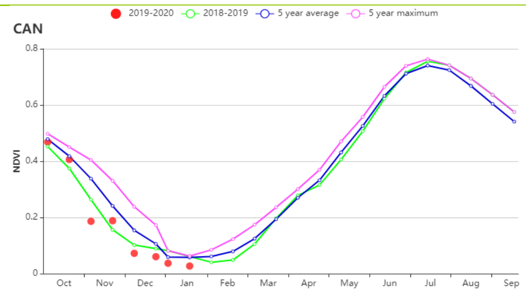
In the **Prairies**, the main food production area in Canada, the agro-climatic indicators were below average (RAIN -7%, TEMP -0.8°C, RADPAR -4%). Attributed to the shortage of precipitation of Alberta and Saskatchewan and serious deficit of RADPAR in Manitoba, the potential biomass was below average (BIOMSS -11%).

In the **Saint Lawrence basin** region, the agro-climatic indicators are mostly average, which resulted in average potential biomass.

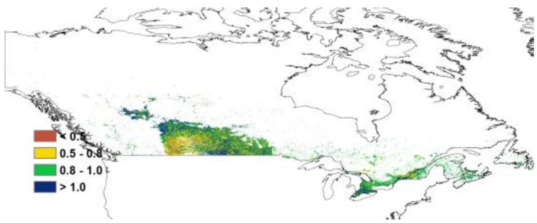
**Figure 3.12 Canada's crop condition, October 2019 - January 2020**



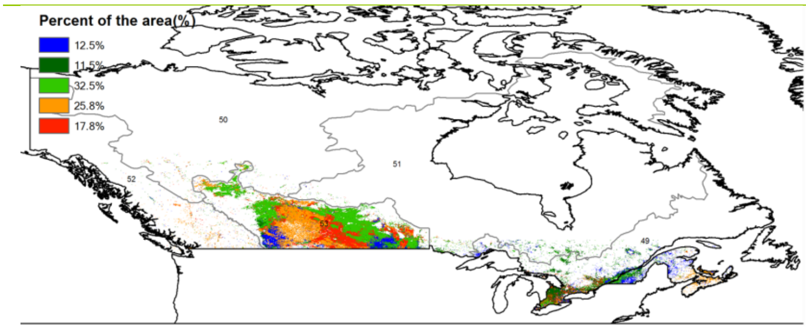

(a). Phenology of major crops

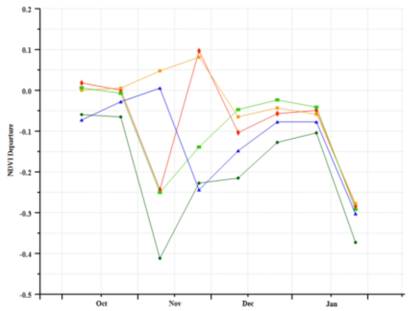



(b) Crop condition development graph based on NDVI



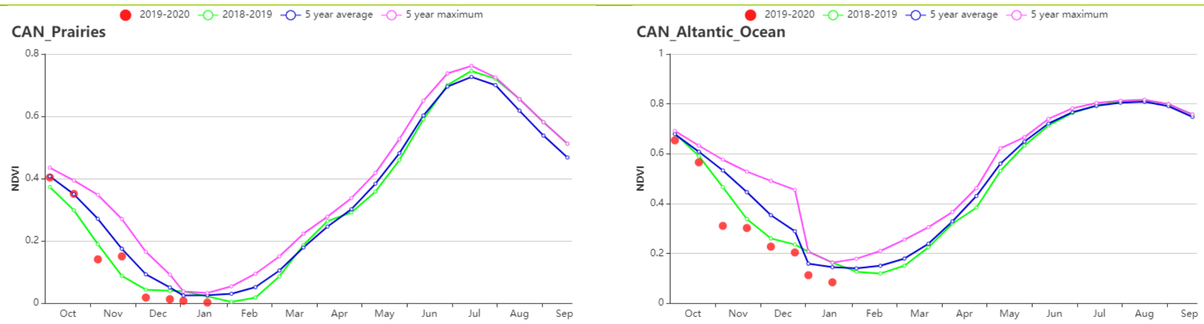

(c) Maximum VCI



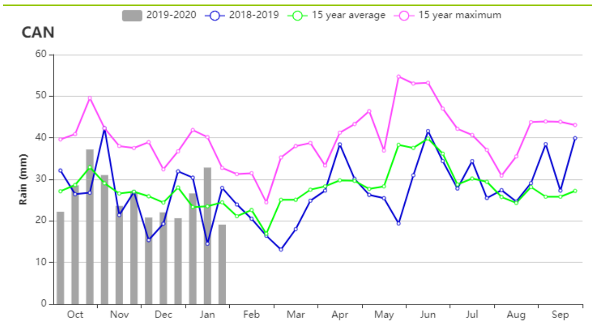



(d) Spatial NDVI patterns compared to 5YA

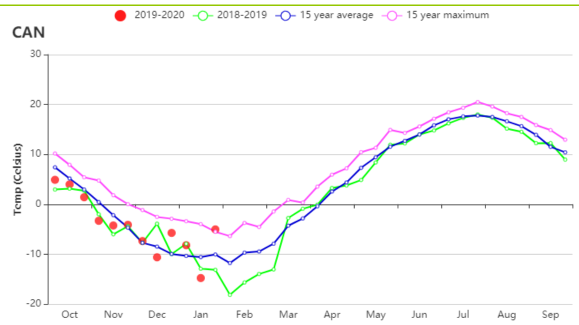
(e) NDVI profiles




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




(f)Time series profile of rainfall




(g)Time series profile of temperature

**Table 3.15 Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Saint Lawrence basin | 480 | 0 | -1.4 | -0.2 | 318 | 0 |
| Prairies | 155 | -7 | -5.5 | -0.8 | 276 | -4 |

**Table 3.16 Canada agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Saint Lawrence basin | 52 | 0 | 99 | 1 | 0.92 |
| Prairies | 36 | -11 | 49 | 30 | 0.93 |

AFG AGO ARG AUS BGD BLR BRA CAN **DEU** EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [DEU] Germany

This reporting period for Germany covers the late stages of sugar beets (October harvest) and early vegetative stages of winter wheat and winter barley.

At the national level, total precipitation was 5% below average, temperature was significantly above average (TEMP, +1.2°C), and radiation was average. Above average precipitation occurred in most of Germany from early-October to mid-October, early-November and mid-December. This was favorable for winter crop planting and establishment. Negative rainfall departures occurred during short periods in late October, late November and after late December. Most parts of Germany experienced warmer-than-usual conditions during this reporting period, except early-October and in mid-November, when a cold spell swept through most European countries. Due to favorable rainfall early in the monitoring period and overall warmer-than-usual conditions, the biomass production potential (BIOMSS) is expected to increase by 1% nationwide compared to the five-year average.

According to the national crop condition development graph, the reporting period experienced crop condition that was better than in 2019. As compared to the 5-year average, it was worse until November, but increased to above average in December and exceeded the 5-year maximum in January 2020. These observations are confirmed by the spatial NDVI profiles. Crop condition was above average in October on only 41.4% of the cropland, and improved to 55.1% in December and 92% in January, because of warmer-than-usual temperatures. The large negative outliers are probably due to fog, snow, clouds or other factors. Overall, the above-mentioned pattern of crop growth is also reflected by VCIx. Its value reached 0.95 countries wide. CALF during the reporting period was the same as the recent five-year average.

Generally, the values of agroclimatic and agronomic indicators mentioned above show favorable conditions for most winter crops and the outlook of winter crops is above average.

**Regional analysis**

Based on cropping systems, climatic zones, and topographic conditions, six sub-national regions can be distinguished for Germany. The ones which are most relevant for crop cultivation are the Northern wheat zone, North-west mixed wheat and sugar beets zone, and the Central wheat zone.

**Schleswig-Holstein and the Baltic coast** is the major winter wheat zone of Germany. The CropWatch agroclimatic indicators RAIN (+5%) and temperature (TEMP, +1.3°C) were above average, whereas radiation (RADPAR, -4%) was below. Due to unfavorable sunshine, biomass (BIOMSS) in this zone was decreased by 1% as compared to the five-year average. As shown in the crop condition development graph based on NDVI, the values were below or close to average in October and below average from November to December, then above average in January 2020. The area had a high CALF (100%) as well as a favorable VCIx (0.94), indicating a larger cropped area.

Wheat and sugar-beets are major crops in the **Mixed wheat and sugar-beets zone of the north-west**. The CropWatch agroclimatic indicator RAIN was average with warm weather (TEMP +1.0°C) and radiation below average (RADPAR, -2%), which led to a small decrease (-2%) of BIOMSS. As shown in the crop condition development graph based on NDVI, the NDVI values and crop condition was above the situation in 2019 until late-October, then below average in November, while after early-December, it was average, and even above the 5-year maximum in January 2020. The area had a high CALF (100%) and a high VCIx (0.96), indicating favorable crop prospects.

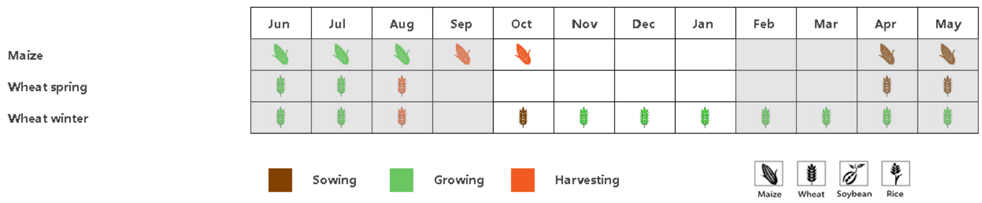
**The Central wheat zone of Saxony and Thuringia** is another major winter wheat zone; The CropWatch agroclimatic indicator show that this region experienced a precipitation deficit (-13%) with warm weather (TEMP, +1.5°C) and radiation above average (RADPAR, +6%). With suitable temperature, biomass (BIOMSS) in this zone is expected to increase by 7% compared to the five-year average. As shown in the crop condition development graph based on NDVI, the values were higher than in 2019 from October to November, and above the 5-year maximum after December. The area has a high CALF (100%) as well as a favorable VCIx (0.95), indicating favorable crop prospects.

**The East-German lake and Heathland sparse crop area** experienced rainfall deficit (RAIN, -6%) but with above average temperature (TEMP, +1.6°C), average radiation (RADPAR, +4%) and above average BIOMSS (+8%). NDVI values were average until late-November, and then increased to above 5-year maximum by late December. The area had a high CALF (100%) and a high VCIx (0.96).

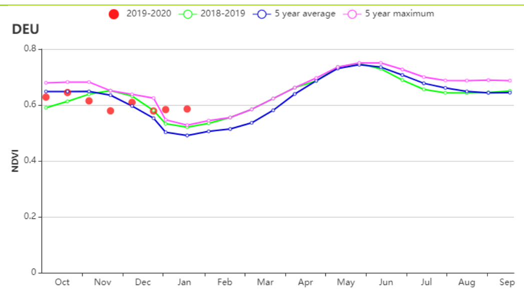
The cropland in the **Western sparse crop area of the Rhenish massif** was more marginal. It recorded about 4% above average rainfall, with warm weather (TEMP +1.0°C) and radiation below average (RADPAR, -7%), which led to a decrease of BIOMSS (-9%). As shown in the crop condition development graph based on NDVI, the NDVI values and crop condition were similar to the other regions, and showed above the situation in 2019 until late-October, then below average in November, while after early-December, it was average, and even above the 5-year maximum in January 2020. The area had high CALF (100%) and a high VCIx (0.91).

Dry weather was recorded in the **Bavarian Plateau** (RAIN -9%), with above average temperatures (+1.1°C) and radiation (RADPAR +1%). Compared to the five-year average, BIOMSS increased 2%. The area had a high CALF (100%) as well as a favorable VCIx (0.95). As shown in the crop condition development graph based on NDVI, the values were all above the situation in 2019 and average during the whole reporting period, except November, showing favorable crop prospects for the regions.

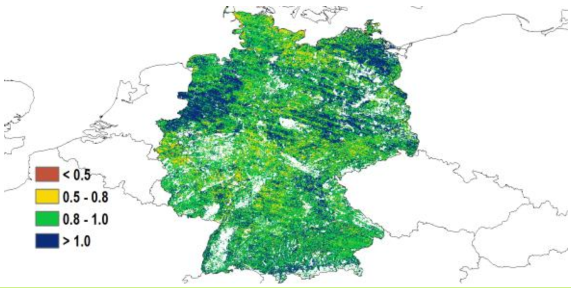
**Figure 3.13 Germany's crop condition, October 2019 - January 2020**



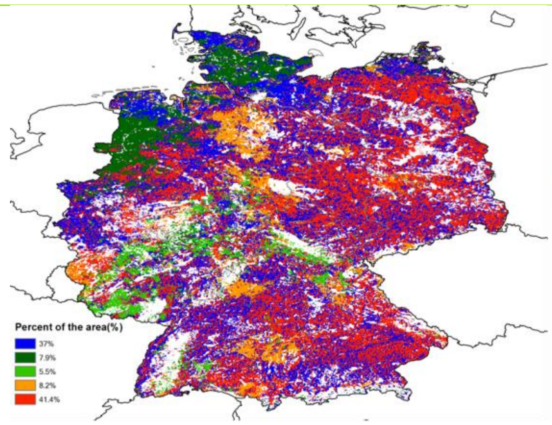

(a). Phenology of major crops



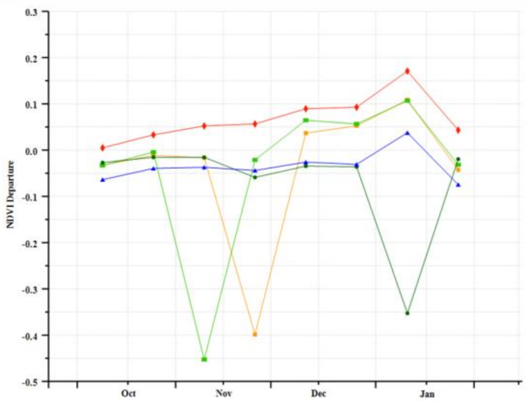

(b) Crop condition development graph based on NDVI



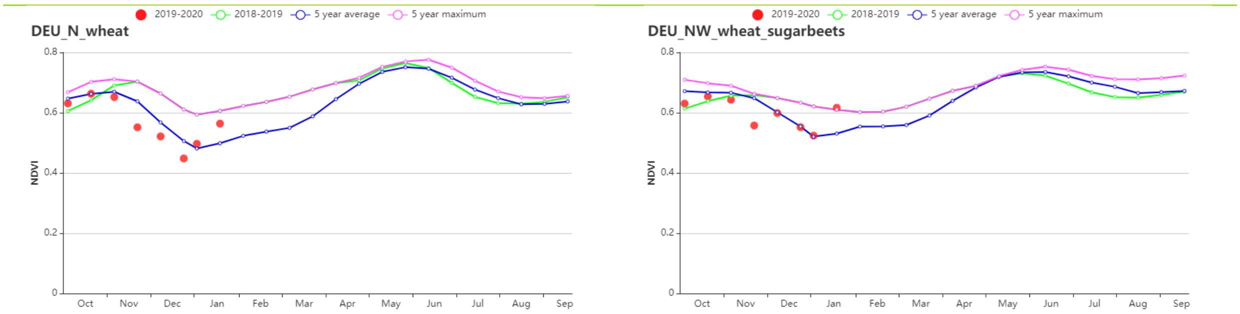

(c) Maximum VCI



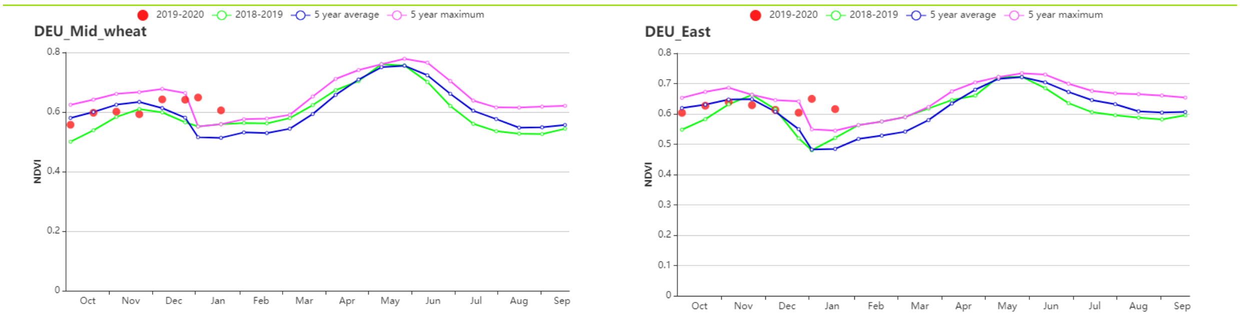

(d) Spatial NDVI patterns compared to 5YA



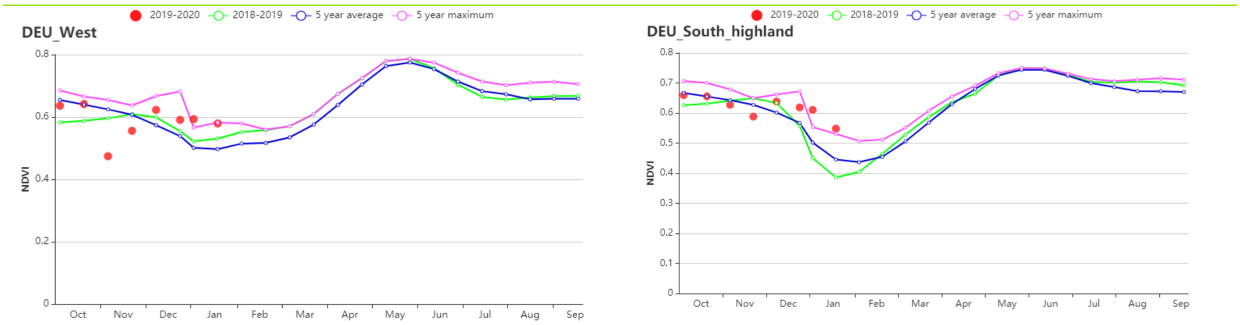

(e) NDVI profiles



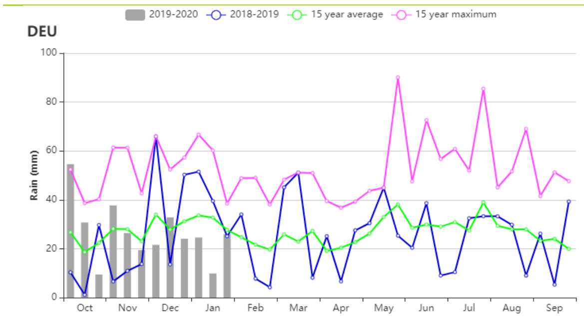

(f) Crop condition development graph based on NDVI (Wheat zone of Schleswig-Holstein and the Baltic coast (left) and Mixed wheat and sugar beets zone of the north-west(right))



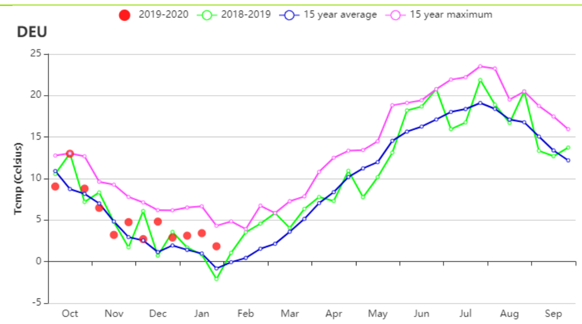

(g) Crop condition development graph based on NDVI (Central wheat zone of Saxony and Thuringia(left) and Sparse crop area of the east-German lake and Heathland (right))




(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 3.17 Germany agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, July-October 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Wheat zone of Schleswig-Holstein and the Baltic coast | 349 | 5 | 6.4 | 1.3 | 169 | -4 |
| Mixed wheat and sugarbeets zone of the north-west | 340 | 0 | 6.2 | 1.0 | 196 | -2 |
| Central wheat zone of Saxony and Thuringia | 243 | -13 | 5.3 | 1.5 | 232 | 6 |
| East-German lake and Heathland sparse crop area | 228 | -20 | 5.6 | 1.6 | 222 | 4 |
| Western sparse crop area of the Rhenish massif | 314 | 4 | 5.1 | 1.0 | 213 | -7 |
| Bavarian Plateau | 345 | -9 | 4.2 | 1.1 | 291 | 1 |

**Table 3.18 Germany's agronomic indicators by sub-national regions, current season's value and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Wheat zone of Schleswig-Holstein and the Baltic coast | 43 | -1 | 100 | 0 | 0.94 |
| Mixed wheat and sugarbeets zone of the north-west | 49 | -2 | 100 | 0 | 0.96 |
| Central wheat zone of Saxony and Thuringia | 56 | 7 | 100 | 0 | 0.95 |
| East-German lake and Heathland sparse crop area | 54 | 8 | 100 | 0 | 0.96 |
| Western sparse crop area of the Rhenish massif | 50 | -9 | 100 | 1 | 0.91 |
| Bavarian Plateau | 64 | 2 | 100 | 0 | 0.95 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU **EGY** ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

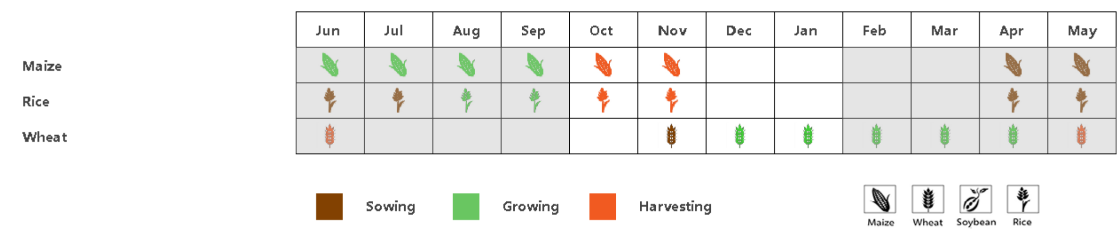
# [EGY] Egypt

During the reporting period, the summer crops such as maize and rice were harvested, followed by the sowing of winter wheat in November. The CropWatch agro-climatic indicators show that rain and temperature were 99% and 0.5°C above the average, respectively. High rainfall occurred in late October and January. RADPAR, which is the main limiting factor for crop growth in Egypt since almost all crops are irrigated, was 0.4% below the average. The estimated BIOMSS was 14% below the average and VCIx was 0.85. The nationwide NDVI profile shows below-average crop conditions during October and November. Starting in December, conditions improved to average. The NDVI spatial pattern shows that 6.8% of the cultivated area was above the 5YA, 60.3% was below the 5YA, and 32.8% was below the average until the end of December then increased in January. The whole country VCIx value was 0.85 and the CALF exceeded the 5YA by 8%, indicating favorable crop conditions.

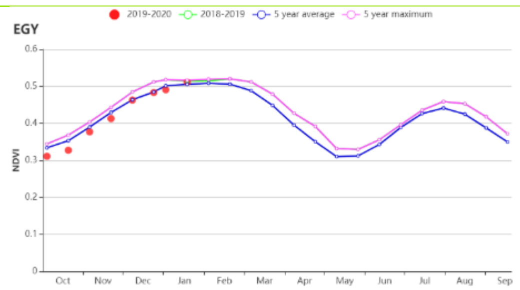
**Regional Analysis**

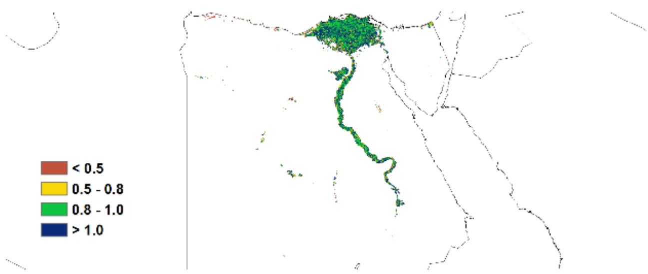
Egypt can be subdivided into three agro-ecological zones (AEZs) based on cropping systems, climatic zones, and topographic conditions. Only two of them are relevant for crops: 1) the Nile Delta and the Mediterranean coastal strip and 2) the Nile Valley. Rainfall was 121% above the average in the first AEZ and 39% below average in the Nile Valley. Temperatures in both zones were slightly above average and on the contrary, the RADPAR was slightly below average. The estimated BIOMSS was 27% below the average in the Nile Delta and Mediterranean coastal strip and 16% above the average in the Nile Valley. For the Nile Delta and Mediterranean coastal strip, CALF was up by 6% and VCIx at 0.84. In the Nile Valley, CALF was up by 10% and VCIx at 0.95. The NDVI-based crop condition development graphs indicate below-average conditions during October and November, and average starting in December. Since most of the agricultural lands in Egypt are irrigated, the rainfall makes little change in the outcome of the season. However, additional water usually has a beneficial effect. It should be noted that unusually high amounts of rainfall registered during a short period (late of October) may have slightly delayed the sowing of winter wheat. This could explain the reduction of BIOMSS over the Nile Delta and the Mediterranean coastal strip. However, the crops seem to be well on track by the end of January.

**Figure 3.14 Egypt's crop condition, October 2019 - January 2020**



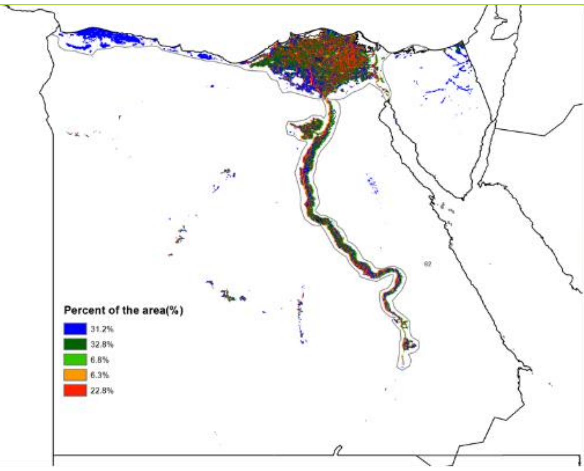

(a). Phenology of major crops

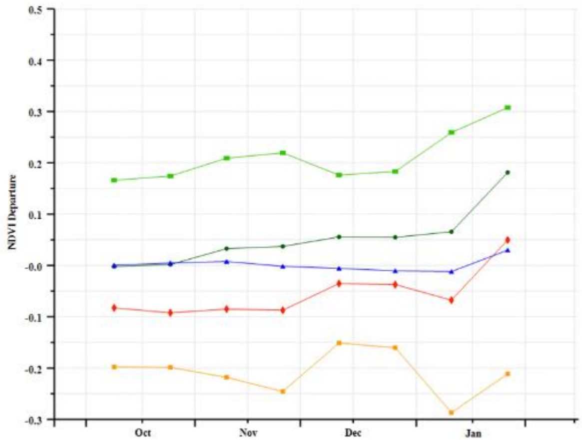


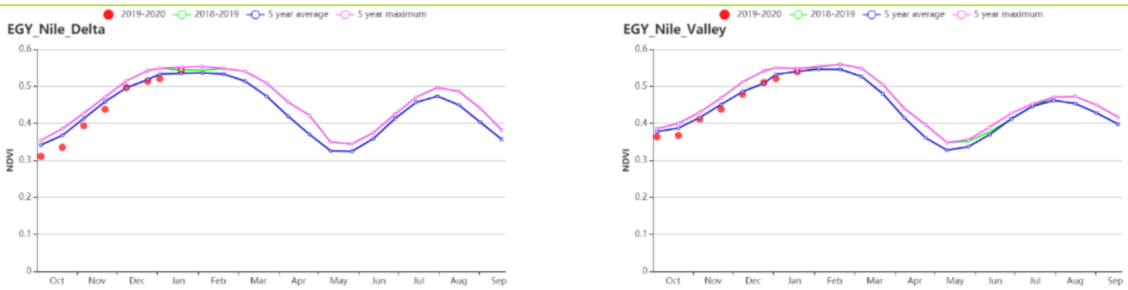

(b) Crop condition development graph based on NDVI

(c) Maximum VCI

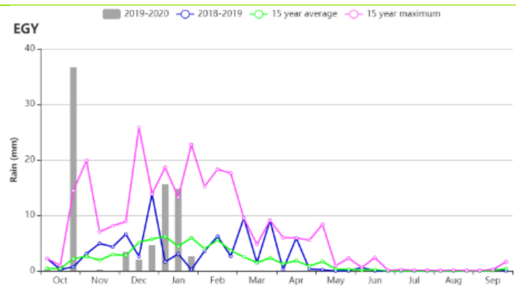


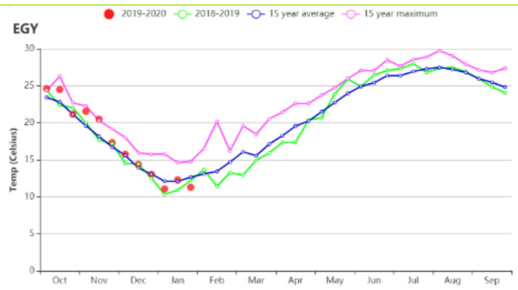




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles




(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 3.19 Egypt's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Nile Delta and Mediterranean coastal strip | 108 | 121 | 17.6 | 0.5 | 756 | -0.5 |
| Nile Valley | 6 | -39 | 17.4 | 0.6 | 881 | -0.4 |

**Table 3.20 Egypt's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Nile Delta and Mediterranean coastal strip | 203 | -27 | 72 | 6 | 0.84 |
| Nile Valley | 128 | 16 | 82 | 10 | 0.95 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY **ETH** FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [ETH] Ethiopia

This monitoring period covers the grain filling and harvest time for cereal crops grown during the main rainy season (meher). The major crops are wheat, teff and barley. At the national level, as compared to the average, CropWatch agroclimatic indicators show that the conditions were favorable, because rainfall was 72% above average during the October to January period. This may also benefit the production of maize during the belg (February to May) rainfall season in the central and southeastern parts of the country. Nationwide, there was a drop (-3%) in RADPAR. Total biomass production potential was above average (BIOMASS +12%), which is a positive indicator for livestock producers. CALF was above average (+3%) and maximum VCI was 0.97. The spatial NDVI patterns compared to the five-year average and corresponding NDVI departure cluster profiles indicate that NDVI was above average for 62.5% of arable land. In general, all the CropWatch indicators show favorable crop conditions. We expected a good production from the Meher season and good moisture availability for the upcoming belg season.

**Regional Analysis**

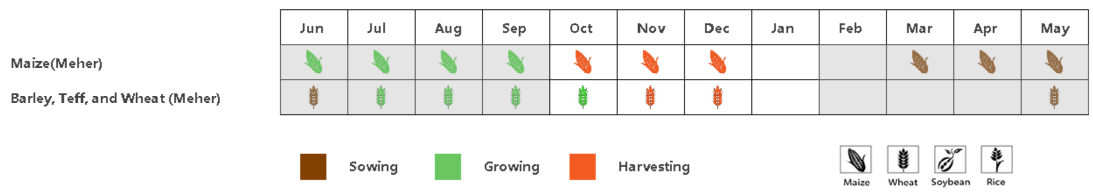
The main rain-fed cereal producing areas include the Southeastern mixed-maize zone, Western mixed maize zone, and the Central-northern maize-teff highlands zone.

In the **Southeastern mixed-maize zone** the total recorded rainfall reached 241 mm, which is 112% above average. In this zone, both TEMP and RADPAR were below average (0.3 °C and 10%, respectively). Because of the higher rainfall, the total biomass production was increased by 13% and CALF was above average by 9%. NDVI trends were also above average and VCI was at 1.06. All the indicators were favorable and we expect a good crop production.

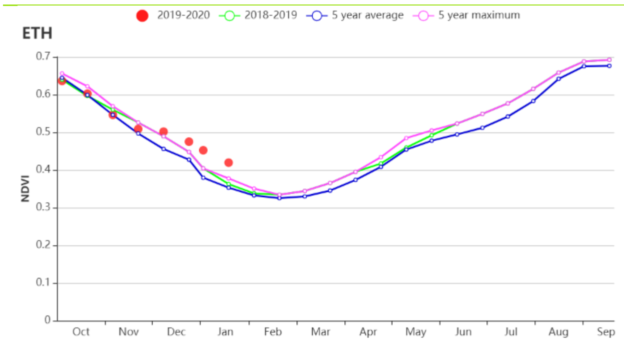
The **Western mixed maize zone** recorded a high rainfall total of 624 mm (+96%). In this zone, all CropWatch indicators except the temperature (TEMP -1.1°C) were above average. The RADPAR remained constant while CALF showed a slight increase of 1%. The total biomass production was above average by 4%, which is good for livestock production in this zone. According to the NDVI development graph crop conditions were close to average during October and subsequently increased to above average. A maximum VCI value of 1.01 was recorded. All CropWatch indicators concur in assessing crop and livestock feed conditions as favorable.

Finally, like the other zones, favorable weather conditions were observed in the **Central-northern maize-teff highlands** (RAIN +73%). in this zone, except for TEMP (-0.1°C) and the RADPAR (-3%), all CropWatch indicators were above average. The total biomass production was 16% above its five-year average. According to the NDVI profiles, crop conditions from October to the end of November were close to the average. In December and January, they were above average. The VCIx value was 0.96 in this zone. Overall, the conditions were favorable for crop and livestock production.

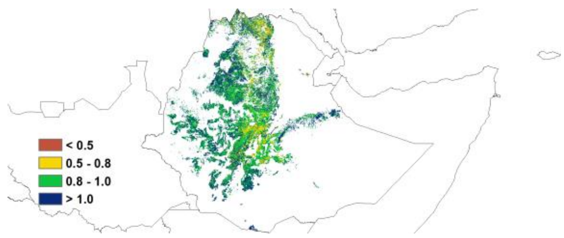
**Figure 3.15 Ethiopia's crop condition, October 2019 - January 2020**



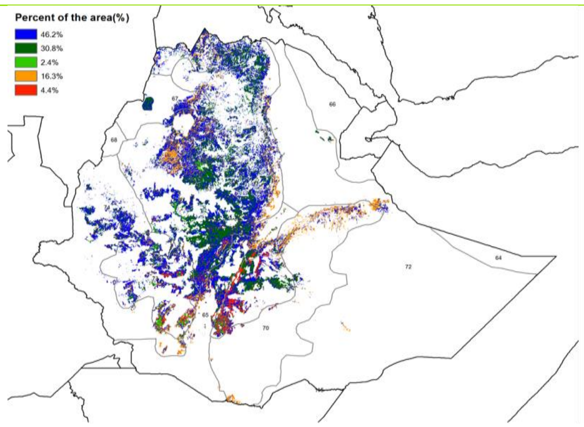

(a). Phenology of major crops



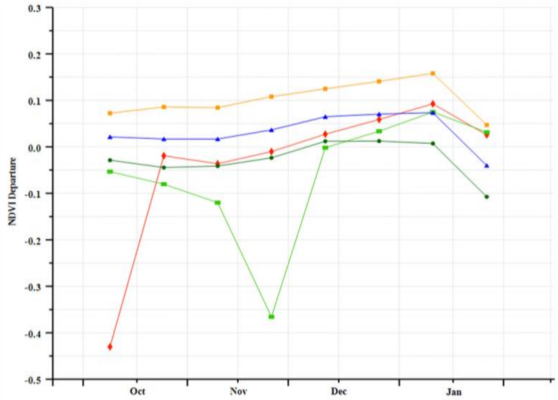

(b) Crop condition development graph based on NDVI



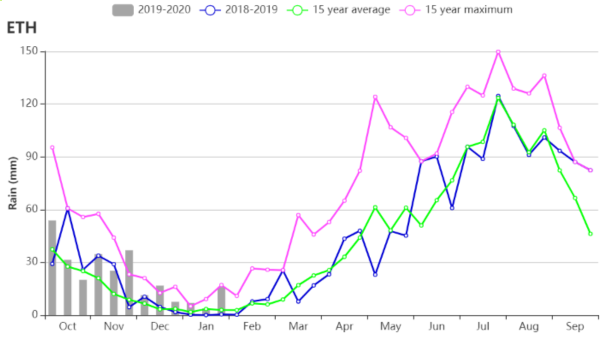

(c) Maximum VCI



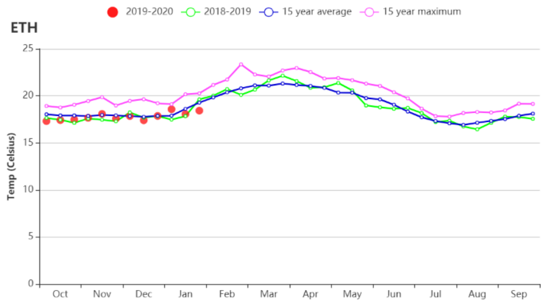

(d) Spatial NDVI patterns compared to 5YA



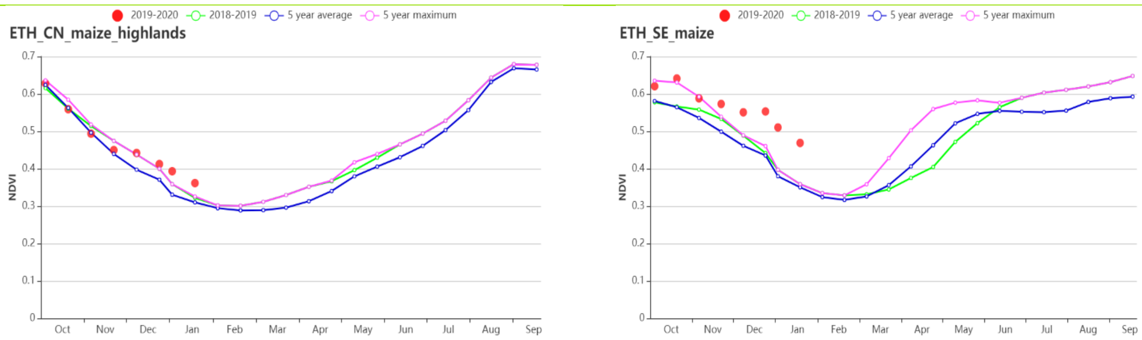

(e) NDVI profiles



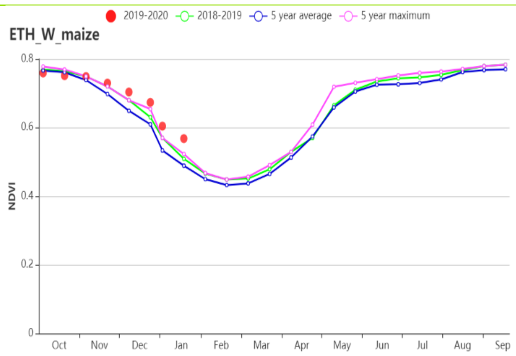

(f) Rainfall Index




(g) tempratrure index




(h) Crop condition development graph based on NDVI (central-northern maize-teff highlands (left) and south-eastern mixed maize zone (right))




(i) Crop condition development graph based on NDVI Western mixed maize zone

**Table 3.21 Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| South-eastern mixed maize zone | 242 | 112 | 18.2 | -0.3 | 1127 | -10 |
| Western mixed maize zone | 624 | 96 | 20.5 | -1.1 | 1247 | 0 |
| Central-northern maize-teff highlands | 141 | 73 | 17.0 | -0.1 | 1327 | -3 |

**Table 3.22 Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| South-eastern mixed maize zone | 490 | 13 | 100 | 9 | 1.06 |
| Western mixed maize zone | 565 | 4 | 100 | 1 | 1.01 |
| Central-northern maize-Teff highlands | 372 | 16 | 92 | 2 | 0.96 |

# [FRA] France

The monitoring period covers winter wheat sowing and early growth as well as the harvest of spring wheat and maize.

CropWatch agro-climatic indicators show that the temperature was 0.8°C higher as compared to the long-term average. RAIN was 39% above average, while sunshine (RADPAR) was 10% below. Due to unfavorable sunshine conditions, the biomass production potential (BIOMSS) is estimated to have decreased by 9% nationwide compared to the 15-year average.

The national-scale NDVI development graph shows that the NDVI values were higher than in the 2018-2019 season and the crop conditions were close to the 5-year average. The spatial patterns of NDVI departures compared to the five-year average indicate above-average NDVI values on 54.5% of the arable lands. This spatial pattern is also partly reflected with the spatial distribution of maximum VCI (VCIx) across the country, which reached an average of 0.95. Generally, the outlook for winter crops is above average.

**Regional analysis**

Taking into account 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, both RAIN (+25%) and TEMP (+0.6 °C) were above the long-term average, while RADPAR (-7%) was below. Higher than normal rainfalls decreased sunshine that in turn reduced BIOMSS (-10%). The NDVI profile was similar to the previous season's levels, but below the five-year average.

In the Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean, environmental conditions were favorable as the VCIx reached 0.92. Compared to the 15-year average, a significant drop in BIOMSS (-12%) was estimated. RAIN and TEMP were increased by 40% and 0.8 °C, respectively, whereas RADPAR dropped by 14%.

In the Maize-barley and livestock zone along the English Channel, substantial variability was observed in the region's NDVI profile. It was generally below average for this period and indicated a similar crop growth level as in last year. RAIN in the region increased by 33% while the RADPAR decreased by 8%. A relative high VCIx (0.96) but a drop in BIOMSS (-11%) indicated slightly below-average crop conditions.

In the Rapeseed zone of eastern France, below-average to average crop conditions was observed in Oct and Nov 2019 evidenced by the NDVI profile. From Dec 2019 and onward the profile was showing an above average trend indicating favorable conditions. Overall, RAIN and TEMP were increased by 23% and 1.1°C, while RADPAR dropped by 12%. BIOMSS dropped by 12% as well when compared to the five-year average.

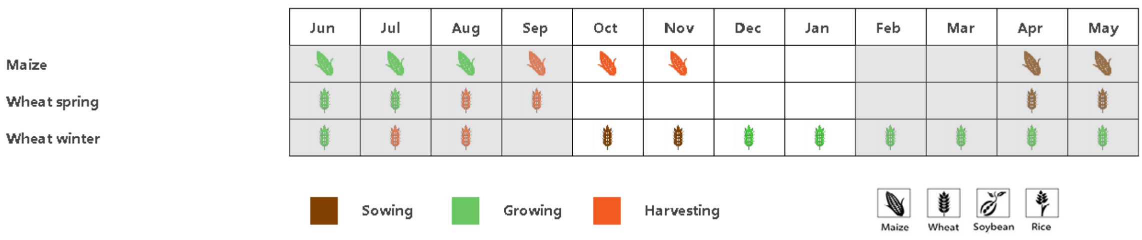
In the Massif Central dry zone, the VCIx was recorded at a relative high level (0.98) and the NDVI profile was showing an average to above average level, indicating normal or above normal crop conditions. The RAIN and TEMP in the region increased by 37% and 1.1°C, while RADPAR decreased by 14%. BIOMSS decreased by 14% as well when compared to the five-year average.

In the southwestern maize zone, RAIN (+49%) and TEMP (+0.9 °C) were also higher, whereas RADPAR (-11%) and BIOMSS (-12%) were lower. The NDVI profile was below the previous season level but close to the five-year average, indicating a close to average crop condition for the region.

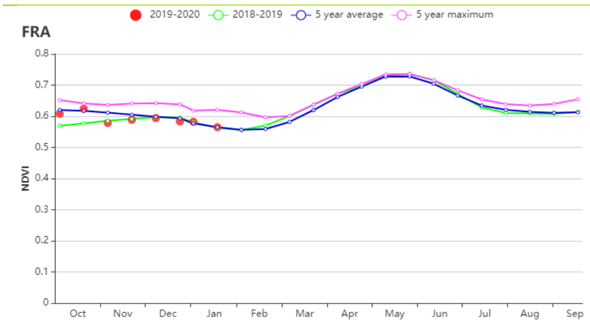
In the Eastern Alpes region, the NDVI profile showed close to average crop conditions since the end of Dec, 2019. Before that, the NDVI profile was below the average level. The region showed the largest increase in RAIN (+56%) and a 1.0°C rise in TEMP. It also showed a relative low decrease in RADPAR (-8%) and BIOMSS (-4%). Such environmental condition tends to favor crop growth, which also indicated with the relative high VCIx (0.95).

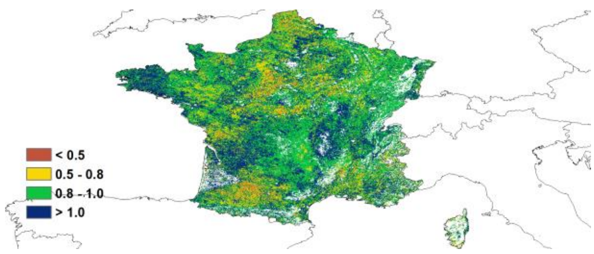
The Mediterranean zone is the only region showing an increased BIOMSS (2%). The NDVI profile also confirms slightly above average crop conditions. RAIN in the region increased by 55%, and also the TEMP increased by 0.7 °C. It is also the region that showed the lowest drop in RADPAR (-5%).

**Figure 3.16 France's crop condition, October 2019 - January 2020**



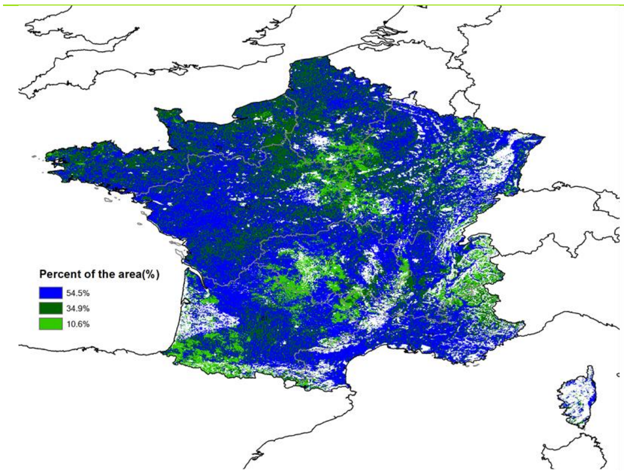

(a). Phenology of major crops

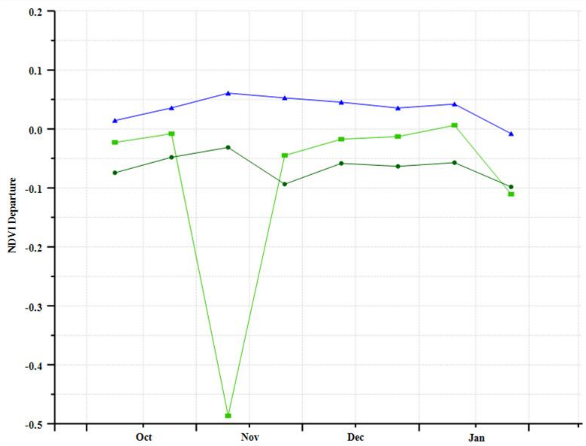



(b) Crop condition development graph based on NDVI

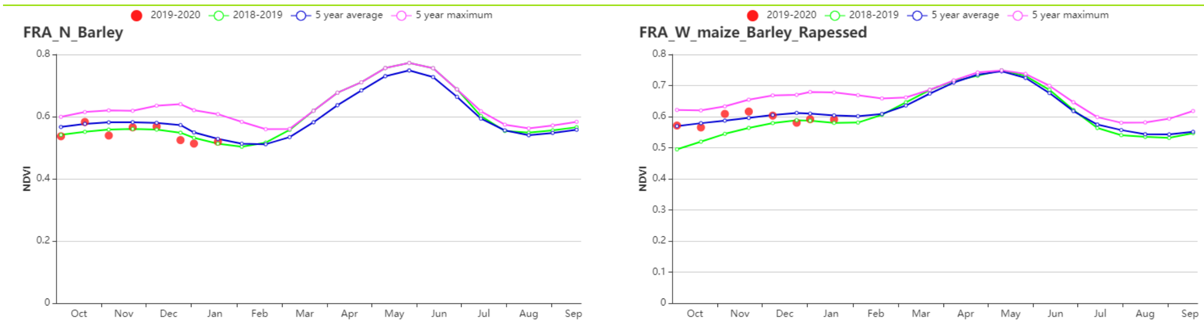
(c) Maximum VCI



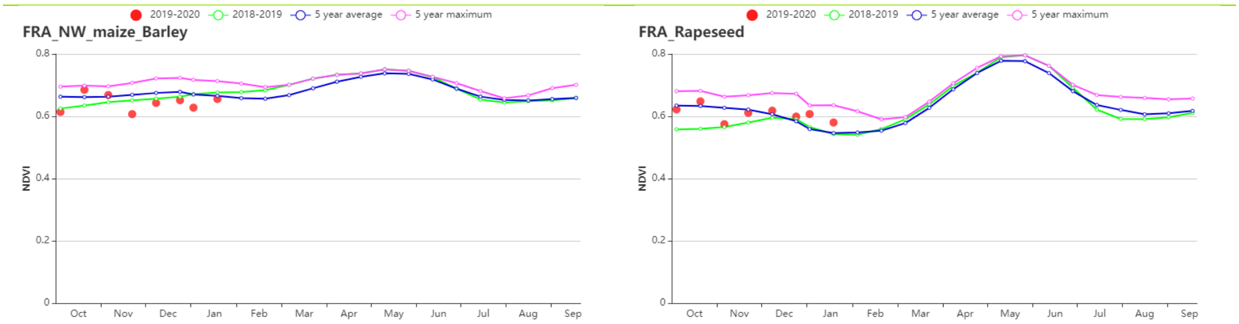




(d) Spatial NDVI patterns compared to 5YA

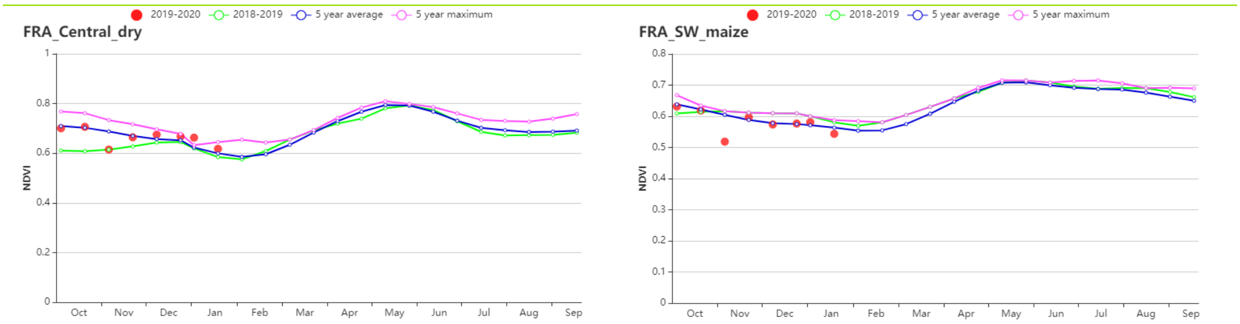
(e) NDVI profiles



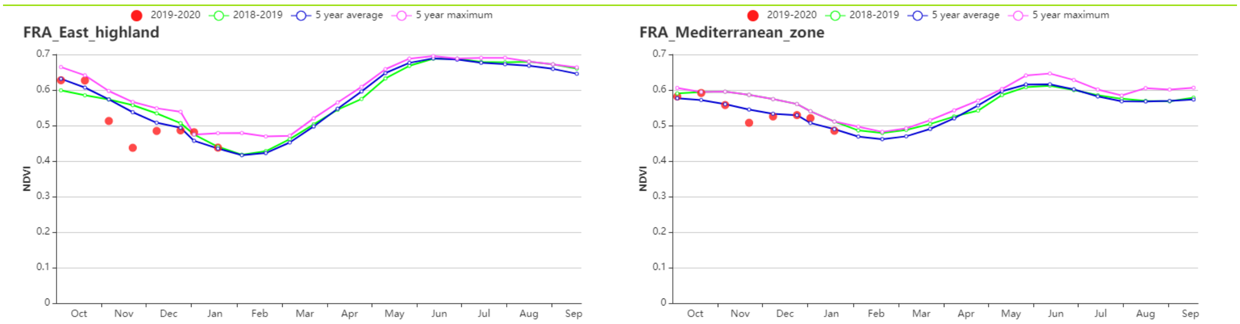

(f) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))




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




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




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

**Table 3.23 France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Northern Barley zone | 420 | 25 | 7.4 | 0.6 | 227 | -7 |
| Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean | 491 | 40 | 8.8 | 0.8 | 270 | -14 |
| Maize barley and livestock zone along the English Channel | 520 | 33 | 8.5 | 0.2 | 241 | -8 |
| Rapeseed zone of eastern France | 491 | 23 | 6.3 | 1.1 | 253 | -11 |
| Massif Central Dry zone | 515 | 37 | 6.4 | 1.1 | 303 | -14 |
| Southwest maize zone | 619 | 49 | 8.4 | 0.9 | 356 | -11 |
| Alpes region | 733 | 56 | 4.8 | 1.0 | 361 | -8 |
| Mediterranean zone | 615 | 55 | 7.6 | 0.7 | 435 | -5 |

**Table 3.24 France's agronomic indicators by sub-national regions, current season's value and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Northern Barley zone | 59 | -10 | 99.5 | 1.4 | 0.91 |
| Mixed maize /barley and rapessed zone from the Centre to the Atlantic Ocean | 76 | -12 | 98 | 1.4 | 0.92 |
| Maize barley and livestock zone along the English Channel | 66 | -11 | 99.9 | 0.1 | 0.96 |
| Rapeseed zone of eastern France | 62 | -12 | 99.5 | 0.5 | 0.93 |
| Massif Central Dry zone | 74 | -15 | 99.8 | 0.6 | 0.98 |
| Southwest maize zone | 99 | -13 | 96 | 0.5 | 0.96 |
| Alpes region | 80 | -4 | 95.3 | 1.2 | 0.95 |
| Mediterranean zone | 121 | 2 | 95.4 | 4.6 | 0.95 |

# [GBR] United Kingdom

Summer crops have been harvested and winter crops (winter wheat, winter barley, and rapeseed) have been planted during the current reporting period. According to crop condition development graph, NDVI values were below average from October to January. Rainfall for the country were above average (RAIN, +9%), radiation were slightly below average (RADPAR, -3%) and temperatures were close to average (TEMP, -0.2°C). The below average radiation and unfavorable growing conditions resulted in the below average biomass (BIOMSS, -7%). The seasonal RAIN profile presents overall above average rainfall except mid-October, November and late January, while the seasonal TEMP profile shows that temperature was below average before mid-November, then above average or average from late November to January.

The national average VCIx was 0.90. CALF (99%) is unchanged compared to its five-year average. The NDVI departure cluster profiles indicate that: (1) 23.4% of arable land experienced slightly above average crop conditions, mainly including Southwest England and Scotland (East of Aberdeenshire); (2) 45.4% of arable land experienced below or slightly below average crop conditions, mainly including Southeast England (Hampshire and Kent)and Scotland (Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders), Northeast England (Northumberland, County Durham), Yorkshire and the Humber, East Midlands (Lincoinshire), East of England (Norfolk); (3) 31.1% of arable land experienced slightly below average from October to Noveber, then fluctuating conditions from December to January, including Southeast England (West Sussex, East Sussex), East of England (Sufolk, Essex) and West Midland (Staffordshire, Warwickshire, Worcestershire). Altogether, the outputs for wheat in the country are expected to be below average.

**Regional analysis**

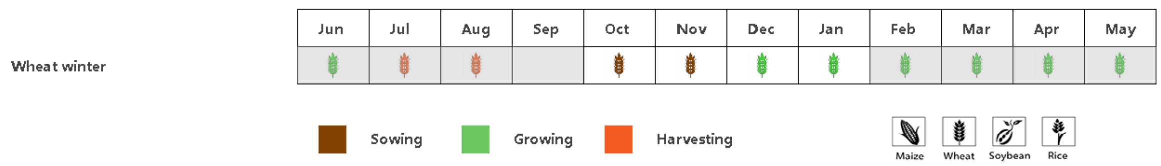
Based on cropping systems, climatic zones, and topographic conditions, three sub-national regions can be distinguished: 1) **Central sparse crop region**, 2) **Northern barley region**, and 3) **Southern mixed wheat and barley region**. The fractions of arable land (CALF) in all subregions are average compared to 5 years average.

The **Central sparse crop region** is one of major agricultural regions in terms of crop production. Rainfall was above average (RAIN +3%), radiation and temperature were below average (RADPAR, -2%; TEMP, -0.4°C), which resulted in the biomass estimates that were below average (BIOMSS, -6%). NDVI values were below or near the five-year maximum according to the region's crop condition development graph in October to January. The VCIx was at 0.94. Altogether, the conditions for wheat are expected to be below average.

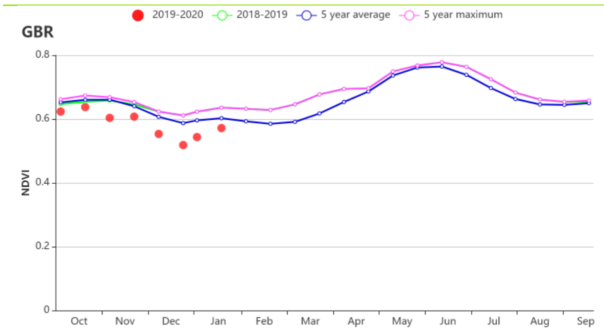
**Northern barley region** suffered the largest rain deficit (RAIN, -9%) in all the regions. Temperature were average (TEMP, -0.3°C) and radiation were above average (RADPAR, +2%). Biomass was slightly below average (BIOMSS, -1%). NDVI was below average according to the crop condition graphs in this reporting period. The VCIx was 0.92. Altogether, the output of wheat is expected to be on average.

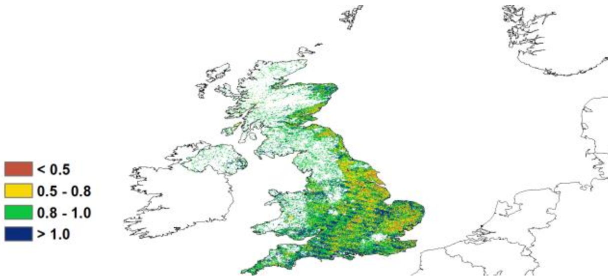
The largest rainfall excess (RAIN, +35%) was recorded in **Southern mixed wheat and barley zone**, while temperature was on average (TEMP,-0.2°C) and radiation was below average (RADPAR, -6%). The low radiation and excessive rainfall resulted in below average biomass (BIOMSS, -9%). NDVI was below average according to the crop condition graph in this period. The VCIx was 0.89, slightly less than the other regions. Altogether, the output of wheat is expected to be below average.

**Figure 3.17 United Kingdom crop condition, October 2019 - January 2020**



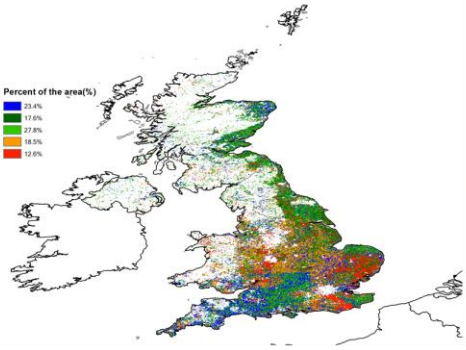

(a). Phenology of major crops

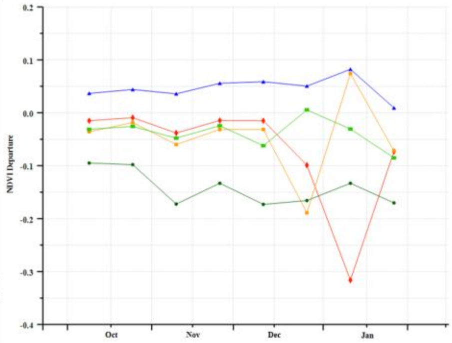



(b) Crop condition development graph based on NDVI

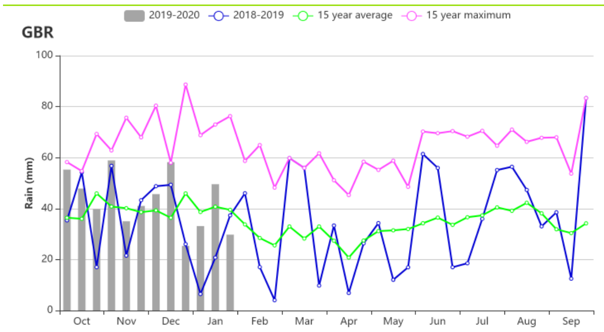
(c) Maximum VCI

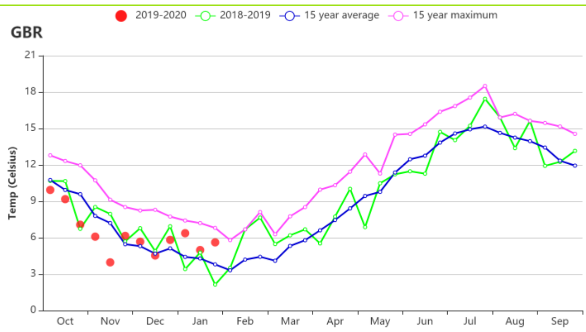


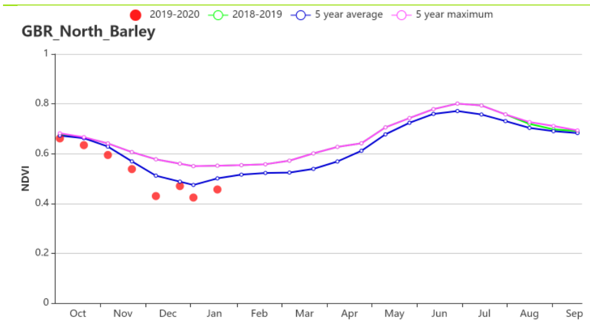

(d) Spatial NDVI patterns compared to 5YA

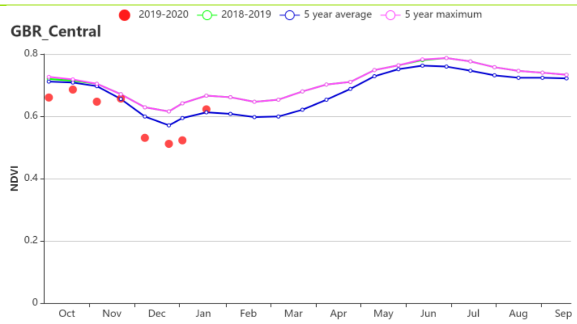
(e) NDVI profiles



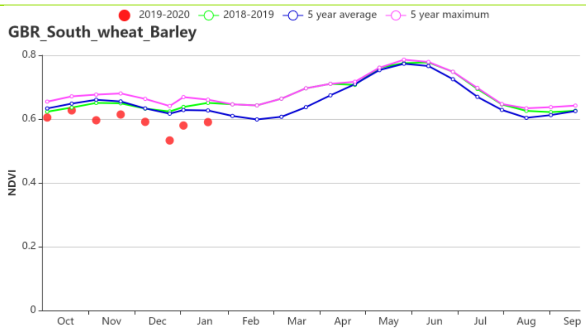




(f) Crop condition development graph based on NDVI (Sparse crop area of N England, Wales and N. Ireland (left) and Northern Barley region (right))




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




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

**Table 3.25 United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Northern Barley area (UK) | 558 | -9 | 5.1 | -0.3 | 131 | 2 |
| Southern mixed wheat and Barley zone (UK) | 539 | 3 | 6.2 | -0.4 | 161 | -2 |
| Central sparse crop area (UK) | 483 | 35 | 7.2 | -0.2 | 186 | -6 |

**Table 3.26 United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Northern Barley area (UK) | 29 | -1 | 99 | 0 | 0.92 |
| Southern mixed wheat and Barley zone (UK) | 38 | -6 | 100 | 0 | 0.94 |
| Central sparse crop area (UK) | 47 | -9 | 99 | 0 | 0.89 |

# [HUN] Hungary

Winter crops (wheat and barley) were growing during this monitoring period.

The agro-climatic indicators of RADPAR and TEMP were above average: RADPAR +3.8%, and TEMP +1.6°C, which led to a 0.9% increase in BIOMSS compared with the fifteen-year average, while RAIN was below average by 15.5%. According to the national NDVI development graphs, crop condition was below average from October to late November but above average from December to January. Some spatial and temporal detail is provided by NDVI clusters: NDVI was above average throughout the monitoring period for 31.4% of arable land, below average for 45.0% of arable land in the Northern Great Plain such as Helves, Jasz-Nagykun-Szolnok, Bekes, and Szabolcs-Szatmar-Bereg. For the rest 23.6%, the NDVI was below average from October to November but above average from December to January in the Puszta region such as Jaz-Nagykum-Szolnok and Bekes.

With the maximum VCI value at the national level reaching 0.93 and the cropped arable land fraction (CALF) at 97% (above average 7% compared to the recent five-year average), crop condition is assessed as slightly above average.

**Regional analysis**

CropWatch has adopted four agro-ecological zones (AEZ) to provide a more detailed spatial analysis for the country. They include North Hungary, Central Hungary, the Puszta and Southern Transdanubia. Specific observations for the reporting period are included for each region.

Cultivated arable land (CALF) increased in all sub-regions: 5% in North Hungary region, 1% in Southern Transdanubia, and by 1% and 15% in Central Hungary and Puszta sub-regions, respectively.

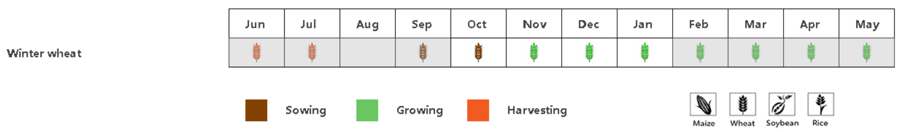
**Central Hungary** is one of the major agricultural regions in terms of crop production. A sizeable share of winter wheat, maize and sunflower is planted in this region. The NDVI was below average from October to late November and above average from December to January. Agro-climatic conditions were above average for temperature and radiation (TEMP +1.4%; RADPAR +6%), and rainfall was below average (RAIN, -10%). Compared to the 15YA, the biomass production potential was below average (BIOMSS, -1%) while VCIx reached 0.9. The crop production in this region is expected to be close to average.

**Northern Hungary** is another important winter wheat region where 5 to 8% of the national winter wheat, and 1 to 4% of maize are grown.The NDVI was below average from October to late November and above average from December to January. The temperature (TEMP +1.4°C), and radiation (RADPAR +3%) were little above average while the accumulated rainfall (RAIN -10%) was below average, resulting in a biomass production potential decrease in this region (BIOMSS -10%). The VCIx was favorable at 0.96. The crop production in this region is expected to be below but close to average.

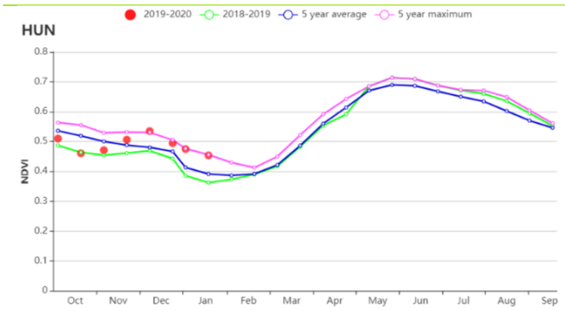
**The Puszta region** grows mostly winter wheat, maize and sunflower especially in the counties of Jaz-Nagykum-Szolnok and Bekes. According to the crop condition graph, NDVI values were below average from October to late November and above average from December to January. The biomass potential decreased by 5% due to low rainfall and little increase radiation (RAIN -28% and RADPAR +5%); temperature was close to average (TEMP +1.7°C). The maximum VCIx reached 0.95, indicating a good crop.

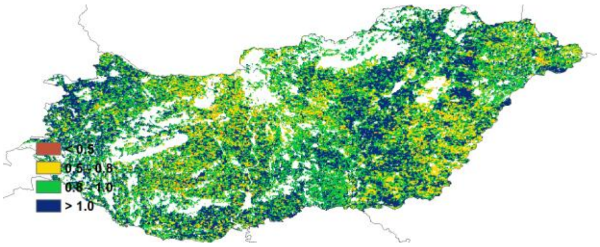
**Southern Transdanubia** cultivates winter wheat, maize and sunflower, mostly in Somogy and Tolna counties while smaller areas are planted in northern Transdanubia.  All agro-climatic indicators were as follows: RAIN -11%, TEMP +1.5°C and RADPAR +2%, while BIOMSS increased by 11%. The maximum VCI (0.93) stands for good crops in the Transdanubia region.

**Figure 3.18 Hungary's crop condition, October 2019 - January 2020.**

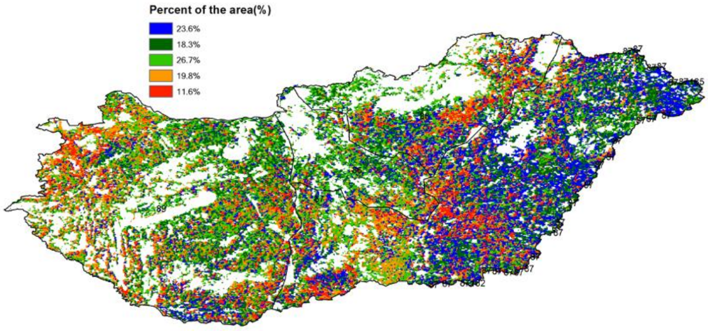


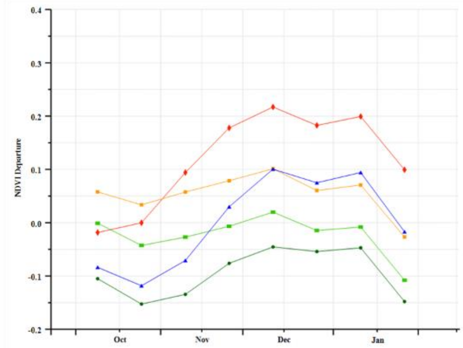

(a). Phenology of major crops



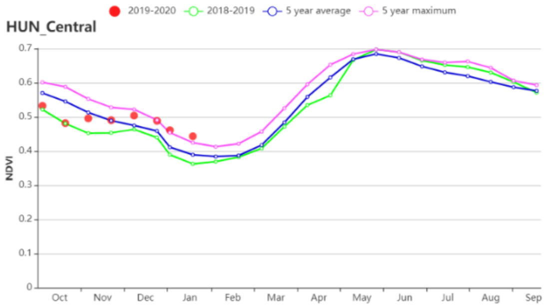



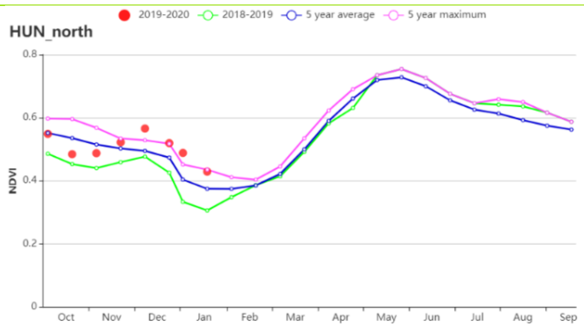

(b) Crop condition development graph based on NDVI (c) Maximum VCI



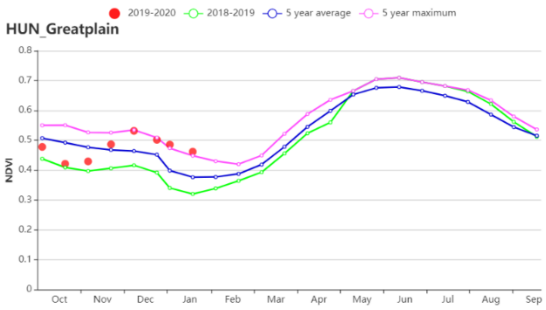



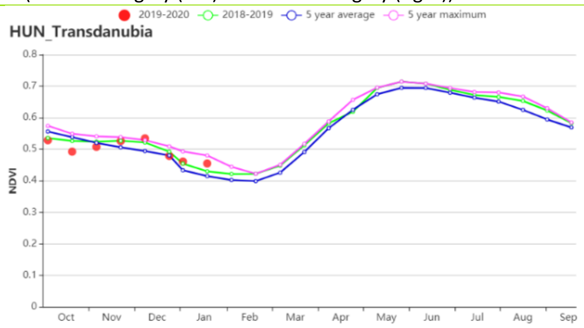

(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles




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




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

**Table 3.27 Hungary's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Central Hungary** | 196 | -10 | 5.9 | 1.4 | 359 | 6 |
| **North Hungary** | 220 | -1 | 5 | 1.4 | 324 | 3 |
| **Great Plain** | 169 | -28 | 6.4 | 1.7 | 362 | 5 |
| **Transdanubia** | 212 | -11 | 6 | 1.5 | 361 | 2 |

**Table 3.28 Hungary's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Central Hungary** | 78 | -1 | 98 | 1 | 0.9 |
| **North Hungary** | 65 | -10 | 98 | 5 | 0.96 |
| **Great Plain** | 76 | -5 | 97 | 15 | 0.95 |
| **Transdanubia** | 90 | 11 | 96 | 1 | 0.93 |

# [IDN] Indonesia

From October 2019 to January 2020, the harvest of the secondary maize was completed and the main season maize was sown in Java and Sumatra; Correspondingly, main season rice was planted while the second rice in Java reached maturity and was harvested. Rainfall (RAIN, -11%) was below average while temperature (TEMP, +0.2℃) and radiation (RADPAR +9%) were slightly above, which led to an increase of biomass production potential (BIOMSS, 6%). Crop condition was slightly below average as shown in the NDVI development graph. Spatially, crop condition in 39.6% of the cropped area was close to average. In 11.7% of cultivated area, mostly located in Sumatera Barat, Sumatera Selatan, Jambi, Sumatera Barat and Riau, crop conditions were slightly below average at be beginning of this period but continued to deteriorate to significantly below average. Crop condition on 18.9% cropland, the condition was significantly below average. However, they recovered to slightly below average afterward. Considering that the area of cropped arable land (CALF) in the country was average compared with the five-year average and the VCIx value of 0.95, the crop condition is nevertheless anticipated to be slightly below average.

**Regional analysis**

The analysis below focuses on four agro-ecological zones, namely **Sumatra** (92), **Java** (90, the main agricultural region in the country), **Kalimantan and Sulawesi** (91) and **West Papua** (93), among which former three are relevant for crops cultivation. The numbers correspond to the labels on the VCIx and NDVI profile maps.

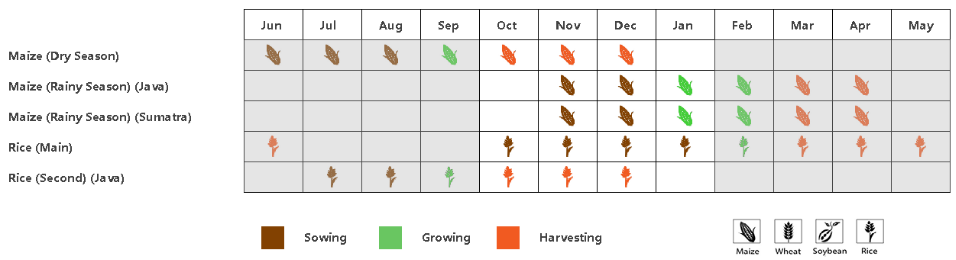
The weather over **Java** was relatively dry. RAIN was below average (-38%), whereas radiation (RADPAR +10%) and temperature (TEMP,+0.6℃) were above average, resulting in close to average (+3%) biomass production potential. According to the NDVI development graph, crop condition was below the 5-year average. Overall, the crop conditions in Java are assessed as fair.

**Kalimantan and Sulawesi** experienced the same patterns as the rest of the country: Rainfall (RAIN, -8%) was below average while temperature (TEMP, +0.1℃) and radiation (RADPAR +9%) were slightly above, which led to an increase of biomass production potential (BIOMSS, 7%). According to the NDVI development graph, crop conditions were slightly below the 5-year average except for the end of October and January. Overall, the crop conditions were close to average.

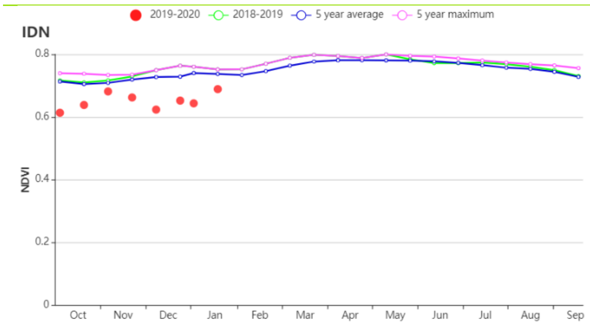
The slightly below average rainfall (RAIN -7%) in **Sumatra** was accompanied by above average radiation (+9% departure) and temperature (+0.3℃ departure) , which resulted in slightly above average biomass production potential (BIOMSS +8%). According to NDVI development graphs, crop condition was slightly below the 5-year average except for the end of October. The crop condition in Sumatra was close to average.

Considering that all the arable land was cultivated and enough water (RAIN, 1250 mm), though slightly less than the five-year average, was available for the crops, CropWatch assesses the conditions of crops slightly below average.

**Figure 3.19 Indonesia's crop condition, October 2019 - January 2020**

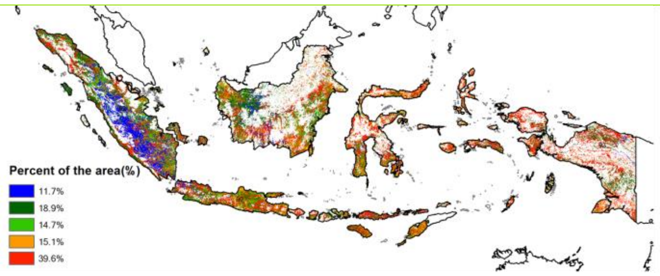



(a). Phenology of major crops

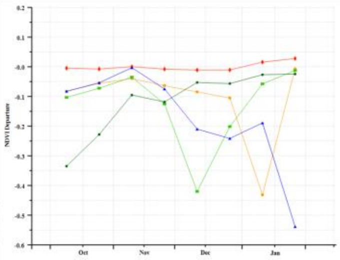



(b) Crop condition development graph based on NDVI

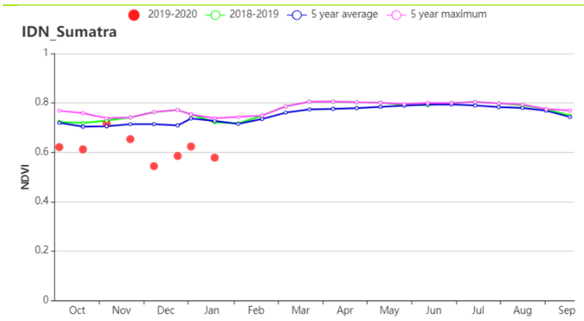

(c) Maximum VCI

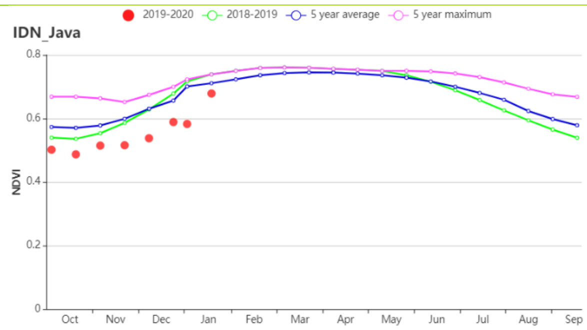



(d) Spatial NDVI patterns compared to 5YA

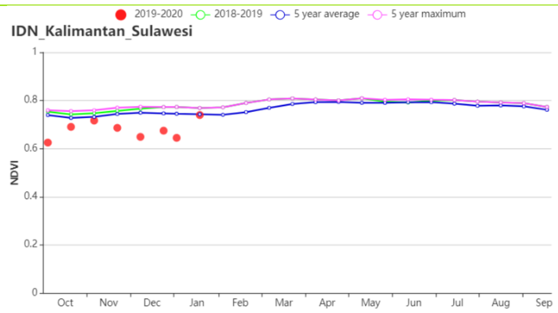


(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Sumatra (left) and Java (right))




(g) Crop condition development graph based on NDVI (Kalimantan-Sulawesi)

**Table 3.29 Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA(%) | Current (°C) | Departure from 15YA(%) | Current ($MJ/m^2$) | Departure from 15YA(%) |
| Java | 750 | -38 | 25.8 | 0.6 | 1323 | 10 |
| Kalimantan and Sulawesi | 1180 | -8 | 24.6 | 0.1 | 1229 | 9 |
| Sumatra | 1371 | -7 | 24.3 | 0.3 | 1140 | 9 |
| West Papua | 1436 | -13 | 23.5 | 0.2 | 1116 | 9 |

**Table 3.30 Indonesia’s agronomic indicators by sub-national regions, current season's value and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA(%) | Current (%) | Departure from 5YA(%) | Current |
| Java | 817 | 3 | 96 | -1 | 0.87 |
| Kalimantan and Sulawesi | 799 | 7 | 100 | 0 | 0.97 |
| Sumatra | 739 | 8 | 100 | 0 | 0.96 |
| West Papua | 710 | 6 | 100 | 0 | 0.97 |

# [IND] India

This monitoring period (October 2019-January 2020) covers the late growth and harvest of Kharif (summer) maize, rice and soybean and the planting and early growth of Rabi (winter) rice and wheat. The graph of NDVI development shows that crop growth during this monitoring period was higher than the average level in previous years; especially from December 2019 to January 2020, the difference between the NDVI value and the average level continued to increase.

At the national scale, affected by the monsoon rainy season, India continued to have rainfall in October and November. The rainfall during this monitoring period was much higher than the 15YA average (+76%). RAIN in 26 states of India exceeded the 15-year average, in 8 agro-ecological regions it increased significantly, with large spatial differences: Deccan Plateau (+148%), Eastern coastal region (+35%), Gangetic plain (+81%), Assam and north-eastern region (+25%), Agriculture areas in Rajasthan and Gujarat ( +357%), Western coastal region (+1139%), and the North-western dry region (+159%). Cumulative rainfall was much higher than the 15-year average, especially between October and November 2019. TEMP in India decreased by 0.3°C compared with the same period of the previous 15 years. Only Eastern coastal region remained unchanged, and the rest of the agro-ecological regions decreased. Compared with the 15-year average level, RADPAR for the whole of India also decreased by 7%.

At the country level, BIOMSS during this period was 37% above average of the past 15 years. Only in Assam and north-eastern region BIOMSS was lower than the 15-year average (-3%), where the increase in rainfall could not compensate the effect of decreasing temperature and sunshine. But the BIOMSS of remaining seven agro-ecological regions had increased significantly. This may be related to the heavy rainfall in the early part of the period. Although it caused the reduction of TEMP and RADPAR, the continuous rainfall in October and November 2019 increased the soil moisture required for planting and promoted the growth of crops. In addition, CALF increased by 7%, and the cultivated area expanded. However, the CALF in North-western dry region was lower than the 5-year average (- 40%). Heavy rain (+ 1139% relative to average) might have caused flooding and affected the sowing of cultivated land in the earlier period from Fig (L).

Overall, due to the abundant rainfall in the previous period, India's crop growth in this period is better than the average level in the previous year. The wheat production for the whole of India in this period may increase even if the North-western dry region might be lower than the average.

**Regional analysis**

India is divided into eight agro-ecological zones: the **Deccan Plateau** (94), the **Eastern coastal region** (95), the **Gangatic plain** (96), **Assam and north-eastern region** (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).

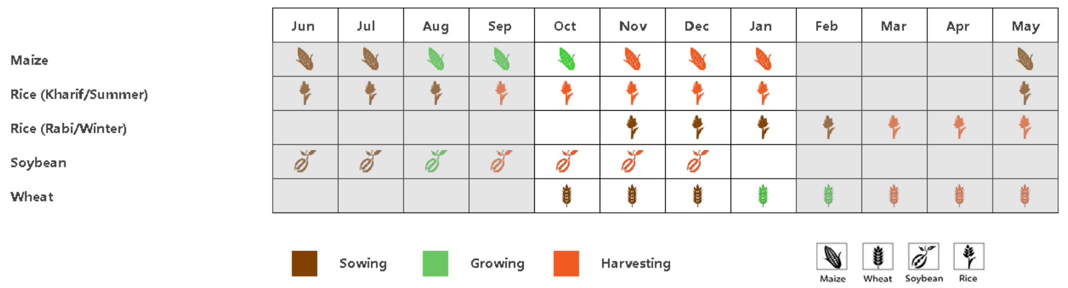
The five agro-ecological zones of the **Deccan Plateau**, the **Eastern coastal region**, the **Gangetic plain**, **Agriculture areas in Rajasthan and Gujarat**, and the **Western coastal region** have similar trends in agricultural indices. Compared to the same period of previous years, RAIN had increased significantly. Although TEMP and RADPAR were lower, abundant rainfall compensated for their effects and caused BIOMSS to be much higher than the 15-year average. At the same time, CALF also increased and the VCIx was higher than 1.04. The graph of NDVI development shows that the crop growth of the five agro-ecological regions during this monitoring period exceeded the 5-year maximum. Generally, the crop production is expected to be above average.

The **Assam and Northeastern region** recorded 395mm of RAIN (+25%), with slightly lower average TEMP at 16.4°C (-0.2°C) and RADPAR of 846 MJ/m² (-6%). BIOMSS was lower than the average (-3%). Increased rainfall was not enough to compensate for reduced temperature and sunshine. CALF reached 96% which was above average (+1%), and VCIx was 0.99. The outlook of crop production in this region is not promising.

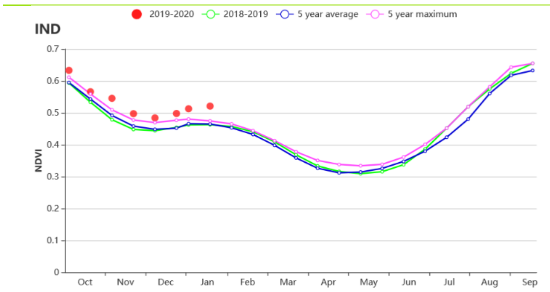
The **North-western dry region** recorded 129 mm of RAIN (+1139% much higher the average), with slightly below average TEMP at 20.9°C (-0.1°C) and RADPAR of 977 MJ/m² (-3%). BIOMSS was much higher than the average (+318%), and CALF reached 37% which is lower than average (-40%). Heavy rainfall might have caused flooding conditions and affected the sowing of cultivated land in the earlier period from Fig (L). The VCIx was 1.09. Therefore, although crops are growing better in the region, a large reduction in CALF will reduce crop production to below average.

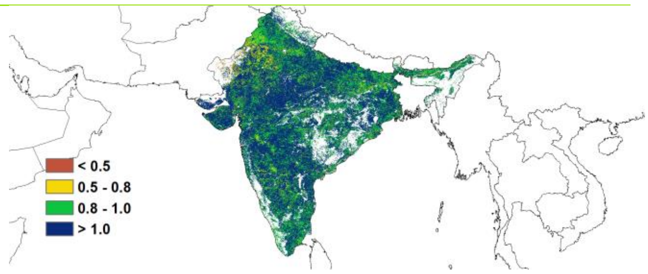
The **Western Himalayan region** recorded 272 mm of RAIN (+159% higher the average), with much lower average TEMP at 10.4°C (-1.3°C) and RADPAR of 818 MJ/m² (-9%). The BIOMSS was higher than the average (+50%) due to the sufficient rainfall. CALF reached 97% which was above the 5-year average (+4%) and VCIx was 1.00. But crop condition as assessed by NDVI was close to the average. Generally, the crop production may be favorable.

**Figure 3.20 India's crop condition, October 2019 - January 2020**



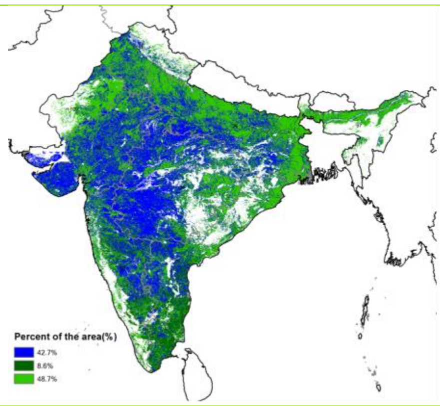

(a). Phenology of major crops

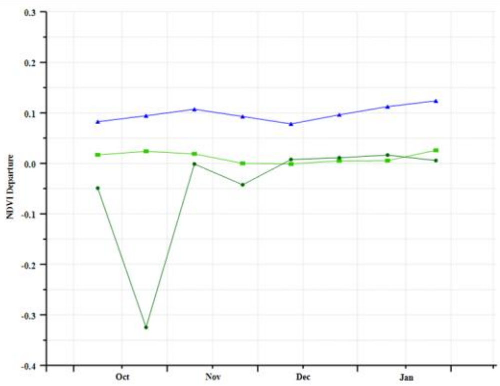



(b) Crop condition development graph based on NDVI

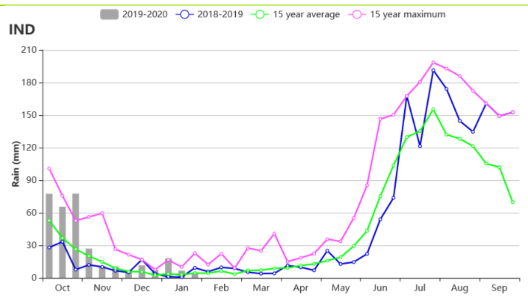
(c) Maximum VCI



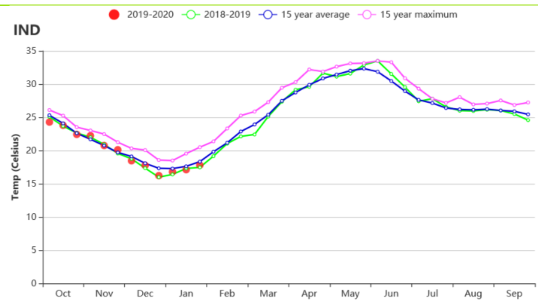




(d) Spatial NDVI patterns compared to 5YA

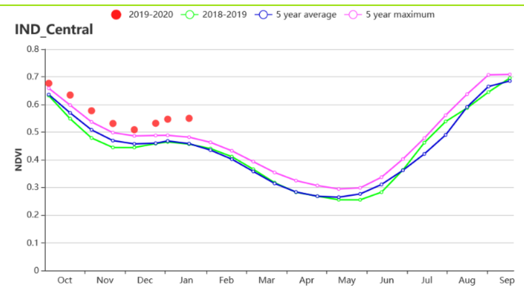
(e) NDVI profiles

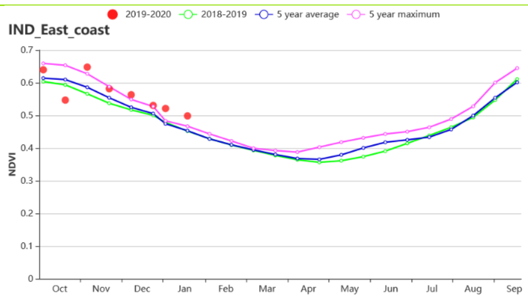



(f) Rainfall profiles

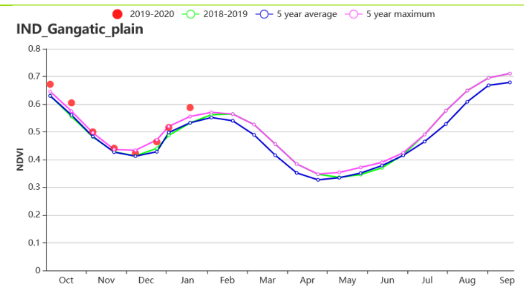


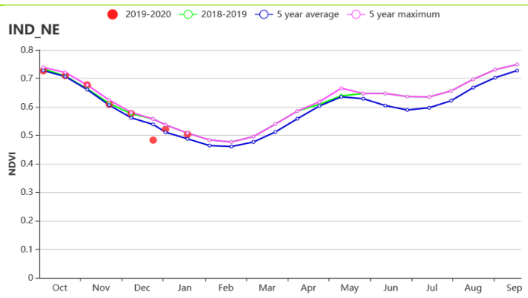

(g) Temperature profiles



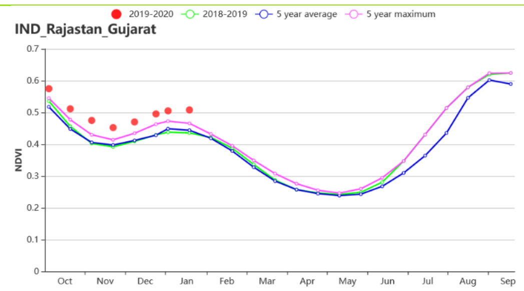



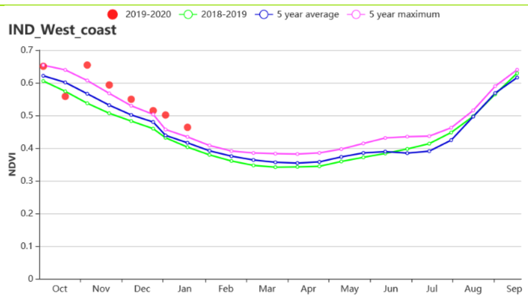

(h) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))



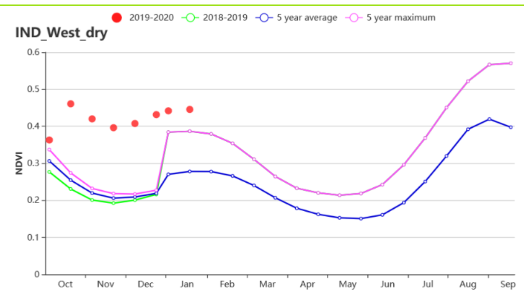



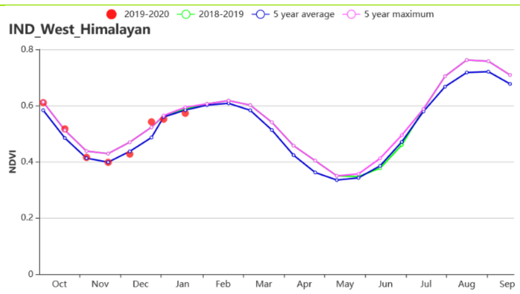

(i) Crop condition development graph based on NDVI (Gangatic Plains (left) and Assam and north-eastern regions (right))



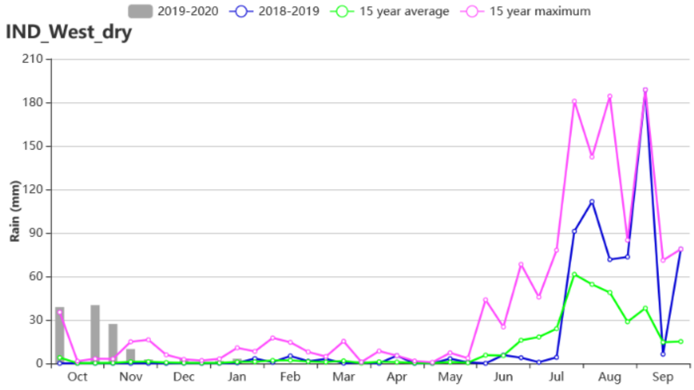




(j) Crop condition development graph based on NDVI (Agriculture areas in Rajastan and Gujarat (left) and Western Coastal Region (right))




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




(L) Rainfall profiles of the North-western dry region

**Table 3.31 India's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Deccan Plateau | 231 | 148 | 20.0 | -0.2 | 989 | -8 |
| Eastern coastal region | 507 | 35 | 22.5 | 0.0 | 1063 | -2 |
| Gangatic plain | 176 | 81 | 18.3 | -0.6 | 907 | -8 |
| Assam and north-eastern regions | 395 | 25 | 16.4 | -0.2 | 846 | -6 |
| Agriculture areas in Rajastan and Gujarat | 142 | 357 | 21.0 | -0.7 | 986 | -7 |
| Western coastal region | 630 | 93 | 23.2 | -0.1 | 1067 | -7 |
| North-western dry region | 129 | 1139 | 20.9 | -0.1 | 977 | -3 |
| Western Himalayan region | 272 | 159 | 10.4 | -1.3 | 818 | -9 |

**Table 3.32 India's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Deccan Plateau | 376 | 43 | 100 | 2 | 1.09 |
| Eastern coastal region | 560 | 7 | 99 | 5 | 1.06 |
| Gangatic plain | 303 | 29 | 99 | 3 | 1.04 |
| Assam and north-eastern regions | 330 | -3 | 96 | 1 | 0.99 |
| Agriculture areas in Rajastan and Gujarat | 418 | 182 | 95 | 19 | 1.09 |
| Western coastal region | 543 | 17 | 99 | 8 | 1.06 |
| North-western dry region | 394 | 318 | 37 | -40 | 1.09 |
| Western Himalayan region | 205 | 50 | 97 | 4 | 1.00 |

# [IRN] Iran

During the monitoring period, crop condition was generally above average except for January according to the NDVI profile. The planting of winter wheat was completed in November. Radiation and temperature were both slightly below average (RADPAR -3%, TEMP, -0.1°C), while abundant rainfall nourished the vegetation (RAIN, +22%). The favorable agro-climatic conditions resulted in an increase in the BIOMSS index by 22% comparing to the five-year average. The national average of maximum VCI index reached 0.92, and the Cropped Arable Land Fraction (CALF) increased by 32% compared to the recent five-year average.

According to the spatial distribution of NDVI profiles, approximately 44.4% of the cropland had very good crop condition during the whole monitoring period, mainly located in northwestern, northeastern, and western parts of Iran. The crop condition of roughly 25% of the croplands, marked in deep green, was quite favorable in October and November, and then glided until the end of the monitoring period. It is worth noticing that 8.1% of the croplands suffered from unfavorable crop condition, mainly distributed in northern region and some parts in western region, including the provinces of Ardabil, Gilan, Mazandaran, Luristan, and Isfahan.

Overall, the early crop condition for winter crops is favorable for the current season. The final outcome of the season will be determined by soil moisture in March when vegetative growth will resume.

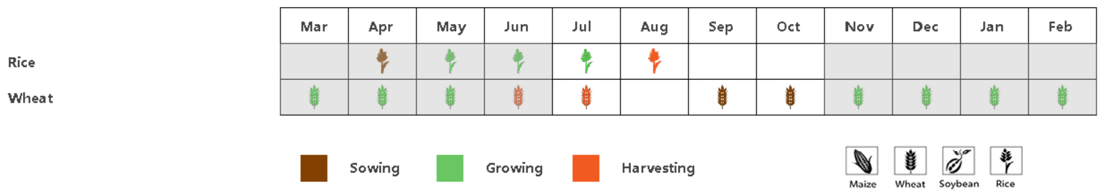
**Regional analysis**

Based on cropping systems, climatic zones and topographic conditions, three sub-national agro-ecological regions can be distinguished for Iran, among which two are relevant for crop cultivation. The two regions are referred to as **the Semi-arid to sub-tropical hills of the west and north** (75), and **the Arid Red Sea coastal low hills and plains** (74).

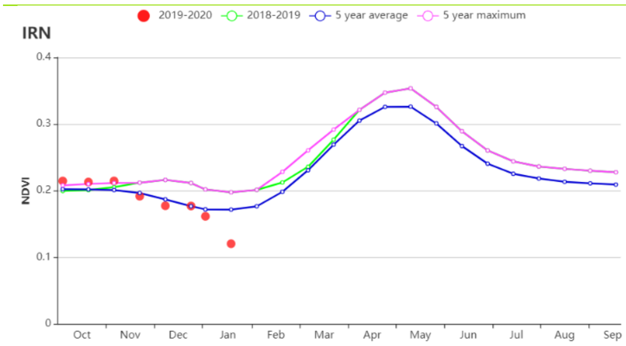
In **the Semi-arid to sub-tropical hills of the west and north region**, crop condition was very good at the beginning of the monitoring period, and the below average NDVI values might be related to the cloudy weather conditions. The accumulated rainfall was 227 mm (13% above average), temperature was slightly below average (TEMP -0.1°C) and radiation was also slightly below average (RADPAR -2%). The favorable weather conditions resulted in an increase of BIOMSS by 5% compared to the recent five-year average. The CALF increased by 17%, and the average VCIx (0.91) was high. The output will be quite favorable.

Crop condition in **the Arid Red Sea coastal low hills and plains region** was above average throughout the whole monitoring period, and crop condition in October even exceeded the five-year maximum. The region received 246 mm rainfall during this report period. The far above average rainfall (RAIN, +72%) and average temperature resulted in a significant 72% increase of BIOMSS. The CALF increased by 121% comparing to five-year average, reflecting that more land was cultivated. The average VCIx (1.05) of this region reached the five-year maximum. Therefore, the crop conditions for this season are expected to be very favorable.

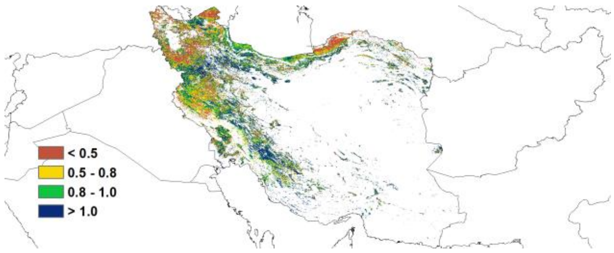
**Figure 3.21 Iran's crop condition, October 2019 - January 2020**



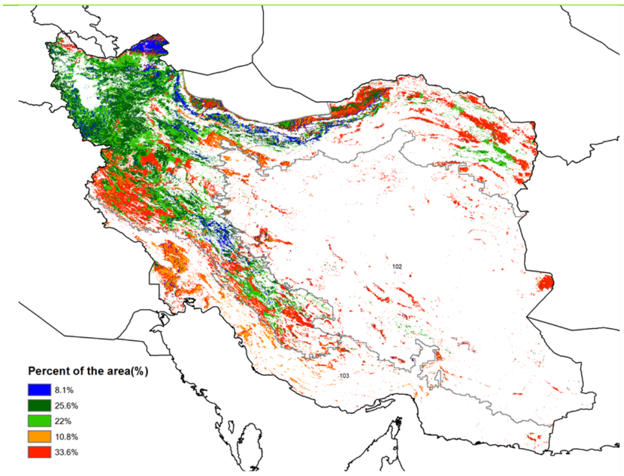

(a) Phenology of major crops



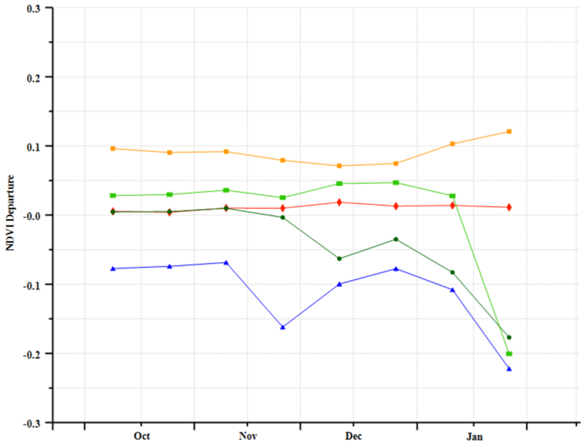

(b) Crop condition development graph based on NDVI



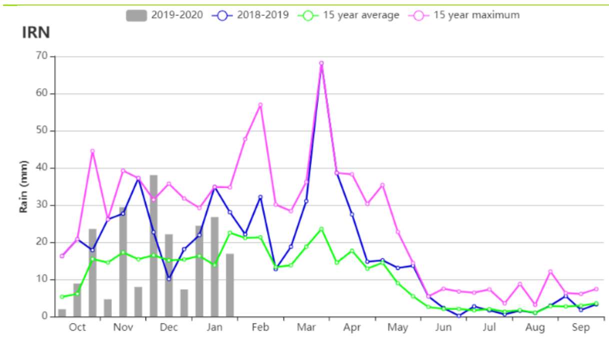

(c) Maximum VCI



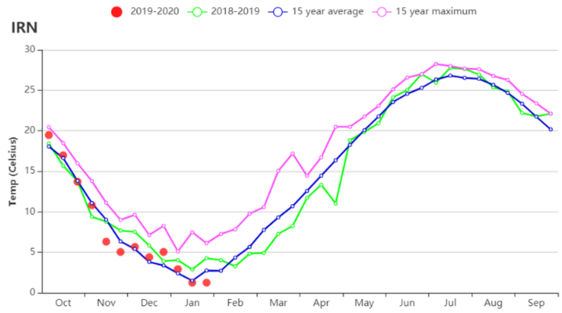

(d) Spatial NDVI patterns compared to 5YA



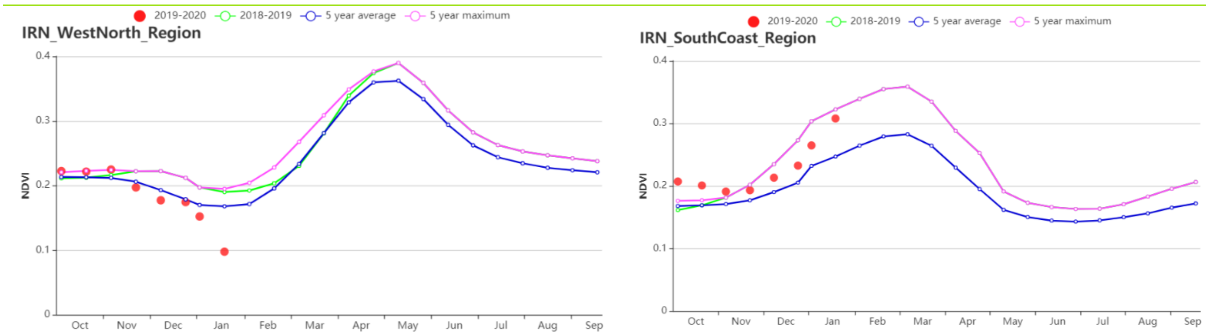

(e) NDVI profiles




(f) Rainfall profiles




(g) Temperature profiles




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

**Table 3.33 Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Semi-arid to sub-tropical hills of the west and north | 227 | 13 | 5.6 | -0.1 | 718 | -2 |
| Arid Red Sea coastal low hills and plains | 246 | 72 | 18.5 | 0 | 833 | -3 |

**Table 3.34 Iran's agronomic indicators by sub-national regions, current season's value and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Semi-arid to sub-tropical hills of the west and north | 153 | 5 | 10 | 17 | 0.91 |
| Arid Red Sea coastal low hills and plains | 330 | 72 | 24 | 121 | 1.05 |

# [ITA] Italy

The 2019-20 winter wheat crop was sown in October. Generally, according to the NDVI development graph, crop conditions were below the values of the previous year, but very close to the average of the past five years from October to January. CropWatch agro-climatic indicators show above average Rainfall (+20%), TEMP (+0.8°C) and RADPAR (+1%). With CALF up by 5%, BIOMSS increased by 0.7% and VCIx was 0.95. Some spatial and temporal detail is provided by the NDVI clusters: NDVI was above average throughout the monitoring period on 23.6% of arable land in Northern Italy, and below average on 18.6% in Eastern Italy. In Southern Italy (about 19.5% of arable land) crop condition was below average from October to November and above average from December to January. About 36.6% of arable land was above average from October to November and below average from December to January. A small fraction, about 1.7% of arable land, was below average in November, but then improved to close to average conditions. The overall crop condition in the country is assessed as favorable.

**Regional analysis**

Based on cropping systems, climatic zones and topographic conditions, four sub-national regions can be distinguished for Italy; they include Eastern Italy, Northern Italy, Southern Italy (Sicily) and Western Italy (including Sardinia).The index of cultivated arable land (CALF) compared to previous years in all sub-regions was as follows: decreased by 3% in Eastern Italy region, increased by 12% in Northern Italy, increased by 1% in Western Italy and increased by 8% in Southern Italy sub-regions.

**Eastern Italy** experienced above average rain (RAIN +36%), below average TEMP (-1.5°C) and RADPAR (-13%). As a consequence, BIOMSS decreased by 27% compared with the averages (5YA). VCIx was 0.81. The crop condition development graph indicates that NDVI exceeded the values of last year from October to late November, but was below the 5 years average. After November NDVI was consistent with the values of the previous year. Average production is expected.

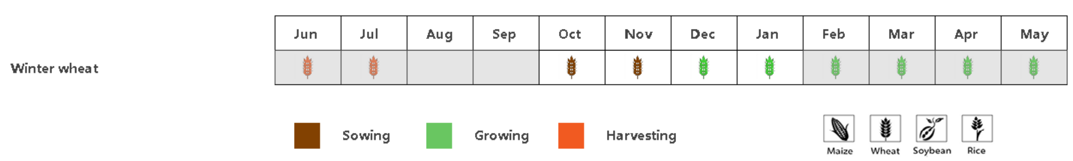
Crop production in **Northern Italy** was affected by high rainfall, with RAIN up by 57% compared to average, slightly below average TEMP (-0.1°C) and average RADPAR. BIOMSS was below the 5YA by 12% and VCIx reached 0.98. The crop condition development graph indicates higher values than during last year, reaching the average of 5 years from November to January. According to the agro-climatic indicators, above average output is expected.

**Southern Italy** recorded above average precipitation (RAIN +7%), TEMP (+0.9°C) and RADPAR (+8%). BIOMSS increased by 8% compared with the average (5YA). VCIx was 0.87. NDVI was below average throughout the monitoring period. The crop production in this region is expected to be close to average.

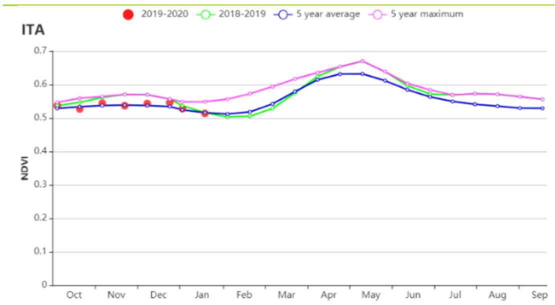
In **Western Italy**, precipitation was 3 % above average (RAIN +3%). RADPAR (+7%) and TEMP (+1.4°C) were also above average, which resulted in a biomass production potential increase in this region (BIOMSS +13%). The NDVI was below average from October to late November and above average from December to January. VCIx reached 0.97. CropWatch expects above average production.

Overall, prospects for winter crops are promising.

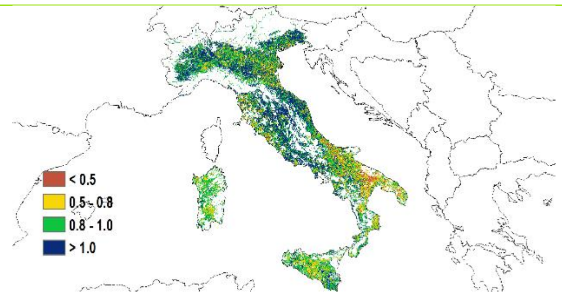
**Figure 3.22 Italy's crop condition, October 2019 - January 2020.**



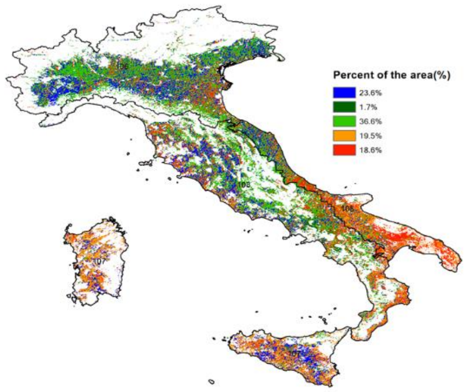

(a). Phenology of major crops



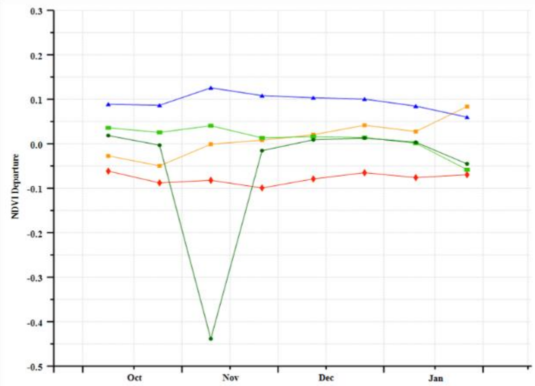

(b) Crop condition development graph based on NDVI



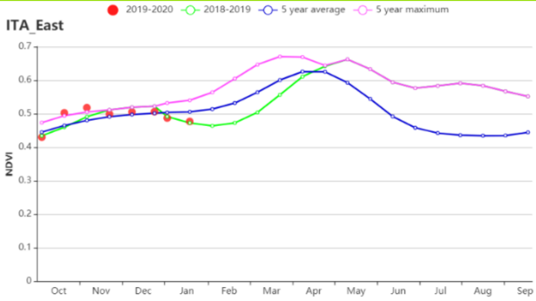

(c) Maximum VCI



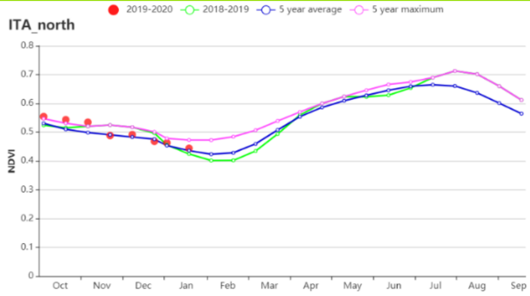

(d) Spatial NDVI patterns compared to 5YA



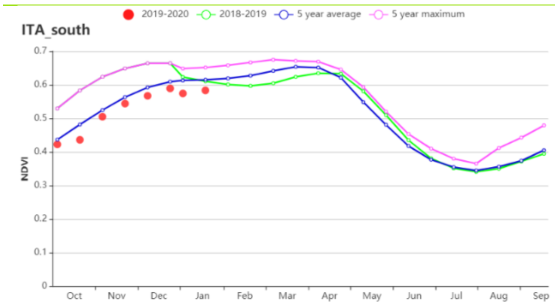

(e) NDVI profiles



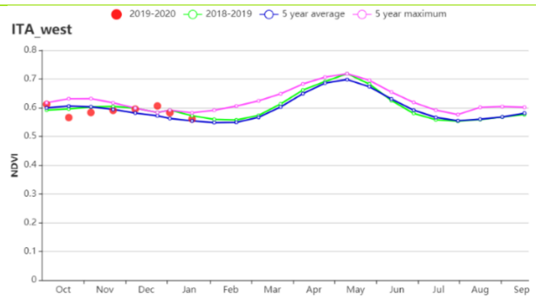

(f) East coast (Italy) crop condition development graph based on NDVI




(g) Po Valley (Italy) crop condition development graph based on NDVI




(h)Islands (Italy) crop condition development graph based on NDVI




(i). Western Italy (Italy) crop condition development graph based on NDVI

**Table 3.35 Italy's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Eastern Italy** | 443 | 36 | 8.5 | -1.5 | 429 | -13 |
| **Northern Italy** | 665 | 57 | 5.2 | -0.1 | 381 | -4 |
| **Southern Italy** | 343 | 7 | 12.7 | 0.9 | 622 | 8 |
| **Western Italy** | 472 | 3 | 10.3 | 1.4 | 504 | 7 |

**Table 3.36 Italy's agronomic indicators by sub-national regions, current season's value and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Eastern Italy** | 127 | -27 | 84 | -3 | 0.81 |
| **Northern Italy** | 87 | -12 | 94 | 12 | 0.99 |
| **Southern Italy** | 231 | 8 | 97 | 8 | 0.87 |
| **Western Italy** | 164 | 13 | 98 | 1 | 0.97 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA **KAZ** KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [KAZ] Kazakhstan

No crops were cultivated in most of the country during the monitoring period, except that only the limited amounts of winter rye and wheat in southern areas are grown during this period. Compared to the fifteen-year average, accumulated rainfall and temperature were both above average (RAIN +15%, TEMP +1.8°C), while radiation was slightly below average (RADPAR -2%). Furthermore, rainfall of more than 20 mm above average in the middle of October, early November and the end of January improved soil moisture conditions. Favorable agro-climatic conditions resulted in an increase in the BIOMSS index by 8% above average. The abundant rainfall will benefit the planting of forthcoming spring crops.

Overall, the agro-climate conditions are favorable in the monitoring period.

**Regional analysis**

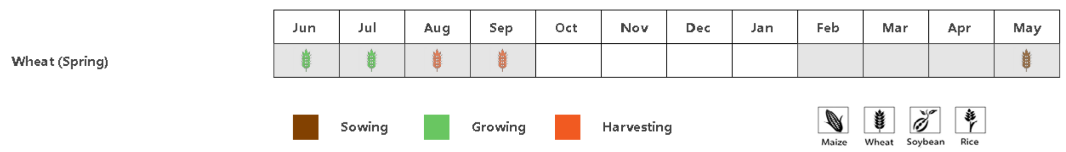
Based on cropping systems, climatic zones and topographic conditions, four sub-national agro-ecological regions can be distinguished for Kazakhstan, among which three are relevant for crop cultivation: the Northern region (112), the Eastern plateau and southeastern region (111) and the South region (110).

In the **Northern region**, the accumulated rainfall (RAIN +23%) and temperature (TEMP +2.5°C) were above average, but RADPAR was below average (-3%). The agro-climatic indicators resulted in an increase of the BIOMSS index by 11%.

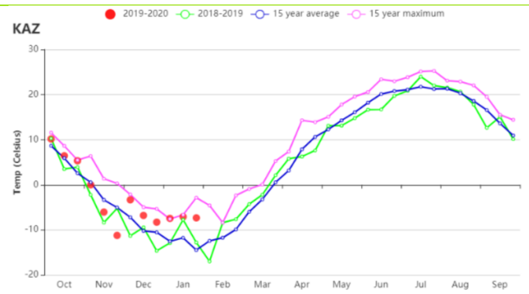
Agro-climatic conditions in the **Eastern plateau and southeastern region** were normal in the report period. RAIN and TEMP were above average (7% and 0.5°C, respectively), while RADPAR was close to average. BIOMSS (up 2%) was slightly above average.

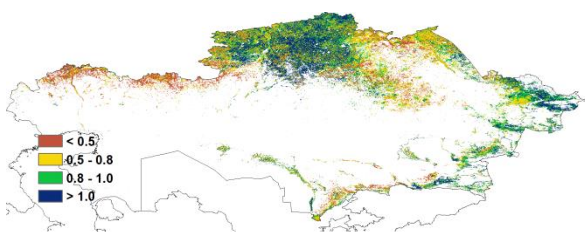
The **South region** received the less rainfall of (116 mm) than the other two regions, which was 12% below the fifteen-year average. TEMP and RADPAR were above average (0.8°C and 2%). The combination of agro-climatic indicators resulted in an increase of the BIOMSS index by 12%. The rainfall deficit in this region should not a have negative impact on winter crops due to the low water requirements in this period.

**Figure 3.23 Kazakhstan's crop condition, October 2019 - January 2020**



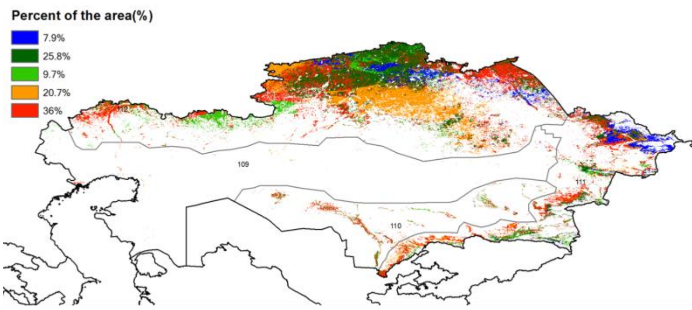

(a). Phenology of major crops

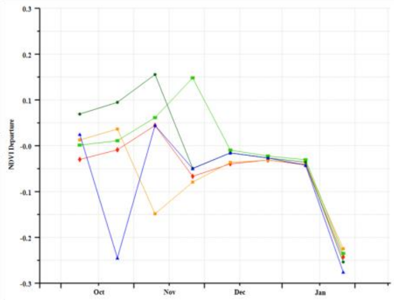



(b) Crop condition development graph based on NDVI

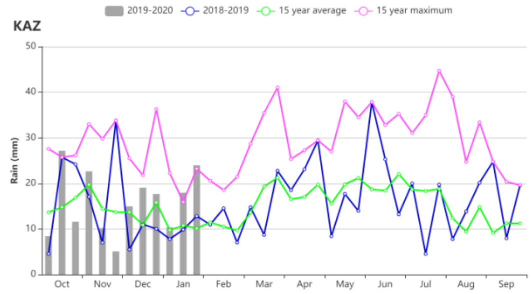
(c) Maximum VCI

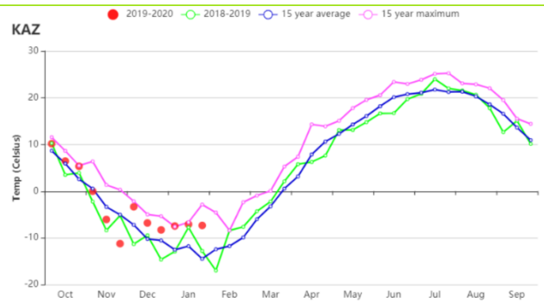



(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles




(f) Rainfall

(g)Temperature Index

**Table 3.37 Kazakhstan agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Northern region | 180 | 23 | -3.6 | 2.5 | 280 | -3 |
| Eastern plateau and southeastern region | 229 | 7 | -2.8 | 0.5 | 465 | 0 |
| South region | 116 | -12 | 2.5 | 0.8 | 500 | 2 |

**Table 3.38 Kazakhstan, agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Northern region | 43 | 11 | 12 | 87 | 0.84 |
| Eastern plateau and southeastern region | 68 | 2 | 25 | 60 | 0.87 |
| South region | 99 | 12 | 10 | 70 | 0.83 |

# [KEN] Kenya

The monitoring period covers mainly the harvest of the long rain maize crop and wheat, as well as the sowing period and early growth phases of short rain maize. Desert locusts had entered into Kenya from Somalia through Wajir and Mandera in late December. Since the harvest of maize and wheat was already concluded, the impact on early maize and wheat was limited. However, the locust already damaged the rangeland and might damage the maize in the south of the country which was cultivated during short rain season. At the national level, the CropWatch indicators had RAIN at 831 mm (+122%). Soil moisture is favorable for rangeland along the coast in the south-east and for the planting of long rain maize crops during March. While temperature (TEMP) (-1°C) and RADPAR (-6%) were below average, CALF (+5%) was above average. BIOMASS was estimated to be below average (-8%). As shown by the NDVI development graph, national crop condition values were above the five-year average. In addition, spatial NDVI patterns indicate that NDVI was above average in 78.4%of arable lands, mostly around North-west Kitui, Machakos and Kirinyaga and below average elsewhere. This spatial pattern is reflected by the maximum VCI in different areas, with high values of VCIx at 1.09. Country-wide, CALF was up by 5%. VCIx values were between 0.8 and 1.0. Generally, even though some CropWatch indicators were below average, crop conditions according to the national NDVI profile and rainfall were above average. This resulted in overall favorable conditions for crops.

**Regional analysis**

Considering the cropping system, climatic zones and topographic conditions we divided this country into four agro-ecological regions: The Eastern Coastal Area, the Highland agriculture zone, the Northern region with sparse vegetation and southwest Kenya.

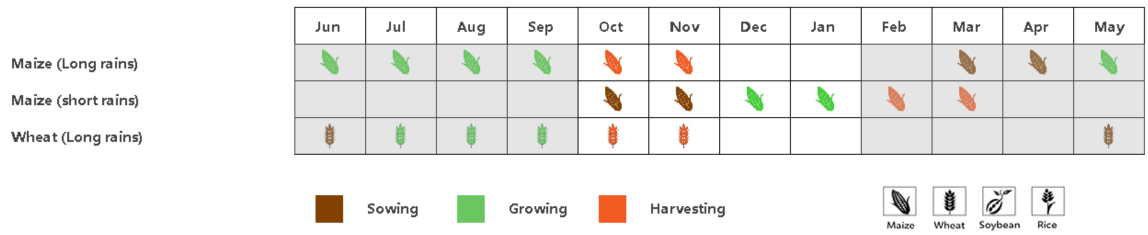
The **Coastal** area includes Mandera, Maralal, Marsabit, Wajir, and Isiolo. The total amount of rainfall in this area was recorded at 905 mm. The rainfall was more than 80% above average. TEMP was constant and radiation was slightly below average (RADPAR -1%). Even though the total amount of rainfall was above average, the total biomass production potential was below the five-year average (BIOMASS -2%). The NDVI profile was above-average for the entire reporting period. Throughout the reporting period, the maximum VCIx was 1.11 with CALF at 100%. Based on the above indicators and NDVI profile over time, crop conditions are assessed as above average.

Precipitation recorded over the **Highland agriculture zone** reached 802 mm, above-average by 124%. Temperature remained constant. RADPAR (-9%) and BIOMASS (-15%) were below average. CALF increased above average by 5% and the crop condition development graph based on NDVI was above the five-year average and maximum VCI values at 1.09. In general, the crop conditions were favorable.

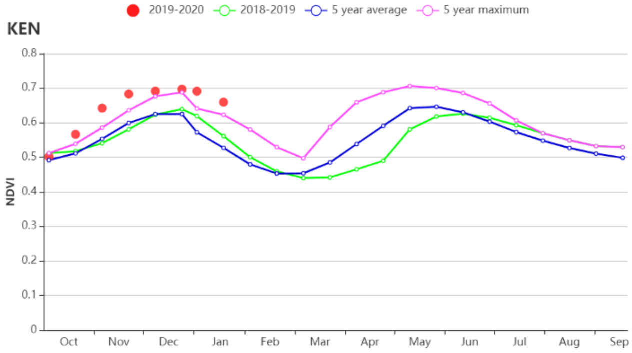
In the **northern region** the total rainfall was 554 mm (+47%). Rainfall was above average, but RADPAR slightly decreased by -6%, resulting in a lower estimate of biomass production. The NDVI development curve shows values above the five years average during the entire monitoring period. The maximum VCI was high at 1.18 with a significant increase in CALF (+46%). Overall, the CropWatch indicators point to 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. Total rainfall (RAIN at 837 mm) was 127% above average. Like the northern region, in the south-west, all CropWatch agroclimatic indicators were recorded as below average, except for the significant positive departure in total rainfall. Temperature (-2.2 ºC), RADPAR (-8%) and BIOMASS (-16%) were below average. The NDVI profile stayed above the five-year average starting from mid November. VCIx reached 1.04 with CALF up by 4%. In general, the conditions were favorable for crops.

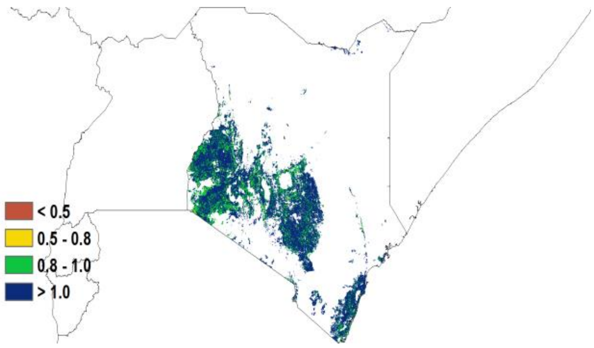
**Figure 3.24 Kenya's crop condition, October 2019 - January 2020**



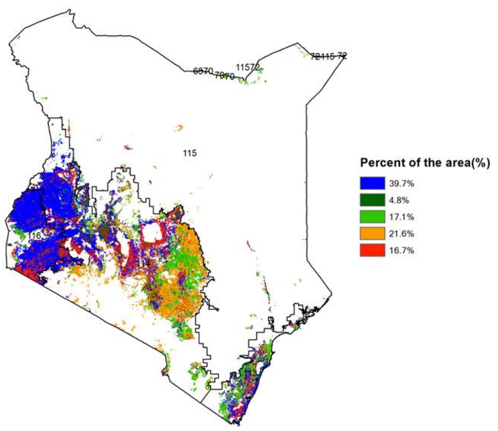

(a). Phenology of major crops



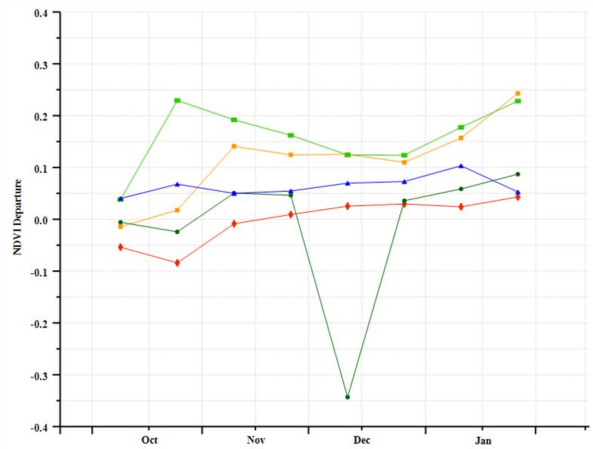

(b) Crop condition development graph based on NDVI



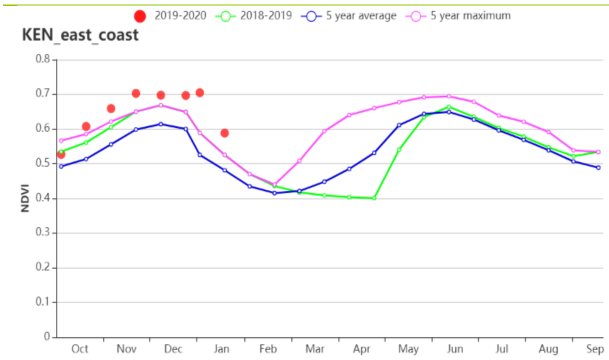

(c) Maximum VCI

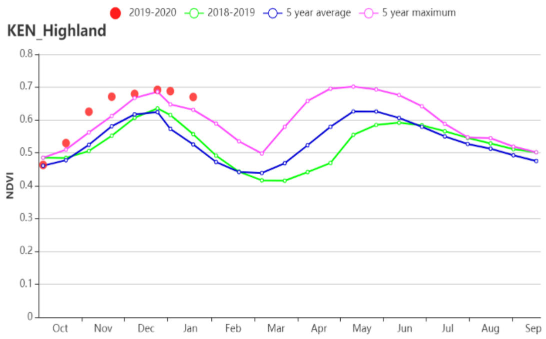



(d) Spatial NDVI patterns compared to 5YA

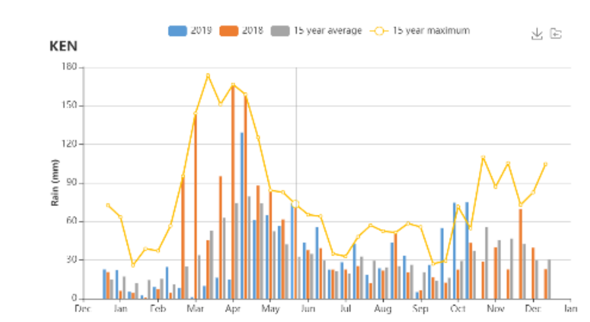



(e) NDVI profiles

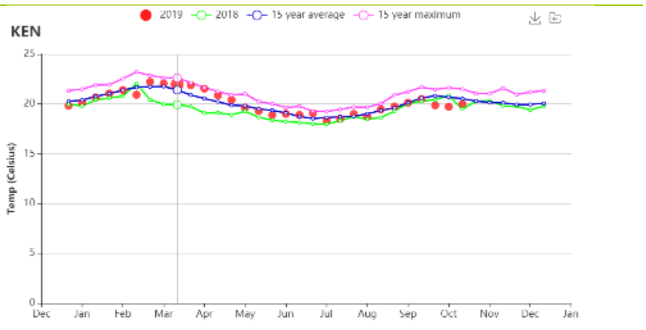


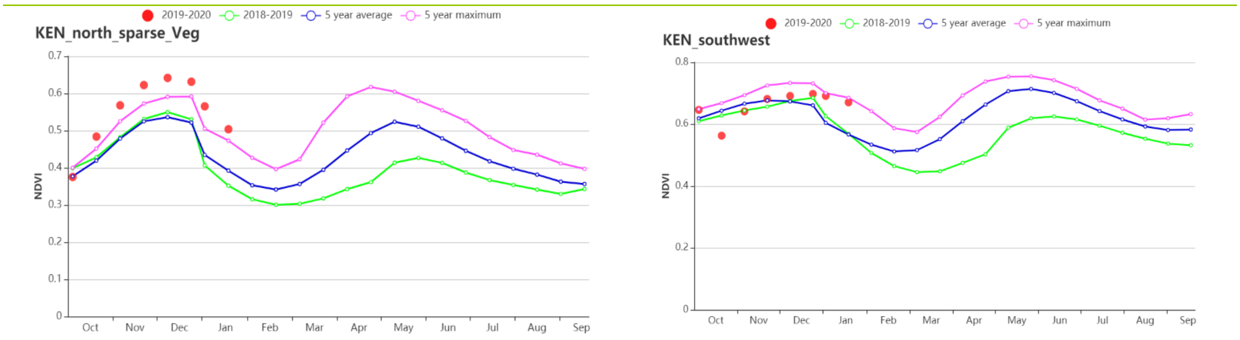

(f) Crop condition development graph based on NDVI (Coast(left) and Highland agriculture zone(right))




(d) Rainfall Index




(e) tempratrure index




(g) Crop condition development graph based on NDVI (Northern rangelands (left) and South-west (right))

**Table 3.39** **Kenya's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Coastal** | 905 | 80 | 26.8 | 0.0 | 1396 | -1 |
| **Highland agriculture zone** | 802 | 124 | 18.3 | -0.4 | 1154 | -9 |
| **Northern rangelands** | 554 | 47 | 23.6 | -1.8 | 1227 | -6 |
| **South-west** | 839 | 127 | 19.5 | -2.2 | 1178 | -8 |

**Table 3.40** **Kenya's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Coastal** | 542 | -15 | 100 | 8 | 1.11 |
| **Highland agriculture zone** | 704 | -7 | 100 | 5 | 1.09 |
| **Northern rangelands** | 564 | -16 | 99 | 46 | 1.18 |
| **South-west** | 941 | -2 | 100 | 4 | 1.04 |

# [KGZ] Kyrgyzstan

The reporting period covers the sowing period for winter wheat in Kyrgyzstan. Rainfall was 15% higher than average; TEMP was higher by 1.8 °C, RADPAR was lower by 2% and BIOMSS was higher by 8%, The nationwide NDVI profile shows that crop condition was around average during the reporting period. The temperature was higher than the average and close to the 15 years maximum. Rainfall was initially below average, but starting from December, it reached average levels.

The NDVI profile shows that NDVI was around average during the reporting period and the north region with vegetation coverage shows a high VCI maximum value (0.8-1.0) in most areas, indicating the agroclimatic indicators were favorable for vegetation.

**Regional Analysis**

More spatial detail is provided below for four main agro −ecological zones: the **Central non-agriculture region** (109), the **South zone** (110), the **Eastern plateau and southeastern zone** (111) and the N**orthern zone** (112).

The **Central non-agriculture region** has very little cropland and the agroclimatic indicators in this region don't influence crop growth in this country.

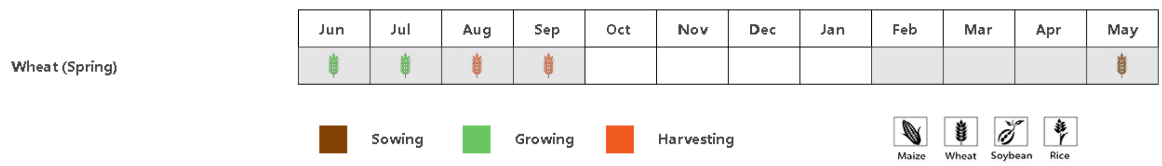
For the **Southern zone**, rain decreased by 12%, whereas increases for temperature (+0.8 ℃), radiation (+2%) and biomass (+12%) were observed. VCI max value of this region was 0.83. The NDVI profile shows that NDVI close to average until late December, when it started to fall below average.

For the **Eastern plateau and southeastern zone**, rainfall increased by 7%, temperature raised by 0.5℃, radiation remained near average and biomass increased by 2%. VCI max value of this region was 0.87. The increase of rainfall could provide favorable conditions for crop growth. The NDVI profile shows that it was close to average throughout the reporting period.

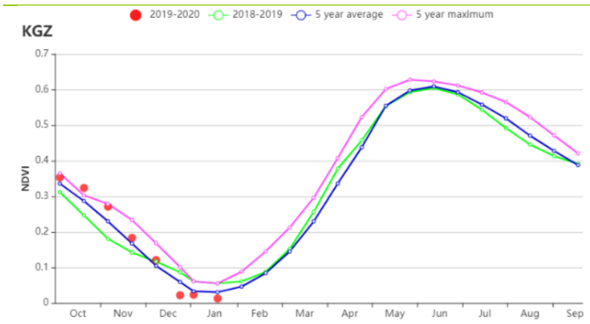
Most of Kyrgyzstan' s cropland is located in the **Northern zone**. During the reporting period, rainfall increased by 23% and temperature up by 2.5 ℃. Radiation slightly decreased by 3% and biomass increased 11%. The VCI value of this region was 0.84 and in most of the northern border region it was around 1.00. The increase of rainfall provided a favorable environment for crop growth. The crop condition is good in this region.

Overall, since the Northern zone experienced favorable meteorological conditions and the northern zone covers most of cropland in Kyrgyzstan, the crop conditions were favorable in this reporting period.

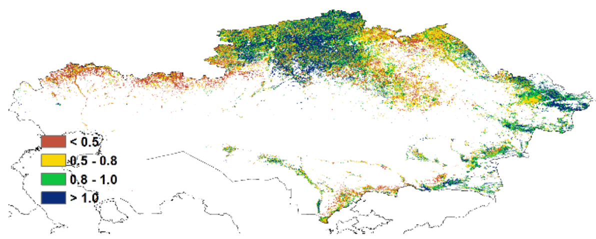
**Figure 3.25 Kyrgyzstan's crop condition, October 2019 - January 2020**



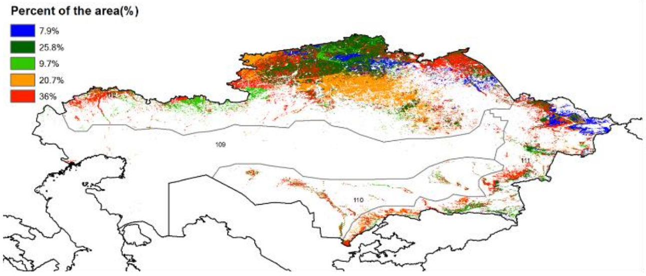

a). Phenology of major crops



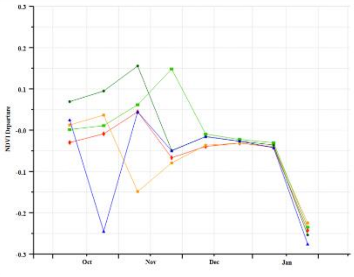

(b) Crop condition development graph based on NDVI



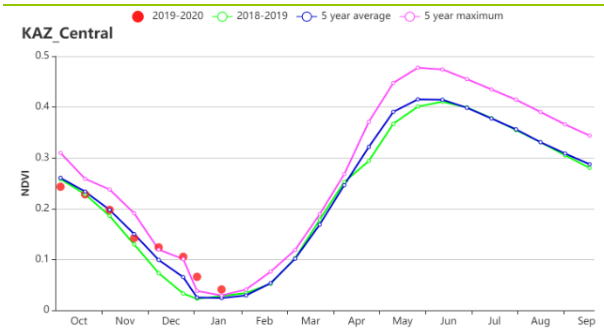

(c) Maximum VCI

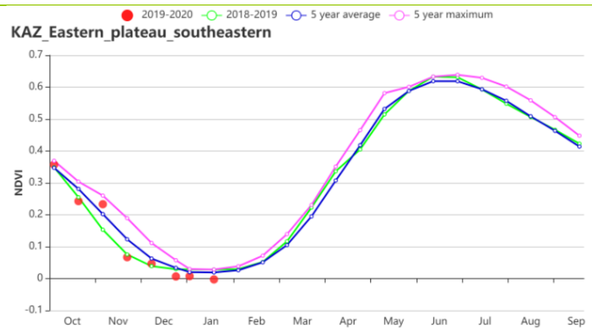



(d) Spatial NDVI patterns compared to 5YA

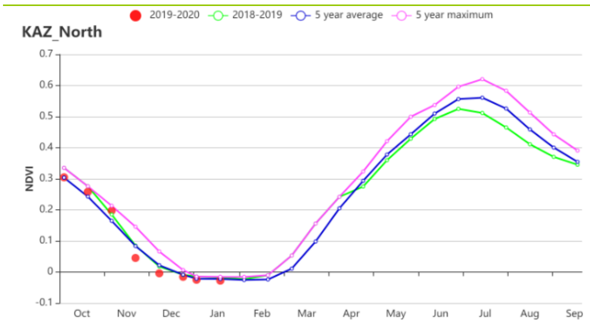


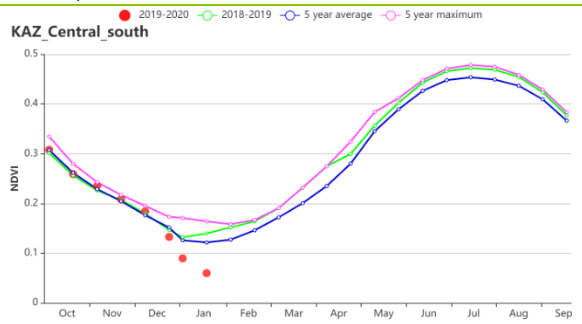

(e) NDVI profiles



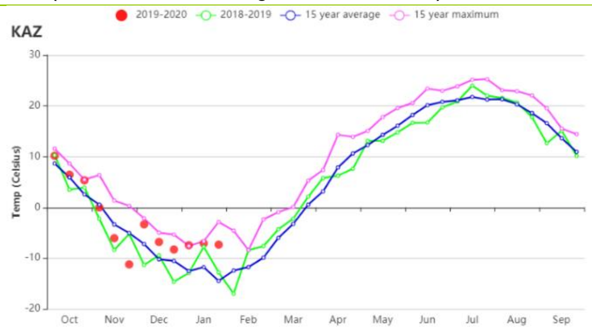

(f) Crop condition development graph based on NDVI (left: Central non-agriculture region, right: Eastern plateau and southeastern zone)




(f) Crop condition development graph based on NDVI (left: Northern zone, right: Southern zone)


(g) Rainfallprofiles




(h) Temperatureprofiles

**Table 3.41 Kyrgyzstan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 to January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Central non-agriculture region | 116 | -11 | -1.1 | 1.8 | 370 | 0 |
| South zone | 116 | -12 | 2.5 | 0.8 | 500 | 2 |
| Eastern plateau and southeastern zone | 229 | 7 | -2.8 | 0.5 | 465 | 0 |
| Northern zone | 180 | 23 | -3.6 | 2.5 | 280 | -3 |

Table 3.42 Kyrgyzstan's agronomic indicators by sub-national regions, current season's values and departure, October 2019to January 2020

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Central non-agriculture region** | 65 | 10 | 2 | -50 | 0.69 |
| **South zone** | 99 | 12 | 10 | 70 | 0.83 |
| **Eastern plateau and southeastern zone** | 68 | 2 | 25 | 60 | 0.87 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ **KHM** LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [KHM] Cambodia

This monitoring period covers the harvest of main (wet season) rice, the planting of dry season rice, the growing and harvesting of medium, late and floating rice and the early stage of dry season maize and soybean in Cambodia. Compared to average, the CropWatch agro-climatic indicators describe a relative dry season with a 37% drop in rainfall. Air temperature (TEMP +0.3°C) and radiation (PADPAR +12%) were both higher than average. Environmental indicators mentioned above caused a 8% decrease in the potential biomass production (BIOMSS -8%). However, the maximum VCI value for the country is at 0.92, which means favorable crop conditions. The fraction of cropped arable land (CALF +2%) was slightly above the average of previous five years.

Water deficits harmed the crops and resulted in well below average crop condtions, especially after November 2019. This is clearly shown in the NDVI profile. According to the Spatial distribution of NDVI profiles, a small area (5.4% of cropland), mainly in Kandal and along the MeKong river, had an above-average NDVI before December. It subsequently dropped to average gradually in January. About 3.9% of the crop land, which mainly lies in the southeast of Banteay Meanchey, suffered a NDVI deficit in the early part of the season, but had recovered since December. About 81.2% of crop land shared the same trend of NDVI departure: it was close to the average before November and decreased gradually during reporting period.

High value of Maximum VCI index (VCIx >0.8) in most parts of the country indicate a limited negative impact from drought on crop growth from December to January. Generally, seasonal rainfall deficiency did not impact the overall crop development, and the wet-season rice production of Cambodia can be expected to be favorable.

**Region 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**, the **Southwestern Hilly region** along the Gulg of Thailand coast.

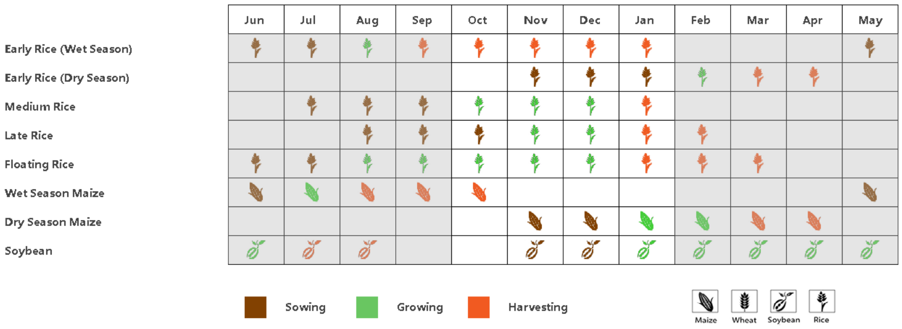
In the **Tonle Sap lake area**, NDVI was below average during reporting period. Compared to average, sunshine and temperature were relatively high (RADPAR +12%, TEMP +0.2°C) and fraction of arable land (CALF +1%) was above average as well. However, the rainfall (RAIN -34%) and the biomass production potential (BIOMASS -12%) were below average. The maximum VCI value for the region is at 0.89.

The **Mekong valley between Tonle-sap and Vietnam border**, the main rice growing area in Cambodia, was affected by low precipitation (RAIN, -44%) with above average RADPAR (+9%) and below average temperature (TEMP, -0.4°C). CALF was above the 5-year average (CALF, +2%) and the biomass potential was below average by 10%. The NDVI for the region was above average from October to December 2019 and below average after December, according to the NDVI profile. The maximum VCI for the region was 0.96. The overall crop outputs are expected to be good.

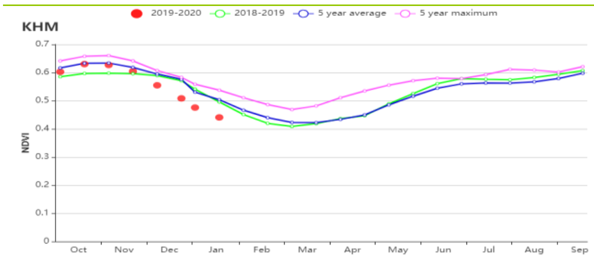
The **Northern plain and northeast** recorded a drop of rainfall below average by 47%. The temperature was slightly below average (TEMP, -0.1°C) and radiation significantly exceeded average (RADPAR, +12%). CALF was a little higher compared to the 5-year average (CALF, +1%). Crop condition was below average for the region, where the biomass potential was 13% below average while the maximum VCI reached 0.92. Altogether, this region had a below-average NDVI during reporting period.

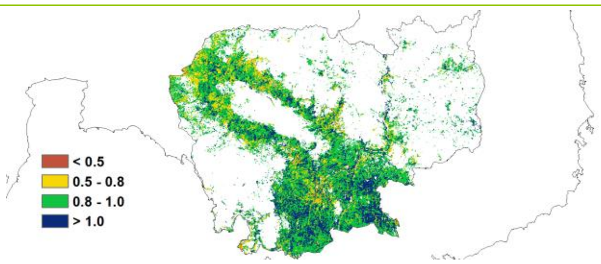
The **Southwest Hilly region** had favorable VCIx (0.92) accompanied by increased BIOMSS (+4%) resulting from the increase in radiation (RADPAR +12%) and above average temperature (TEMP +0.4°C), while the NDVI for the region was below average in the whole reporting period. The precipitation was below average (RAIN -29%).

**Figure 3.26 Cambodia's crop condition, October 2019 - January 2020**



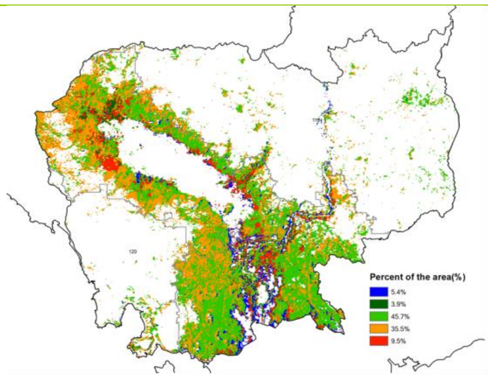

(a). Phenology of major crops

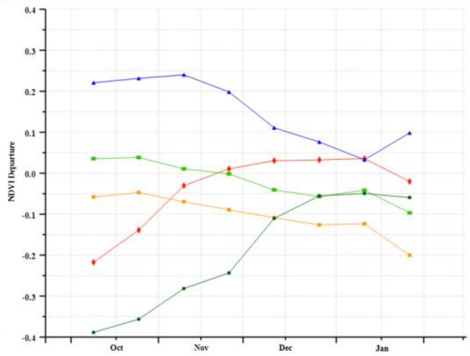



(b) Crop condition development graph based on NDVI

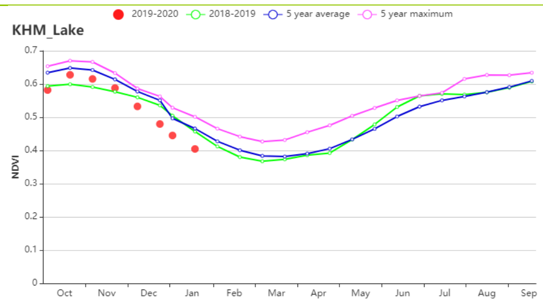
(c) Maximum VCI

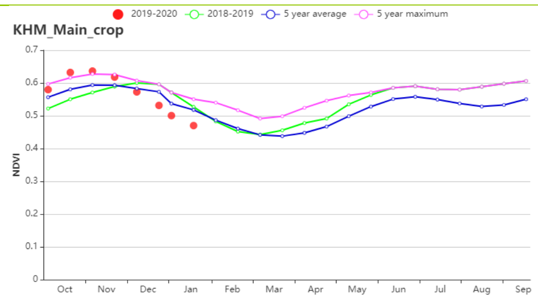


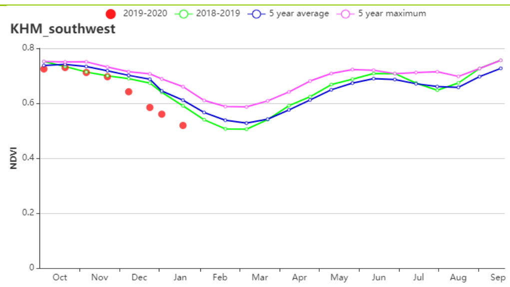

(d) Spatial NDVI patterns compared to 5YA

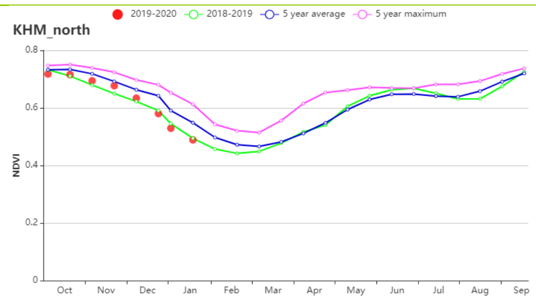
(e) NDVI profiles



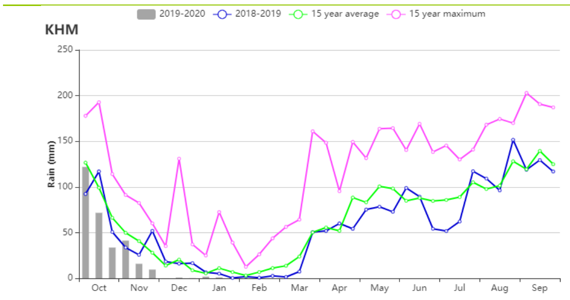



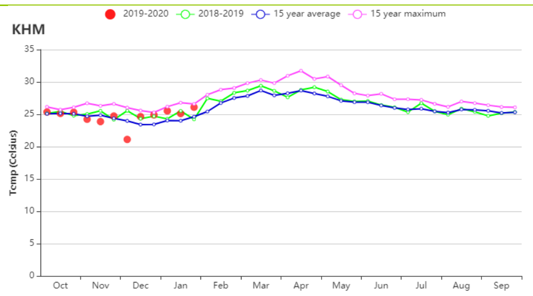

(f) Crop condition development graph based on NDVI_Central Tonle-Sap plain (left) and Mekong valley between Tonle-sap and Vietnam borders (right))




(g) Crop condition development graph based on NDVI_Southwest Hilly region (left) and Northern plain and northeast (right))




(h) Rainfall Index (i) tempratrure index

**Table 3.43 Cambodia agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| **Tonle Sap** | 276 | -34 | 24.5 | 0.2 | 1203 | 12 |
| **Mekong valley between Tonle-sap and Vietnam border** | 314 | -44 | 24.8 | -0.4 | 1193 | 9 |
| **Northern plain and northeast** | 233 | -47 | 24.3 | -0.1 | 1179 | 12 |
| **Southwest Hilly region** | 400 | -29 | 23.1 | 0.4 | 1204 | 12 |

**Table 3.44 Cambodia, agronomic indicators bysub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Tonle Sap** | 585 | -12 | 100 | 1 | 0.89 |
| **Mekong valley between Tonle-sap and Vietnam border** | 617 | -10 | 98 | 2 | 0.96 |
| **Northern plain and northeast** | 541 | -13 | 100 | 1 | 0.92 |
| **Southwest Hilly region** | 707 | 4 | 100 | 0 | 0.92 |

# [LKA] Sri Lanka

The monsoon from the southwest and the mountains in central north and east delineate different climatic zones in Sri Lanka. Rice is the most important crop of the country and is mainly planted in the southwest and central highlands. Maize requires less water and is mainly grown in the north and west. This monitoring period covers the sowing and growing season within the main season (Maha), both for rice and maize. According to the CropWatch monitoring results, crop condition was average for the whole period in general.

Influenced by monsoon and topography, the country experienced typical rainy season conditions during October and November, followed by cold and dry conditions during December and January. Precipitation, temperature and radiation all increased compared to 15YA (RAIN +3%, TEMP +0.2℃, RADPAR +9%). The fraction of cropped arable land (CALF) remained comparable to 5YA. BIOMSS was up 7% as compared to 15YA. As shown on the NDVI development graph, NDVI values were apparently below average in mid-October and early December, while they were close to the 5YA for other periods. During the period of abnormal NDVI values, RAIN was much larger than 15YA and consequently affected the crop conditions. In spite of this, agroclimatic and agronomic indicators reflected the favorable environmental condition for crop growth during the monitoring period. NDVI trends revealed a good prospect for crop production. The maximum VCI for the whole country was 0.99.

As shown by NDVI clusters map and profiles, spatial heterogeneity of crop condition was significant throughout the country's cropland. 28.8% of cropland showed consistent above-zero NDVI departure values, including parts of provinces of North Western, NorthCentral, Southern, Uva and Eastern Sri Lanka. 64.4% of cropland experienced large negative NDVI departure values in mid-October and early December. The regions were Kurunegala, Anuradhapura, the area between Colombo and Galle, and other scattered areas along the western coast. The area between Nuwara-Eliya and Badulla showed below-zero NDVI departure values for the whole period, which accounted for 6.8% of cropland. The VCIx map exhibited high values for almost the whole country.

**Regional analysis**

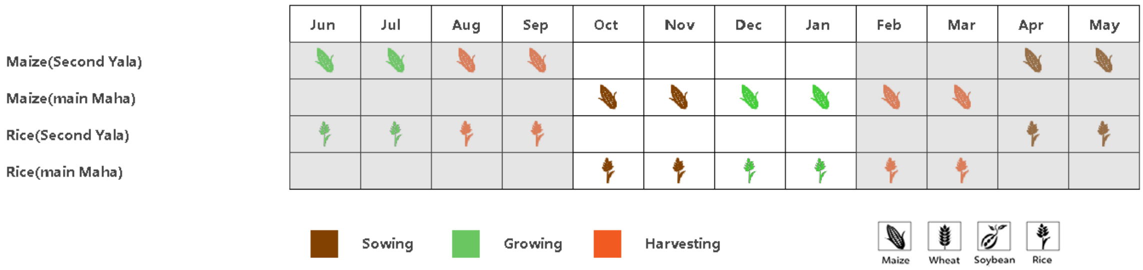
Based on the cropping system, climatic zones and topographic conditions, three sub-national agroecological regions can be distinguished for Sri Lanka. They are the Dry zone, the Wet zone, and the Intermediate zone.

In the **Dry zone**, the recorded RAIN (925mm) was 3% below average and amounted to over 7 mm per day, which was sufficient for the growth of maize. TEMP was 0.3°C above average with RADPAR up as well, by 10%; BIOMSS and CALF increased by 9% and 1% compared to average. NDVI followed a similar trend as the whole county. The VCIx for the zone was 0.99. Overall, crop condition was fair in general.

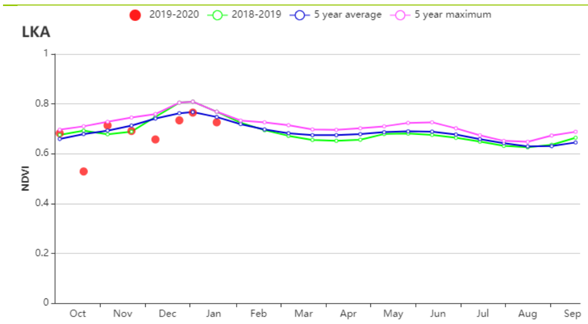
The **Intermediate zone** went through the end of the rainy season with RAIN at 1408 mm, 7% above 15YA. More than 11mm precipitation per day could meet the need of water for rice and maize in this zone. TEMP was comparable to average while RADPAR was up 8% above average. With full use of cropland, BIOMSS was close to the average (+1%). The variation of NDVI was analogous to the Dry zone. The VCIx value for the zone was 1. Condition of crop was assessed as average.

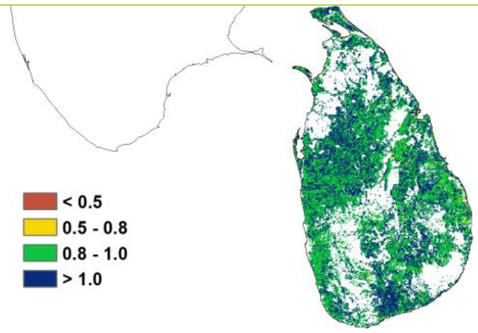
The **Wet zone** received the most RAIN (1783mm) that was 7% up compared to 15YA. TEMP (+0.3°C) and RADPAR (+5%) were higher too. Favorable agroclimatic indicators led to a 7% rise in BIOMSS and cropland was fully utilized. NDVI was average for the whole period except for mid-October. The VCIx value for the zone was 0.99. Crop conditions were normal for this zone, and thus similar to the other two sub-national regions.

**Figure 3.27 Sri Lanka's crop condition, October 2019 - January 2020**



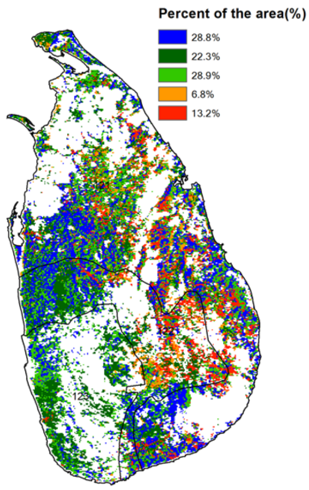

(a). Phenology of major crops

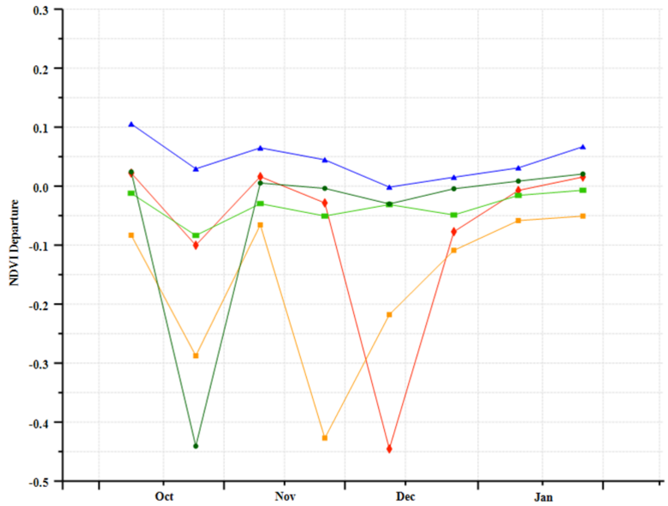



(b) Crop condition development graph based on NDVI

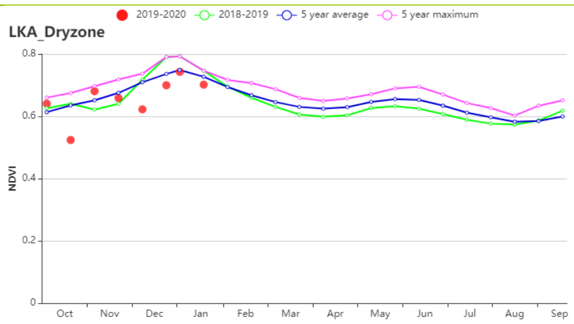
(c) Maximum VCI

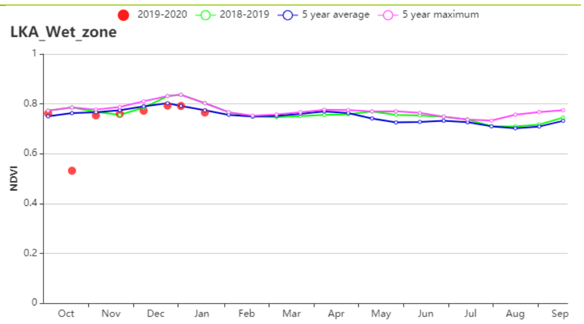


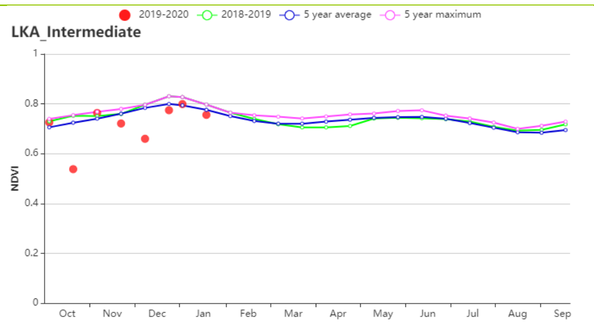

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles




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




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

**Table 3.45 Sri Lanka's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Dry zone** | 925 | -3 | 25.4 | 0.3 | 1219 | 10 |
| **Wet zone** | 1783 | 7 | 23.9 | 0.3 | 1074 | 5 |
| **Intermediate zone** | 1408 | 6 | 23.3 | 0.0 | 1092 | 8 |

**Table 3.46 Sri Lanka's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Dry zone** | 818 | 9 | 100 | 1 | 0.99 |
| **Wet zone** | 694 | 7 | 100 | 0 | 0.99 |
| **Intermediate zone** | 686 | 1 | 100 | 0 | 1.00 |

# [MAR] Morocco

This reporting period covers the first half of the rainy season, which lasts from November to March. Winter wheat is sown in November. The cereal production in Morocco is heavily dependent on rainfall, since only 15 percent of the country's cropland is irrigated. Eighty percent of the arable land is located in arid or semi-arid areas.

For the current reporting period, the CropWatch agro-climatic indicators showed a large reduction (-33%) in rainfall as compared to the 15 year average. The weather was sunnier, RADPAR was 5% above the average, and colder. The average temperature was 0.2°C lower. The CropWatch estimated biomass (BIOMSS) was 17% below the average, due to limited rainfall.

The nationwide NDVI graph indicated that crops conditions were near average and the maximum VCI indicated moderate (0.72) crop conditions. However, the NDVI spatial clustering map showed that the conditions for half of the cropped area, mostly in the southern part of the country, were below the average.

As a general conclusion, all agro-climatic and agronomic indicators were consistent and more sensitive to the large deficit in rainfall than the NDVI-based graph of crop conditions. The current conditions for Morocco are unfavorable.

**Regional analysis**

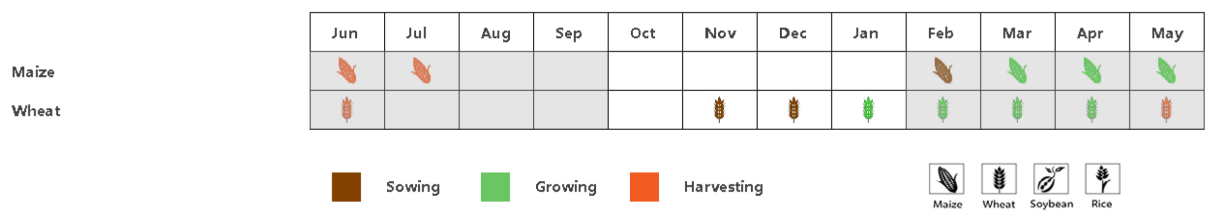
CropWatch adopts three agro-ecological zones (AEZs) relevant for crop production in Morocco: The **Sub-humid northern highlands**, the **Warm semiarid zone** and the **Warm sub-humid zone**.

All agro-climatic indicators measured for the three agro-ecological zones are consistent with the national trend. The reductions in the rainfall for the three zones were 24%, 44% and 32% below the average respectively. The drop in temperature was 0.2 °C below the average in **Sub-humid northern highlands** and by 0.3°C in the two other zones. Higher RADPAR data resulted from the sunnier conditions, particularly for the **Warm semiarid zone** (RADPAR=858 MJ/m2 with a 6% increase above the average). Due to the rainfall shortage, the estimated BIOMSS was below average for the three zones (by 16, 16 and 12% respectively).

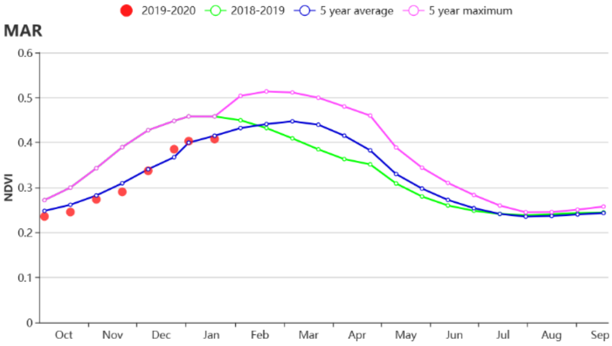
In the **Sub-humid northern highlands** and **Warm sub-humid zones**, the crop conditions based on the NDVI graph indicated that they were below average in October, near average in November and then turned to be above average in December and January. The impact of the rainfall deficit was more profound in the **Warm semiarid zones** where crop conditions were below average during the whole reporting period. This was also confirmed by the estimated maximum VCI since the **Warm semiarid zones** had the lowest VCI (0.61) as compared to the other two zones. The **Warm semiarid zones** include the provinces with major wheat production such as El Jadda and Settat.

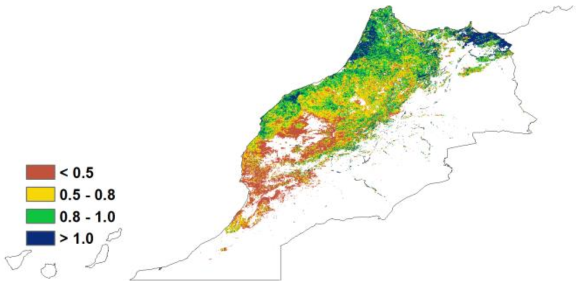
The maximum VCI was high (0.84) in the **Warm subhumid zones**, which indicated less impact of rainfall shortage on crop conditions than in the other two zones, while conditions in **Sub-humid northern highlands** were moderate with maximum VCI of 0.78.

**Figure 3.28 Morocco's crop condition, October 2019 - January 2020**



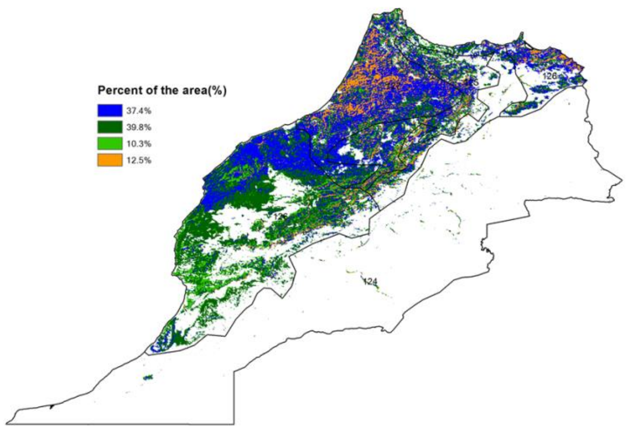

(a). Phenology of major crops

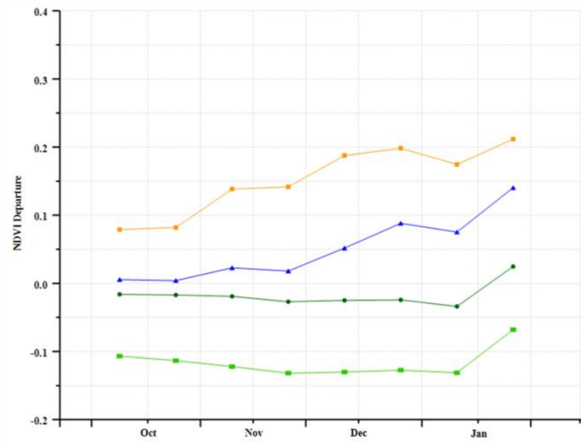



(b) Crop condition development graph based on NDVI

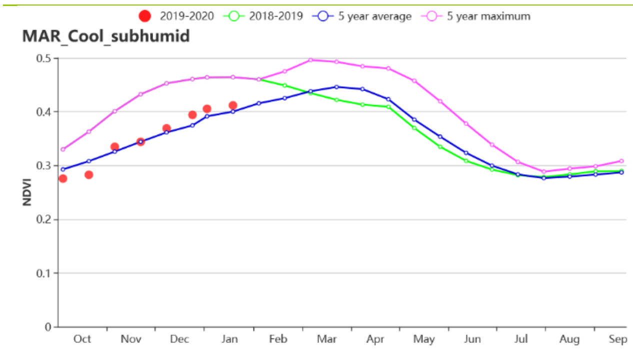
(c) Maximum VCI

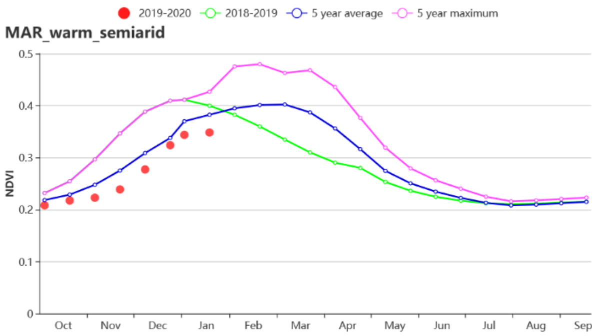


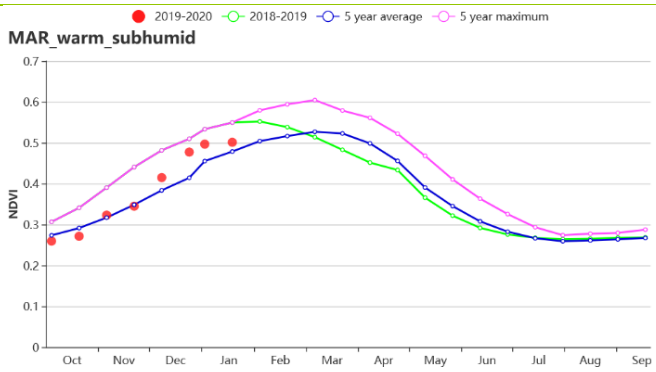

(d) Spatial NDVI patterns compared to 5YA

€ NDVI profiles

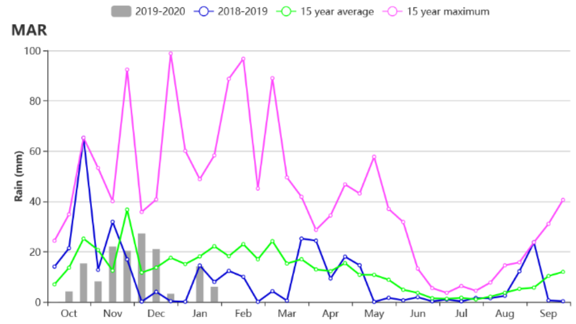


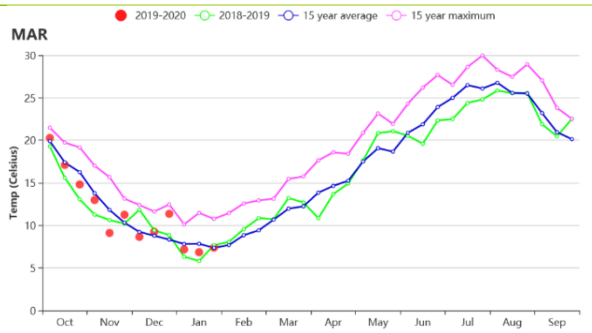

(f). Crop condition development graph based on NDVI (Sub-humid northern highlands).and (g). Warm semiarid zones )




(h) . crop condition development graph based on NDVI, Warm subhumid zones.




(i) Rainfall profiles




(j) Temperature profiles

**Table 3.47 Morocco's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Sub-humid northern highlands | 124 | -34 | 10 | 0.1 | 990 | 3 |
| Warm semi-arid zones | 72 | -40 | 12.3 | 0.1 | 1112 | 4 |
| Warm sub-humid zones | 116 | -43 | 12.4 | -0.1 | 1003 | 3 |

**Table 3.48 Morocco's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Sub-humid northern highlands | 452 | -35 | 66 | 5 | 0.9 |
| Warm semi-arid zones | 270 | -37 | 40 | -11 | 0.7 |
| Warm sub-humid zones | 440 | -39 | 83 | 6 | 0.9 |

# [MEX] Mexico

As the most important crop of Mexico, winter wheat sowing began in October. Both soybean and rice were at harvesting stage over the reporting period. Maize was at growing stage in November and December and reached harvest in January in the northwest. In other areas of the country, maize was at the harvesting stage from October to December.

Crop condition was close to average between October to January according to the crop condition development graph based on NDVI. The CropWatch agroclimatic indicators show that TEMP (+0.4°C) and RADPAR (-3%) were close to average and RAIN was significantly increased (+62%), which was beneficial for crop growth, as indicated by a relatively high value of VCIx (0.89). CALF decreased by 2% compared with the previous 5-year average. BIOMSS increased by 2% compared to average.

Crop condition displayed obvious differences in spatial distribution. According to the spatial pattern of VCIx, VCIx in the south was higher than that in the North. Very high values (greater than 1.0) occurred mainly in southeastern Mexico (including Veracruz, Tabasco and western Campeche), whereas extremely low values (less than 0.5) occurred in the north-east and middle of the country (northwestern Coahuila, northern Nuevo León and northern Tamaulipas). The VCIx 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 42.2% of the total cropped areas were below average during the entire monitoring period, mainly distributed in the northeast of Coahuila, north of Nuevo León and north of Tamaulipas while 54.7% of the total cropped areas, mainly in Sinaloa and Sonora provinces, were just slightly above average.

**Regional analysis**

Based on cropping systems, climatic zones and topographic conditions, Mexico is divided into four agro-ecological regions. These regions include Arid and semi-arid regions (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.

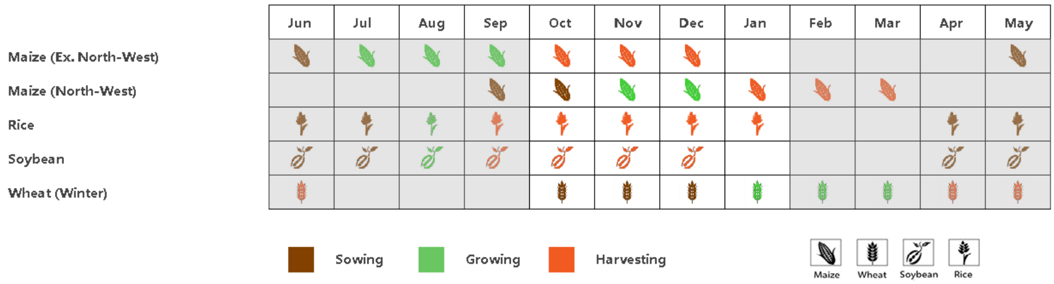
**The Arid and semi-arid regions** located in northern and central Mexico account for about half of planted areas in the country. According to the NDVI development graph, crop condition in this region was generally close to average during the reporting period. VCIx was relatively low with a value of 0.80 and CALF decreased by 5% compared with average, RAIN and TEMP increased by 84% and 0.1°C respectively and RADPAR decreased by 4%, which all resulted in an increasement of BIOMSS(+6%).

**Sub-humid temperate region with summer rains** is situated in central Mexico. According to the NDVI development graph, crop condition was continuously close to average in this region. The agro-climatic condition showed that RAIN and TEMP increased by 114% and 0.5°C respectively and RADPAR decreased by 6% compared to average. BIOMSS also increased by 1% and CALF was 93%. The VCIx(0.93) confirmed favorable crop condition in these regions.

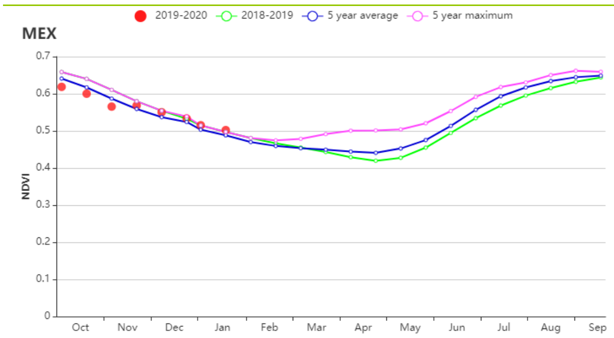
**Sub-humid hot tropics with summer rains** are located in southern Mexico. During the monitoring period, crop condition was above average since November, as shown by the NDVI time profiles. Agro-climatic conditions showed that RAIN was significantly above average (+64%) while TEMP and RADPAR were near average (+0.5°C and -3%). The VCIx in these areas was 0.95 and BIOMSS was on average, which meant crop grew well.

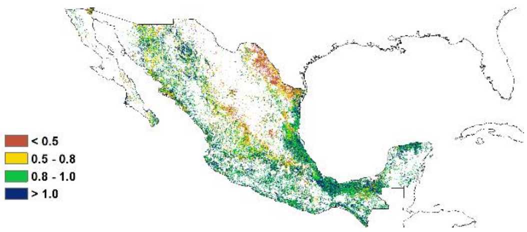
**Humid tropics with summer rainfall** are located in southeastern Mexico. RAIN was significantly above average (+30%), TEMP was 0.7℃ warmer and RADPAR up 4%. As shown in the NDVI development graph, crop condition was below average in October and improved to average from November to January. BIOMSS decreased (-3%) and the VCIx (0.97) confirmed favorable crop condition in these regions.

**Figure 3.29 Mexico's crop condition, October 2019 - January 2020**



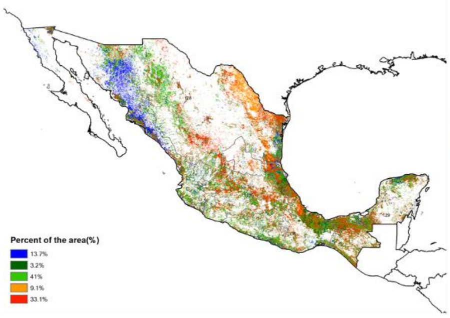

(a). Phenology of major crops

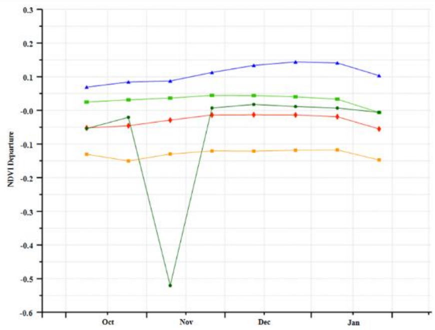



(b) Crop condition development graph based on NDVI

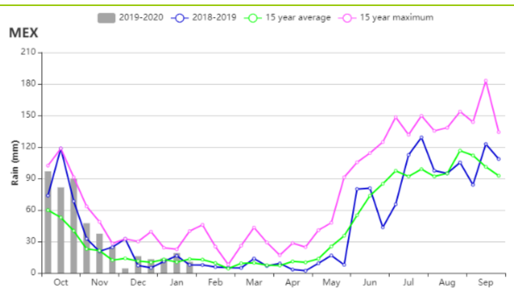
(c) Maximum VCI

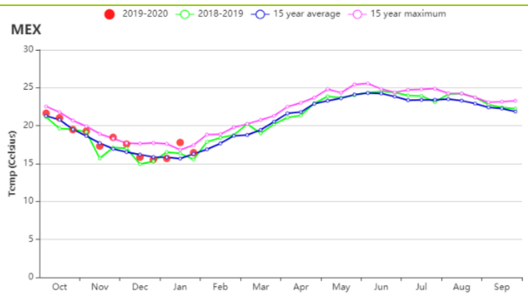



(d) Spatial NDVI patterns compared to 5YA

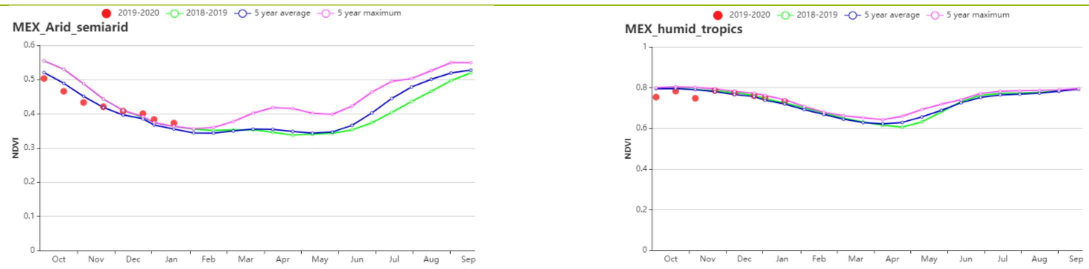
(e) NDVI profiles



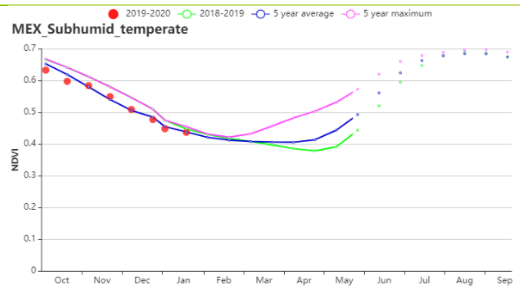



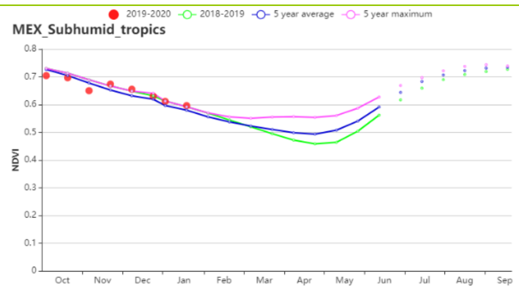

(f) Rainfall profiles

(g) Temperature profiles




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




(g) 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 3.49 Mexico's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Arid and semi-arid regions | 240 | 84 | 14.8 | 0.1 | 929 | -4 |
| Sub-humid temperate region with summer rains | 567 | 114 | 16.2 | 0.5 | 1022 | -6 |
| Sub-humid hot tropics with summer rains | 527 | 64 | 19.7 | 0.5 | 985 | -3 |
| Humid tropics with summer rainfall | 687 | 30 | 22.4 | 0.7 | 1006 | 4 |

**Table 3.50 Mexico's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Arid and semi-arid regions | 322 | 6 | 70 | -5 | 0.8 |
| Sub-humid temperate region with summer rains | 386 | 1 | 93 | -1 | 0.93 |
| Sub-humid hot tropics with summer rains | 426 | 0 | 97 | 0 | 0.95 |
| Humid tropics with summer rainfall | 567 | -3 | 100 | 0 | 0.97 |

# [MMR] Myanmar

As the most dominant cereal crop in Myanmar, rice is grown nationwide during the rainy season. Maize is another major crop that is growing in the dry season in highlands, accompanied by second rice. Wheat plays a little role in total crop production and is mainly grown in the central dry zone. The country went through the end of the rainy season in October and entered a cool dry season during November and January. This monitoring period covers the early harvesting season for maize and harvesting season for rice, as well as the sowing season and the growing season for second rice and wheat crops. CropWatch generally assesses the crop condition of Myanmar during this monitoring period as below-average in general.

Compared to the 15YA level, precipitation (RAIN) decreased by 19% while radiation (RADPAR) was 6% up. Temperature (TEMP) was average. Precipitation was below average mainly in October. As a result, potential cumulative biomass (BIOMSS) underwent a 17% reduction as compared to its 15YA level. The arable land was near full utilization according to the monitoring results in sub-national regions. The crop arable land fraction (CALF) increased by 1% nationally as compared to its 5YA. As shown in the NDVI development graph, NDVI values were about the 5YA at first and were slightly below the average since late December.

Crop condition underwent marked spatial variations according to the NDVI cluster and profile maps. 49.7% of cropland showed positive NDVI departure values throughout the monitoring period, including the regions of Sagaing, Mandalay, Magew, Bago Ayeyarwady and highlands in Shan State. 43.9% of cropland showed negative NDVI departure values during the whole period. 9% of cropland in Ayeyarwady and Bogo displayed negative NDVI departure values before December, reflecting the negative influence of insufficient precipitation during the sowing season. The VCIx map shows values between 0.5 and 0.8 over Mandalay Region and high values in the other regions.

**Regional analysis**

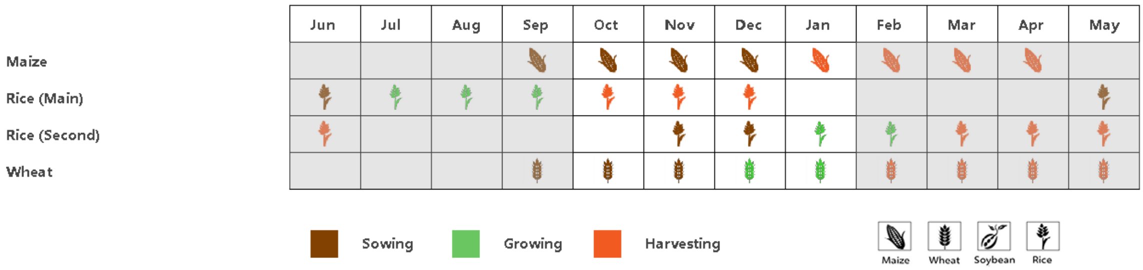
Based on the cropping system, climatic zones and topographic conditions, three sub-national agro-ecological zones (AEZ) can be distinguished for Myanmar. They are the Delta and southern-coast, the Central plain, and the Hills.

The **Delta and southern-coast region** experienced a dry season with a relatively low RAIN (199 mm), a 43% decrease compared to the 15YA. TEMP and RADPAR increased by 0.3℃ and 7%, respectively. BIOMSS decreased by 9% and CALF rose by 1%. NDVI was near average until January, when it dropped slightly to below average in January. The maximum VCIx was 0.96 for this region. The crop condition is below-average in general.

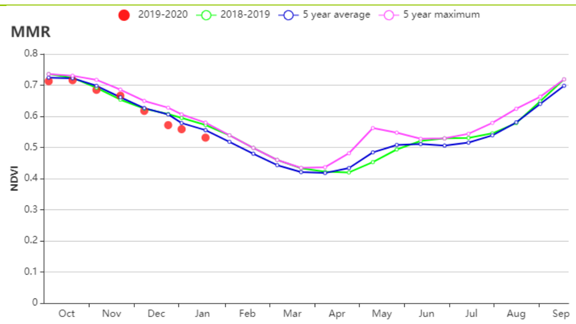
The **Central plain** was also short of RAIN (252 mm, 16% below the 15YA) while TEMP and RADPAR both increased, by 0.2℃ and 6% respectively. BIOMSS was 21% below the 15YA. This was the largest decrease among the three sub-national regions. CALF was up 1% above average. NDVI was near the level of the 5YA during the whole period and also experienced a slight decrease below average in January. The maximum VCIx was 0.94 for the region. The crop condition is assessed as moderately below the 5YA.

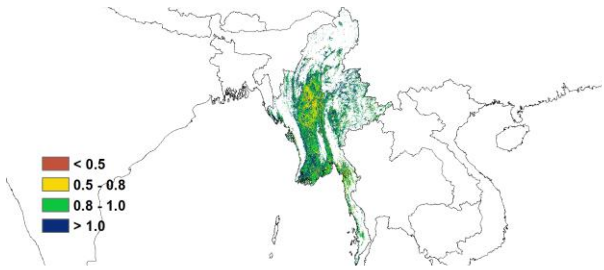
Analogous to the other two sub-national regions, the **Hills region** had less RAIN (286 mm), 12% below the 15YA. Temperature was slightly lower (TEMP -0.3℃) and radiation higher (RADPAR +6%). Even with the cropland fully used, BIOMSS was 18% down compared to the 15YA. The variation of NDVI was similar to the Central region. In spite of the high value of the maximum VCIx (0.99) for the region, the crop condition for this region is slightly below-average in general according to the agroclimatic indicators.

**Figure 3.30 Myanmar's crop condition, October 2019 - January 2020**



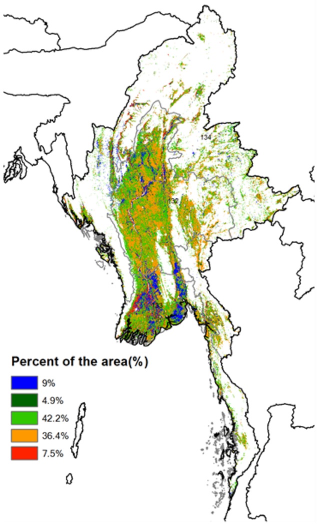

(a). Phenology of major crops

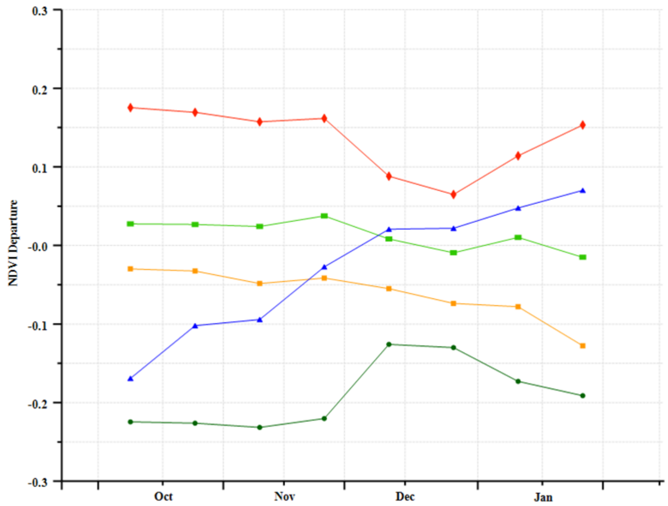



(b) Crop condition development graph based on NDVI

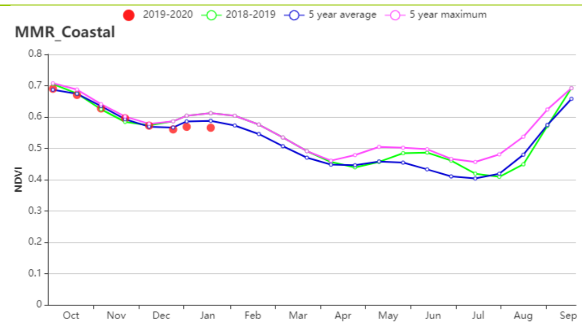
(c) Maximum VCI

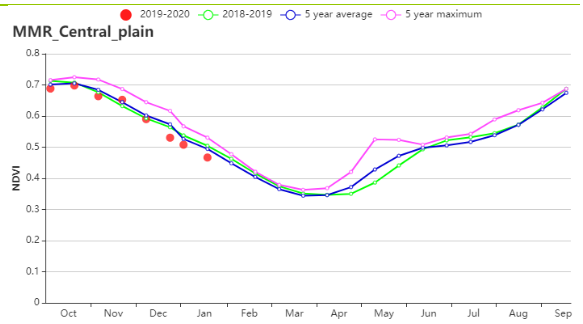


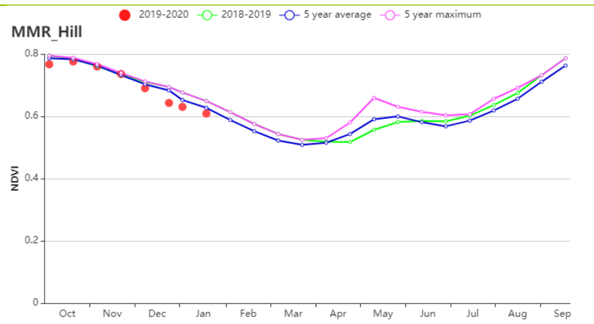

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

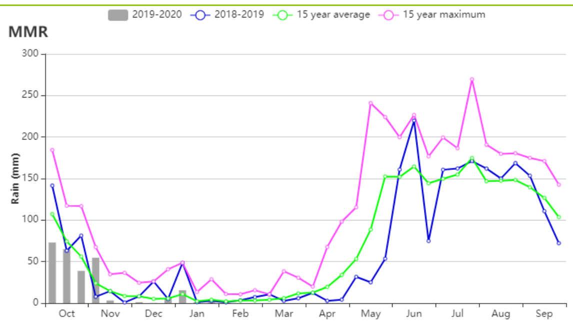


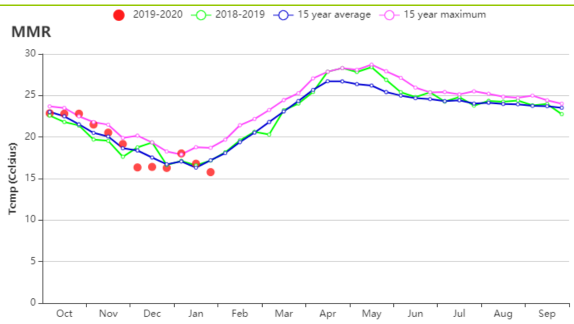

(f) Crop condition development graph based on NDVI (Coastal region (left) and Central plain (right))




(g) Crop condition development graph based on NDVI (Hill region)




(h)rainfall index




(i)temperature index

**Table 3.51 Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Coastal region** | 199 | -43 | 24.8 | 0.3 | 1194 | 7 |
| **Central plain** | 252 | -16 | 19.4 | 0.2 | 1074 | 6 |
| **Hill region** | 286 | 286 | 286 | 286 | 286 | 286 |

**Table 3.52 Myanmar's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Coastal region** | 496 | -9 | 99 | 1 | 0.96 |
| **Central plain** | 355 | -21 | 99 | 1 | 0.94 |
| **Hill region** | 324 | -18 | 99 | 0 | 0.99 |

# [MNG] Mongolia

Mongolia only grows summer crops from May to September. The crops are normally harvested in September, but due to cold conditions (lower than 5.0°C) in May of last spring, the sowing and planting were delayed; therefore, harvest of last summer crops took place in October only. TEMP was near the fifteen-year average (+0.4°C) during this reporting season, and it was warmer (+3.0°C) than average at the beginning of November.

Nationwide, according to CropWatch agro-climatic indicators, the weather was humid and slightly cloudier (RAIN up +28% and RADPAR down -1%). The increased precipitation may benefit early sowing, in the primary agriculture regions of Selenge-Onon, Khangai-Khuvsgul, and Central and Eastern Steppe. The agro-climatic condition resulted in an increase in the BIOMSS index by 2% above the five-year average. The abundant rainfall will benefit the planting of spring crops.

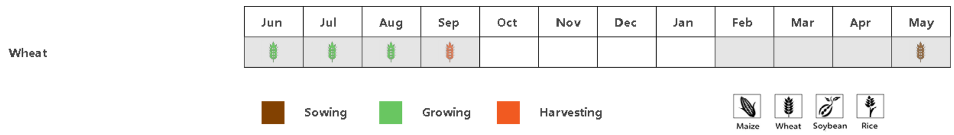
**Regional analysis**

The primary crop condition in the **Khangai Khuvsgul reegion** was higher than the five-year average in mid and late October and lower in November. Accumulated rainfall was above average (RAIN +33%). Compared to the average, TEMP was up by 0.6°C and RADPAR was down by 2%. The BIOMSS index increased by 1% compared to the fifteen-year average in this region.

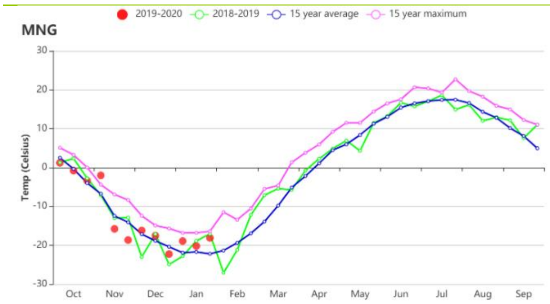
In the **Selenge-Onon region**, RAIN was up by 27%, while TEMP was average, and RADPAR was slightly lower (-2%). The BIOMSS index decreased by 2% of fifteen-year average. The agro-climate condition was almost average.

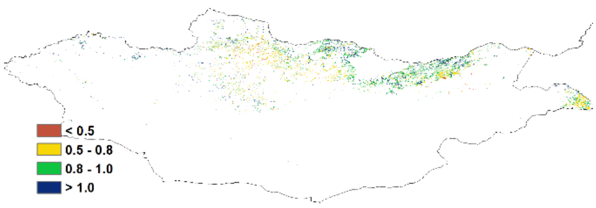
In the **Central and Eastern Steppe Region**, the meteorological variables were above average: RAIN +33% and TEMP +0.6°C. RADPAR increased slightly above average. BIOMSS (+7%) showed an above average potential biomass.

**Figure 3.31 Mongolia's crop condition, October 2019 - January 2020**

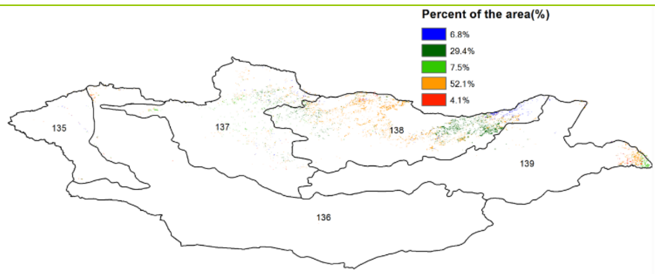


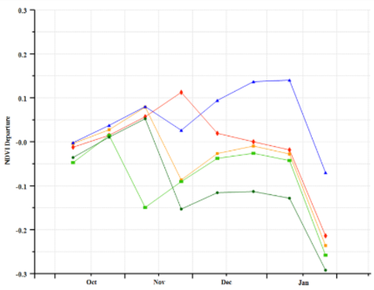

(a). Phenology of major crops



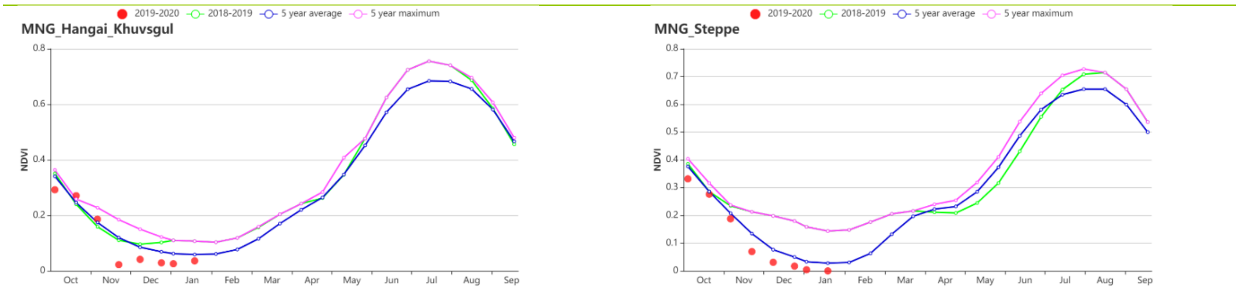




(b) Crop condition development graph based on NDVI (c) Maximum VCI

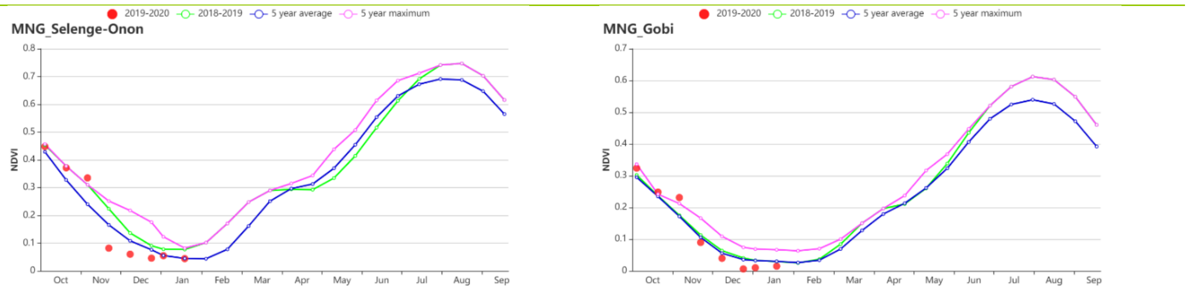


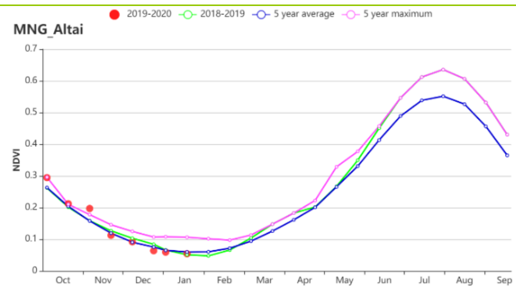

(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles




(f) Crop condition development graph based on NDVI (Hangai Khuvsgul Region (left) andSteppe Region (right))




(g) Crop condition development graph based on NDVI (Selenge-Onon Region (left) and Gobi Region (right))




(h) Crop condition development graph based on NDVI (Altai Region)

**Table 3.53 Mongolia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m²) | Departure from 15YA (%) |
| Hangai Khuvsgul Region | 55 | 33 | -13.9 | 0.6 | 454 | -2 |
| Selenge-Onon Region | 61 | 27 | -12.3 | 0.2 | 448 | -2 |
| Central and Eastern Steppe Region | 80 | 33 | -12.0 | 0.6 | 460 | 0 |
| Altai Region | 53 | -16 | -11.3 | 0.2 | 433 | 0 |
| Gobi Desert Region | 55 | 33 | -13.9 | 0.6 | 454 | -2 |

**Table 3.54 Mongolia's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m²) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Hangai Khuvsgul Region | 38 | 1 | 6 | 49 | 0.87 |
| Selenge-Onon Region | 42 | 2 | 38 | 107 | 0.87 |
| Central and Eastern Steppe Region | 48 | 7 | 13 | 52 | 0.78 |
| Altai Region | 40 | -10 | 3 | 950 | 1.25 |
| Gobi Desert Region | 32 | -19 | 24 | 620 | 1.24 |

# [MOZ] Mozambique

During the period between October 2019 and December 2019, farmers in Mozambique planted their maize, rice and wheat crops. This monitoring period, which lasts until the end of January, also covers the establishment and early growth phases of these crops. Low rainfall recorded in the southern region (in the provinces of Maputo, Gaza and Inhambane) has negatively impacted the crop conditions. However, in January, heavy rainfall was recorded in that region. Unlike the southern region, the central and northern regions of the country recorded favourable rainfall for crop establishment and development.

The CropWatch agroclimatic indicators reveal that during this period, rainfall, temperature and radiation were all above average (RAIN +12%, TEMP +0.3º and RADPAR +1%, respectively). Even so, the potential biomass was just close to average. CALF is 10% above 5YA, reaching 98%, indicating an increase in the total cropped area.

Nationwide, about average crop conditions were observed as indicated by the NDVI based crop development graph. The maximum VCIx recorded was 0.91 which also confirmed the favourable crop condition. Positive NDVI anomalies were verified in more than 30% of the cropped area, mostly concentrated in the provinces of Zambézia, Sofala, Nampula, Manica and northern Tete. About 19.1% of the cropped area recorded continuous unfavorable NDVI anomalies, mostly in southern Mozambique mainly due to the water shortage. The remaining areas showed mixed behaviors.

Overall, CropWatch assesses production potential at an above-average level in the 2019-2020 seasons.

**Regional analysis**

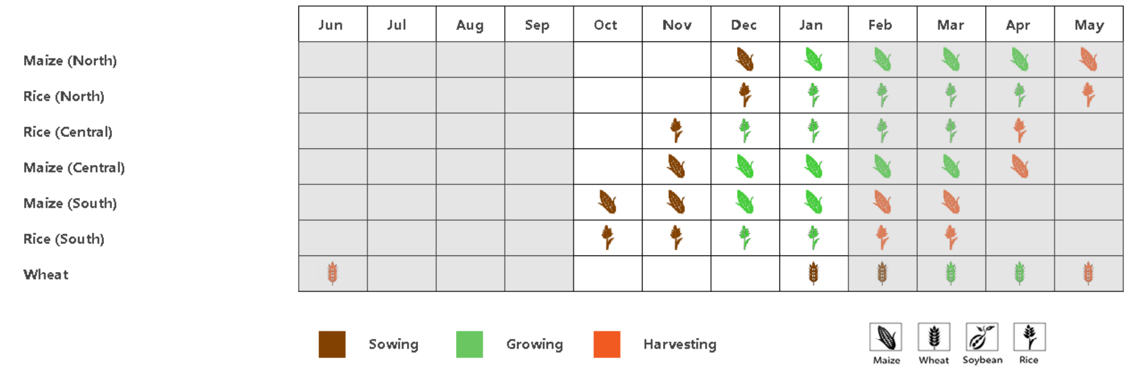
According to the cropping system, topography and climate, Mozambique is subdivided into five agro-ecological zones (AEZ): (1) Buzi Basin, (2) Northern High-altitude Areas, (3) Low Zambezi River Basin, (4) Northern Coast and (5) Southern Region.

The subregions development graphs based on the NDVI show that during the October 2019-January 2020 monitoring period, crop conditions were favourable in the Buzi Basin, Northern High-altitude Areas, Low Zambezi River Basin, and Northern Coast areas, while the Southern region experienced the unfavorable crop conditions throughout entire period compared to the five years average as a result of water shortage.

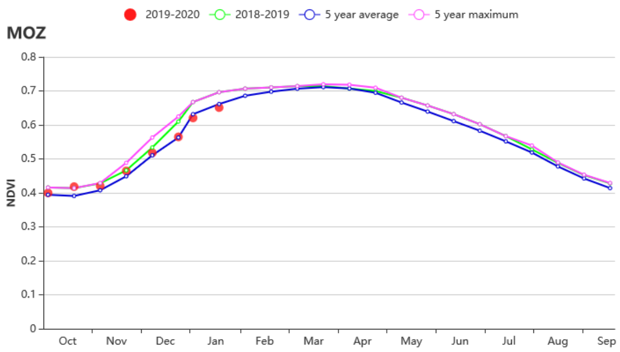
Except for the Southern region (rainfall at 331mm, 29% below average) and the Buzi Basin (near average), all other agro-ecological zones recorded positive rainfall departures of up to 42%. Significant deviations from average temperatures were observed in the Northern high-altitude areas (TEMP -1.5°C) and in the northern Coast (TEMP +1.2°C). Radiation was also lower in the Northern high-altitude areas (RADPAR -4%) and higher in the northern Coast (RADPAR +5%).

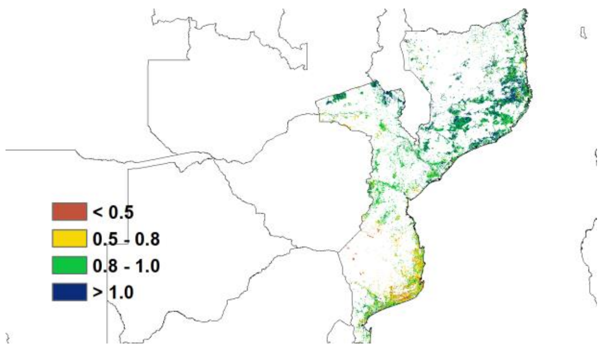
Despite the unfavorable crop conditions observed for the Southern region, an increase in Biomass by 3% was calculated. All other regions recorded a decrease in the biomass, especially in the Northern high-altitude areas, where the indicator decreased by 16%. CALF increased in all agroecological zones, having reached 100% in the Buzi Basin. The maximum VCIx was low in the Southern region, followed by the Buzi Basin, having respectively 0.75 and 0.89. Low VCIx in Southern region confirms the adverse weather conditions and their negative impacts on crops.

**Figure 3.32 Mozambique's crop condition, October 2019 - January 2020**



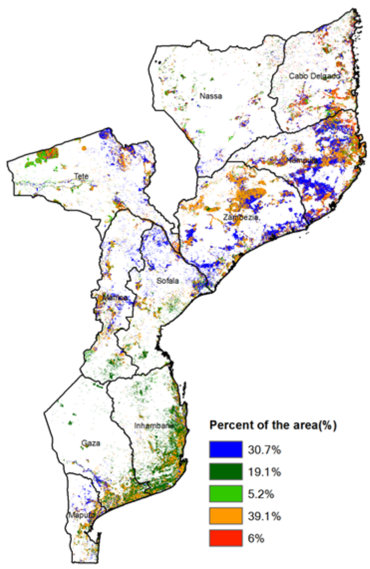

(a). Phenology of major crops

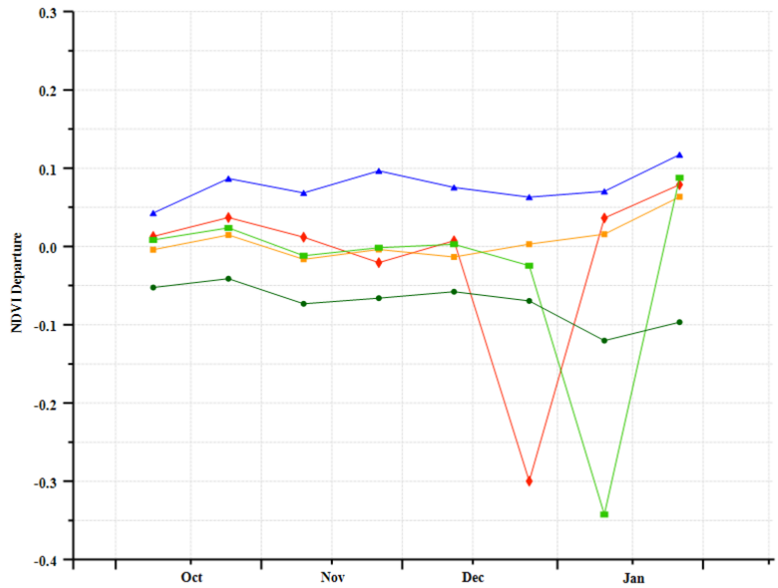



(b) Crop condition development graph based on NDVI

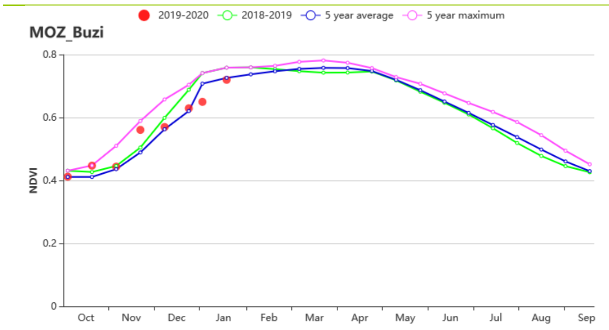
(c) Maximum VCI

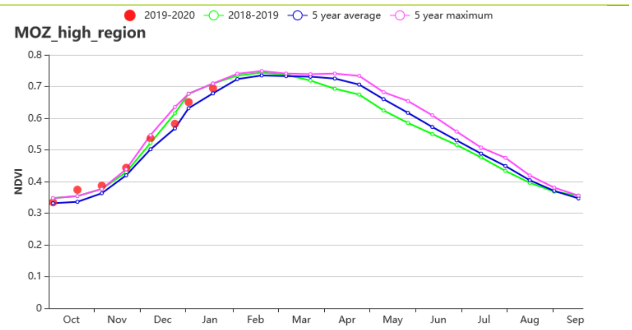


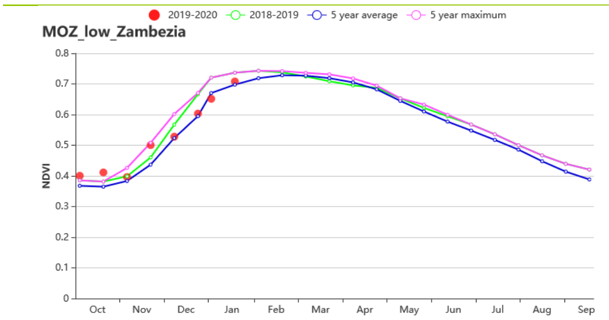

(d) Spatial NDVI patterns compared to 5YA

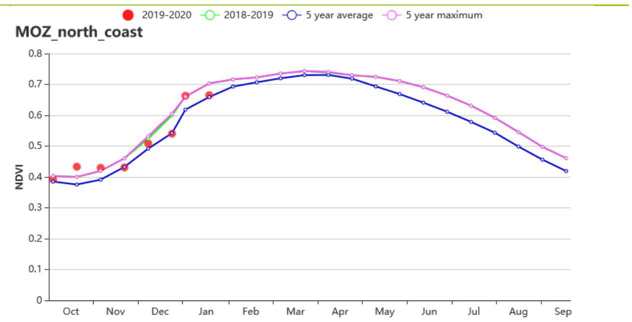
(e) NDVI profiles



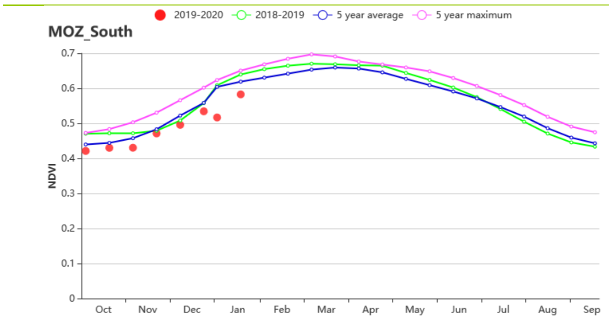



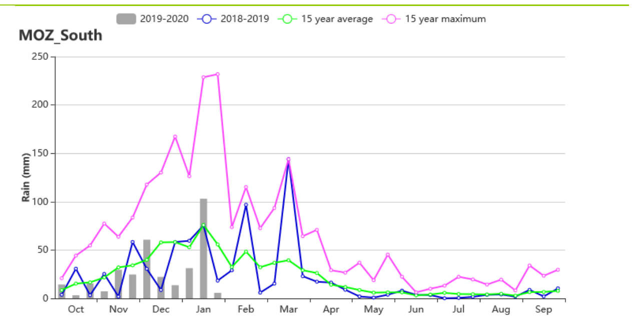

(f) Crop condition development graph based on NDVI- Buzi basin (g) Crop condition development graph based on NDVI- Northern high altitude areas



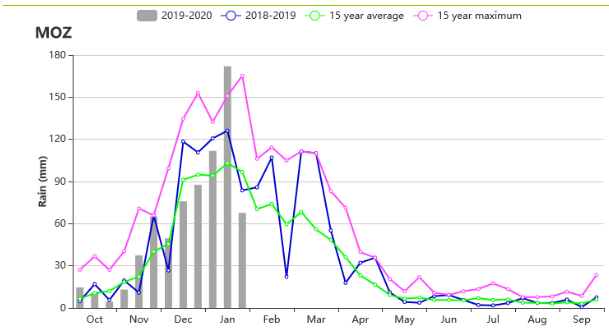



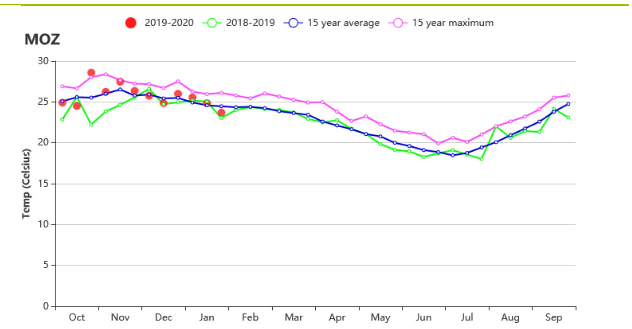

(h) Crop condition development graph based on NDVI- Lower Zambezi River basin (i) Crop condition development graph based on NDVI- Northern coast region




(j) Crop condition development graph based on NDVI- Southern region; (k) Southen region time-series rainfall profiles




(j) Rainfall index (k) Temperature index

**Table 3.55 Mozambique's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Buzi basin** | 730 | 0 | 23.9 | 0.4 | 1442 | 4 |
| **Northern high altitude areas** | 1148 | 42 | 22.5 | -1.5 | 1210 | -4 |
| **Low Zambezi River basin** | 740 | 8 | 26.0 | 0.1 | 1366 | 2 |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Northern coast | 736 | 18 | 27.1 | 1.2 | 1362 | 5 |
| Southern region | 331 | -29 | 26.3 | 0.7 | 1340 | 2 |

**Table 3.56 Mozambique's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Buzi basin | 909 | -1 | 100 | 5 | 0.89 |
| Northern high altitude areas | 680 | -16 | 99 | 8 | 0.95 |
| Low Zambezia River basin | 842 | -3 | 99 | 11 | 0.94 |
| Northern coast | 844 | -1 | 99 | 19 | 0.98 |
| Southern region | 899 | 3 | 94 | 3 | 0.75 |

# [NGA] Nigeria

The previous bulletin covered the period from July to October 2019, which was the harvesting period for main cereals, such as maize, wheat and rice, as well as the sowing period for second season maize. Cropping conditions were generally favorable in the different parts of the country.

Second season maize was the main crop in the fields during this reporting period (October to January). Harvest of the other crops, such as cassava in the south, groundnuts, soybean, sorghum and millet in the North was concluded by November. The conflict remains a big concern and continues to negatively impact food production and security in northern Sahel. Regarding agro-climatic indicators, the region received 282 mm of rainfall. This is an increase of 57% from the 15YA. Temperature (TEMP) was 24.6ºC (-0.4ºC) and radiation was 1216 MJ/m2. The observed maximum vegetation condition index (VCIx) was 0.98 and the Biomass production potential was 313 gDM/m2 (+10% of departure from 5YA).

From mid-October 2019, NDVI development graph and VCIx revealed above average crop conditions during the monitoring period across the country. Relatively better conditions, as compared to the average, were observed for the northern part. The NDVI spatial cluster indicates that only 10.9% of cropped land was below average. Generally, the crop conditions were favorable.

**Regional analysis**

Based on its cropping systems, topographic conditions and climatic zones, Nigeria is divided into four agro-ecological zones (AEZ): 1) Sudano-Sahelian zone in the north with the driest climate, 2) Guinean Savanna, 3) Derived Savanna in the center and 4) Humid forest zone in the south.

The **Sudano-Sahelian zone**, with its closeness to the Sahara desert, this is the driest AEZ. During this recent period, the average rainfall was 48 mm with a +276 % departure from the 15YA. The average temperature was 24.3ºC (-0.2ºC). 1211 (MJ/m2) of radiation was observed (-4%). The total estimated biomass production was 178 gDM/m2 with increase of 37%, and the CALF was 71% (+26 %). NDVI stayed above the average for the whole period.

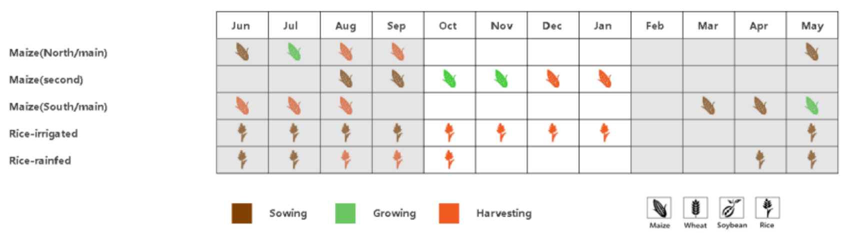
In the **Guinean Savanna**, the average precipitation was 148 mm with a 163 % of departure above the 15YA. The current temperature was 23.7 ºC (-4ºC) and the recorded radiation was 1250 MJ/m2 (-3.2%). The estimated biomass was 224 gDM/m2, a 9% decrease and CALF was 98%. The NDVI values were just above average in last four months and the maximum VCI for this region reached 0.96.

**Derived Savanna**, the transition zone between Guinean savanna and Humid forest zones, received 363 mm of rainfall, a +101% of departure compared to the 15YA. Average temperature was 24.8ºC (-0.5ºC), while the total radiation was 1213 (MJ/m2) (-2%).

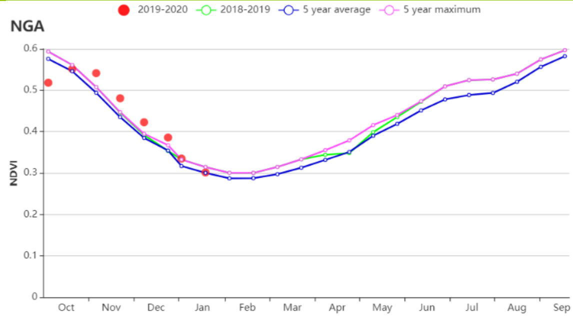
Due to decline of rainfall, the total biomass production was 410 gDM/m2 with a reduction by 22 % compared to the 5YA. The CALF was 99 % which is the same as the 5YA and maximum VCIx was 0.97. The NDVI values continued to be close to the 5YA until January.

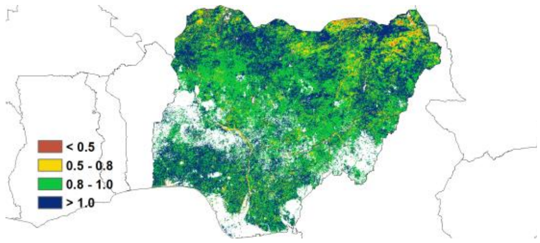
**Humid forest** AEZ, known for its high precipitation, recorded 623 mm (+7%). The temperature was 25.7 ºC (-0. 2ºC) and radiation (1166 MJ/m2) decreased (-0.2%). This might have caused a reduced estimate of biomass production (646 gDM/m2) (-10%). CALF and VCI continued to be high at 98% and 0.98 respectively. Trend in NDVI was below average during October but later in mid November went closer to the average.

**Figure 3.33 Nigeria's crop condition, October 2019 - January 2020**



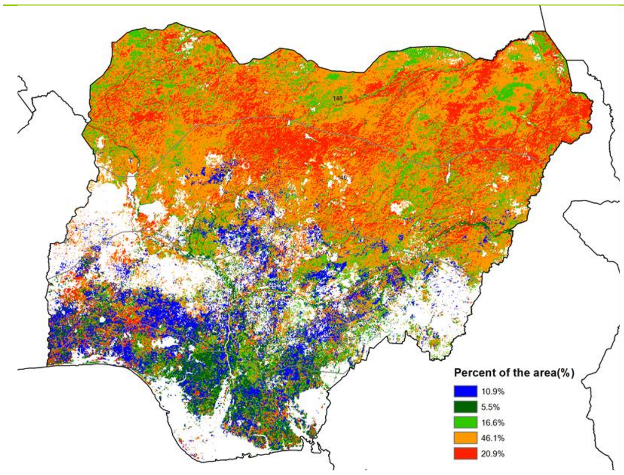
(a) Phenology of major crops

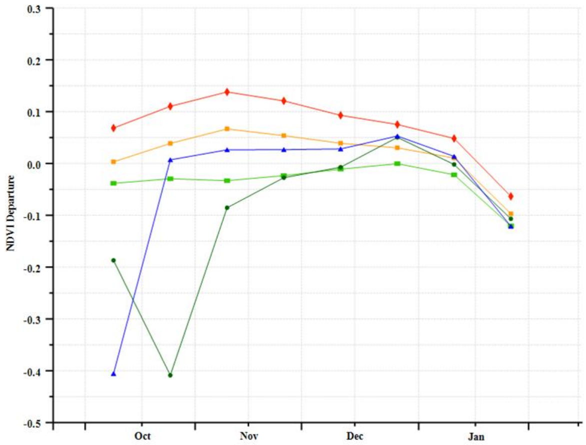



(b) Crop condition development graph based on NDVI

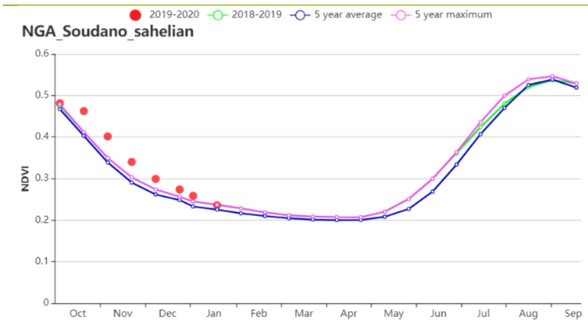
(c) Maximum VCI

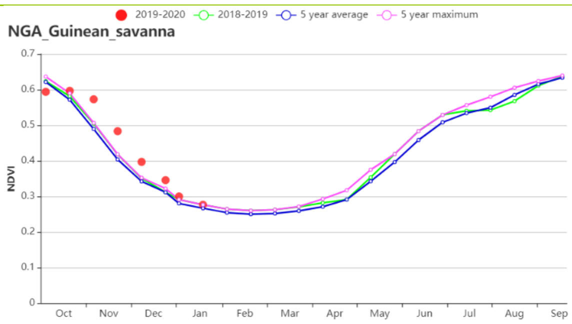


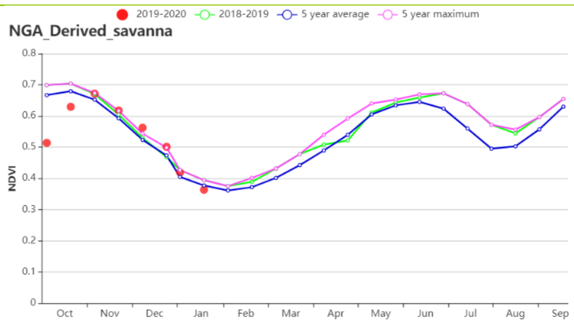

(d) Spatial NDVI patterns compared to 5YA

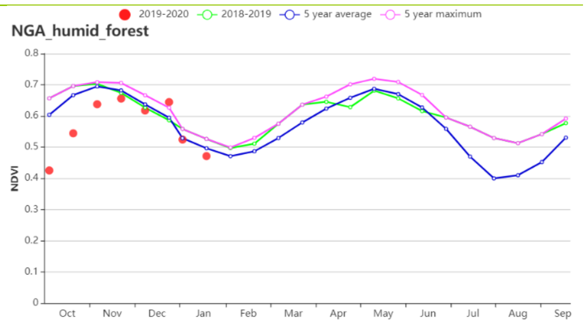
(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Soudano-sahelian region (left) and Derived savanna zone region (right))




(g) Crop condition development graph based on NDVI (Humid forest zone region (left) and Guinean savanna region (right))

**Table 3.57 Nigeria's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Soudano-Sahelian zone** | 48 | 276 | 24.3 | -0.2 | 1211 | -4 |
| **Derived savanna zone** | 363 | 101 | 24.8 | -0.5 | 1213 | -2 |
| **Humid forest zone** | 623 | 7 | 25.7 | -0.2 | 1166 | -0.2 |
| **Guinean savanna** | 148 | 163 | 23.7 | -0.4 | 1250 | -3 |

**Table 3.58 Nigeria's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMASS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Soudano-sahelian zone** | 178 | 37 | 71 | 26 | 0.98 |
| **Derived savanna zone** | 410 | -22 | 99 | 0 | 0.97 |
| **Humid forest zone** | 646 | -10 | 98 | 0 | 0.98 |
| **Guinean savanna** | 224 | -9 | 98 | 0 | 0.96 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA **PAK** PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [PAK] Pakistan

This period covers the harvest of maize and rice in October, as well as the subsequent planting and vegetative growth of wheat. Crop conditions were generally favorable from October to January.

Nationwide, RAIN (+149%) sharply increased, while TEMP (-1.3°C) and RADPAR (-8%) were lower as compared to the 15YA. Three agro-ecological regions had consistently excessive rainfall during this reporting period: The Lower Indus river basin in south Punjab and Sind (+518%), Northern Punjab (+318%) and Northern highlands (+78%) were above average. Correspondingly, less sunshine and lower temperature were observed in these zones. The combination of all the agro-climatic indicators resulted in BIOMSS exceeding the recent five-year average by 113%. These favorable agroclimatic conditions benefited the germination and early growth of winter wheat.

Crop conditions were above the maximum of the last five years starting in October, as shown by the NDVI development graph at the national level. Only 10% of the cropped areas were below average, mainly in north of Peshawar, west of Kohat and Bannu in Northern highlands zone, and some sporadically in Lower Indus river basin in south Punjab and Sind zone. According to the spatial NDVI patterns and profiles, most of the Punjab and the Indus river basin, the two major wheat producing areas, had above average NDVI throughout the period. The national average of VCIx (1.02) is above the maximum of the last five years. Winter wheat prospects are promising.

**Regional analysis**

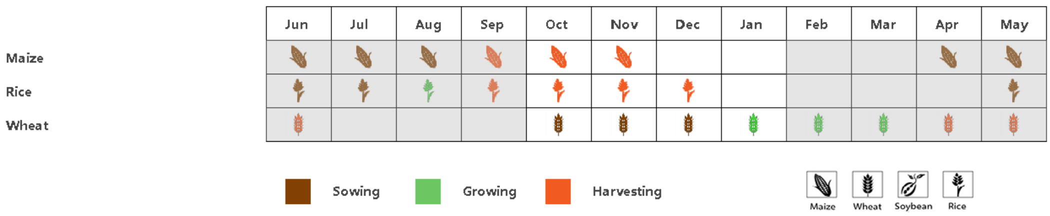
For a more detailed spatial analysis, CropWatch subdivides Pakistan into three agro-ecological regions based essentially on geography and agroclimatic conditions: the Lower Indus basin, the Northern highlands, and the Northern Punjab region.

RAIN in the **Northern highland** region was 78% above average. RADPAR (-4%) was lower and TEMP (+0.5°C) was higher. As a result, BIOMSS was 35% above average. The NDVI development graph showed above average crop conditions in this reporting period. VCIx with 1.02 indicated better conditions than in the previous five years. Planted area (CALF, 60%) was also high.

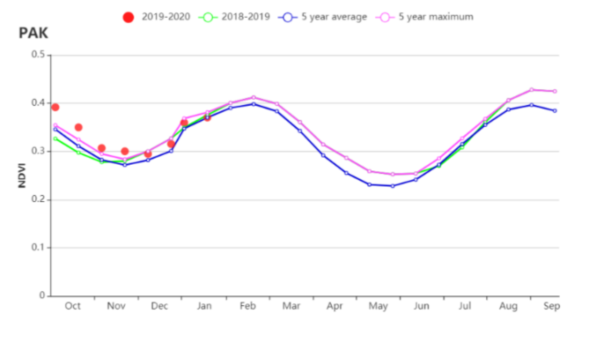
**Northern Punjab**, the main agricultural region in Pakistan recorded the above average RAIN (+318%). TEMP was below average by 1.8°C, and the RADPAR departure was -10%. The resulting BIOMSS exceeded the recent five-year average by 54%. Crop condition assessed through NDVI based crop development profiles showed high values in October. NDVI subsequently dropped to average in December and below average in January. The area had a good CALF of 87% (18% above last five years' average) and a VCIx of 0.96. Overall, the crop production potential for the region is deemed to be favorable.

In the **Lower Indus river basin in south Punjab and Sind**, RAIN was the highest among all regions, sharply above average (+518%), while TEMP was below average by 0.9°C and RADPAR was lower than average. BIOMSS was up by 212% as compared to the five-year average. In January, crop condition based on NDVI development profiles was close to average. The high CALF (75%) represented a large increase over the recent 5YA (+29%); VCIx at 1.03 indicated favorable crop condition. Overall, prospects are favorable.

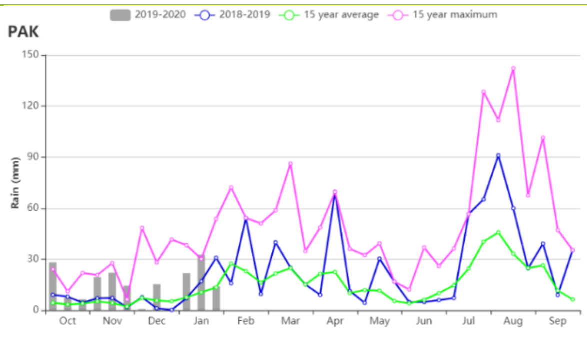
**Figure 3.34 Pakistan's crop condition, October 2019 - January 2020**



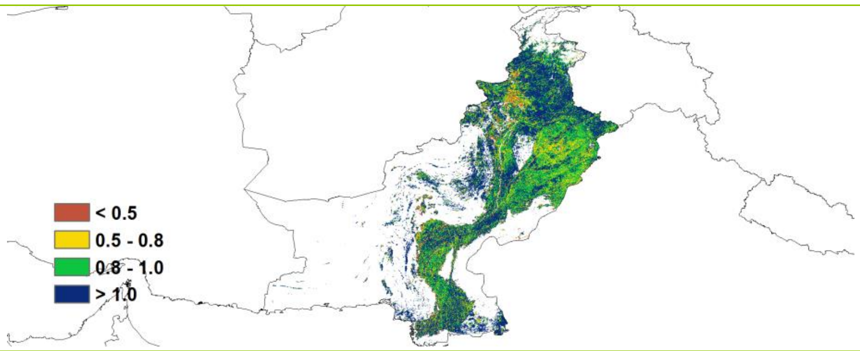

(a). Phenology of major crops



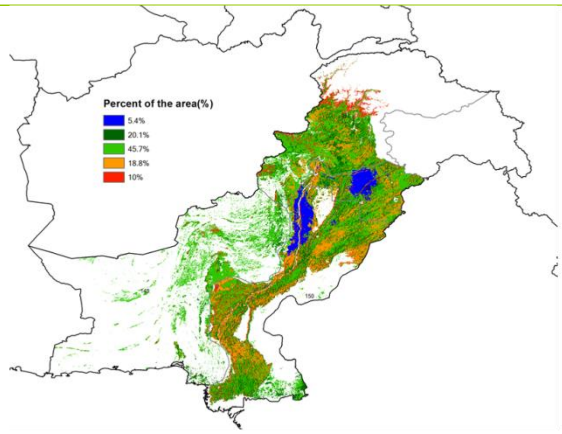

(b) Crop condition development graph based on NDVI



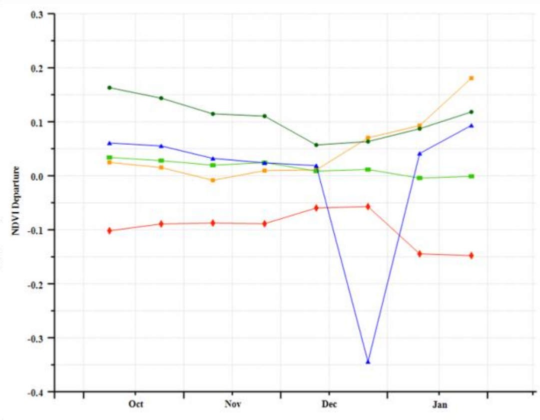

(c) Time series rainfall profile



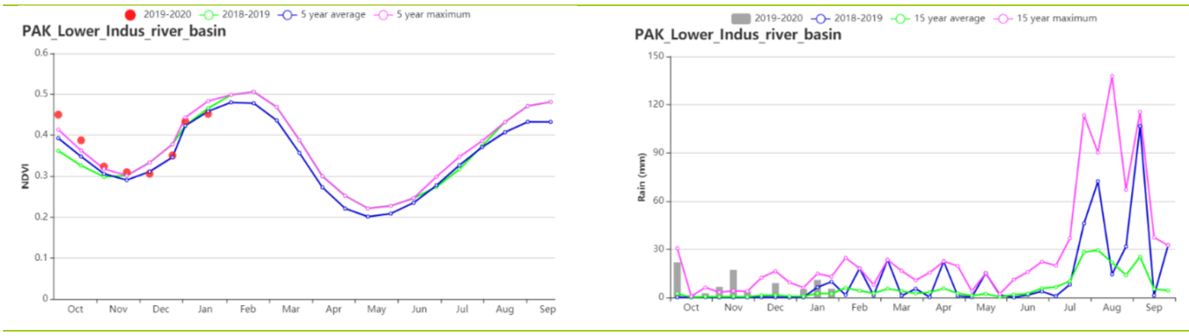

(d) Maximum VCI



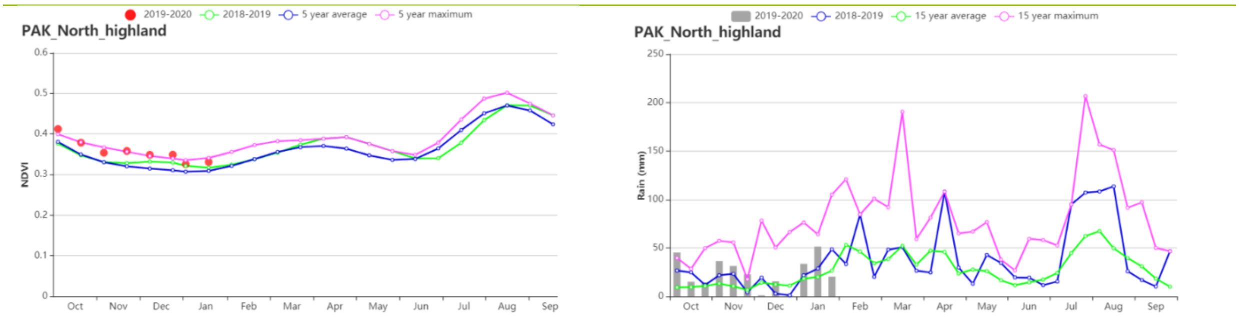

(e) Spatial NDVI patterns compared to 5YA



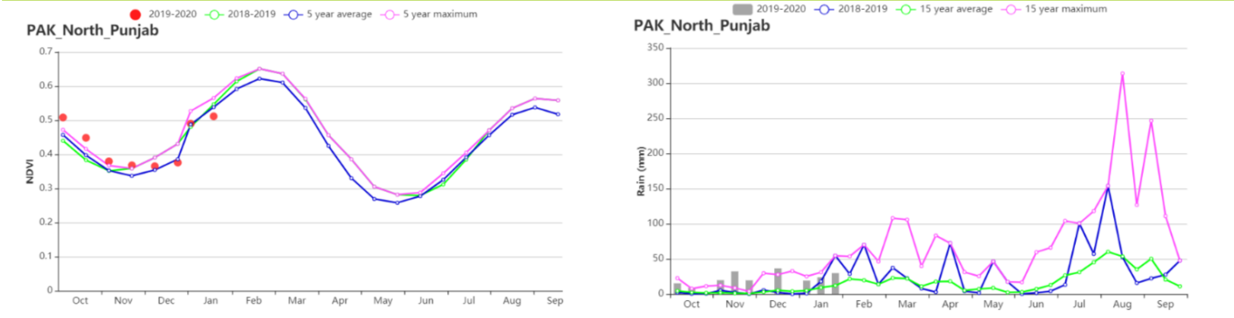

(f) NDVI profiles




(g) Crop condition development graph based on NDVI and time series rainfall profile (Lower Indus river basin in south Punjab and Sind)




(h) Crop condition development graph based on NDVI and time series rainfall profile (Northern highlands)




(i) Crop condition development graph based on NDVI and time series rainfall profile (Northern Punjab)

**Table 3.59 Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m²) | Departure from 15YA (%) |
| Balochistan | 103 | 171 | 13.5 | -0.5 | 918 | -6 |
| Lower Indus river basin in south Punjab and Sind | 84 | 518 | 19.6 | -0.9 | 904 | -6 |
| Northern highlands | 288 | 78 | 8.3 | 0.5 | 716 | -11 |
| Northern Punjab | 204 | 318 | 15.4 | -1.8 | 754 | -10 |

**Table 3.60 Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m²) | Departure from 15YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Balochistan | 278 | 131 | 2 | 489 | 0.93 |
| Lower Indus river basin in south Punjab and Sind | 332 | 212 | 75 | 29 | 1.03 |
| Northern highlands | 209 | 35 | 57 | 60 | 1.12 |
| Northern Punjab | 299 | 54 | 87 | 18 | 0.96 |

# [PHL] Philippines

In the Philippines, the monitoring period covers the harvesting stage of last year's main rice, as well as the sowing stage of secondary rice and maize crops. According to the NDVI profiles for the country, the NDVI was slightly below average until early December, when it started to approach close to average values. Nationwide, precipitation (RAIN) presented a negative departure of 16% compared with average, accompained by above-average radiation (PADPAR +8%) and average temperature (TEMP +0°C). Altogether, the potential cumulative biomass was above average (BIOMASS +6%). According to the VCIx indicator (0.98), favorable crop condition prevailed. The cropped arable land fraction (CLAF) for the country was almost 100%.

Considering the spatial patterns of NDVI profiles, about 52.5% of the crop land, which mainly lies in the western coast of Luzon island, the west of Visayas island and the west of Mindanao island, presented an above-average NDVI during reporting period. A couple of negative outliers for NDVI were observed for November and January. These might be due to cloud cover or aftereffects of typhoons.

In spite of the below average rainfall, the other indicators are close to average and we therefore conclude that overall, crop conditions are favorable.

**Regional analysis**

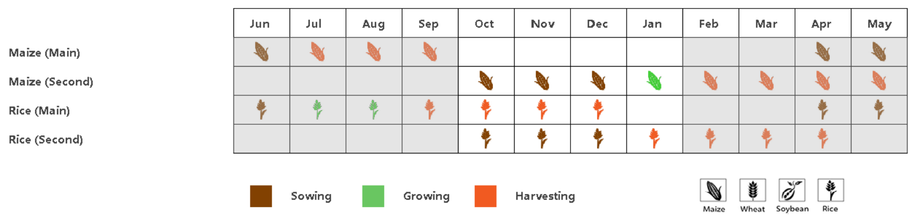
Based on cropping systems, climatic zones and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are the **Lowlands region** (northern islands), the **Hilly region** (Island of Bohol, Sebu and Negros), and the **Forest region** (mostly southern and western islands). All the regions have a stable (unchanged) cropped arable land fraction.

The **Lowlands region** experienced a rainfall deficit (RAIN -12%), average temperature (TEMP +0.0°C) and above average radiation (RADPAR +8%). According to the NDVI profiles for the region, crop condition was below the five-year average, especially in the early Novermber. However, BIOMSS was up 4% above average, with a VCIx of 0.98, which means a good crop condition.

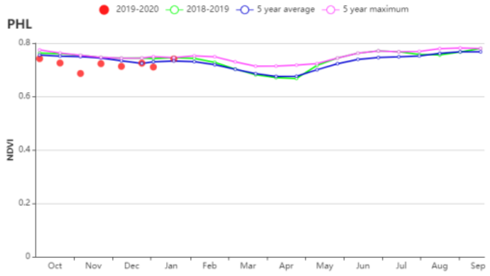
The **Negros and central Visayas Islands region** had a rainfall deficit (RAIN -7%), slightly above average temperatures (TEMP +0.2°C) and a departure of radiation (RADPAR +9%). As is shown by NDVI profile of this region, the NDVI was slightly below average before December 2019 and was above average after that time. Compared with the average, BIOMSS was up 10% above average with a VCIx of 1.00, showing a favorable crop condition.

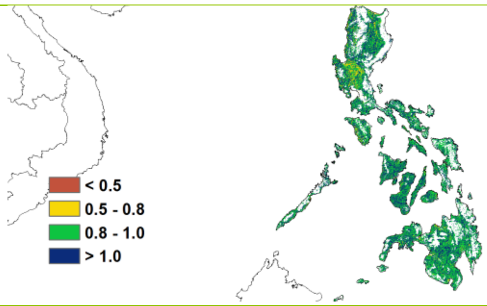
The **Forest region** experienced the largest rainfall deficit (RAIN -20%), slightly above average temperature (TEMP +0.1°C) and above average radiation (RADPAR +8%). According to the NDVI profiles, crop condition was near the five-year average, while BIOMSS was up 6% from average. Altogether, the VCIx for the region was 0.98, displaying a good crop condition.

**Figure 3.35 Philippines's crop condition, October 2019 - January 2020**

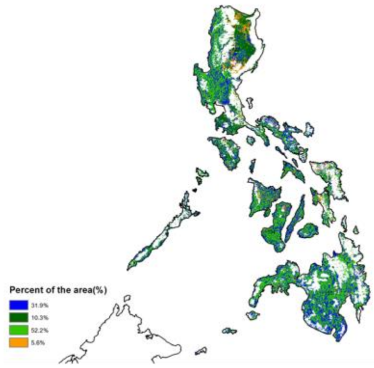


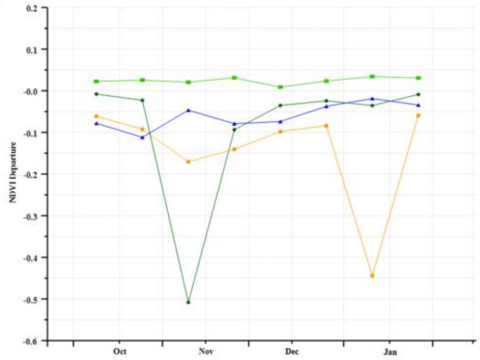

(a). Phenology of major crops



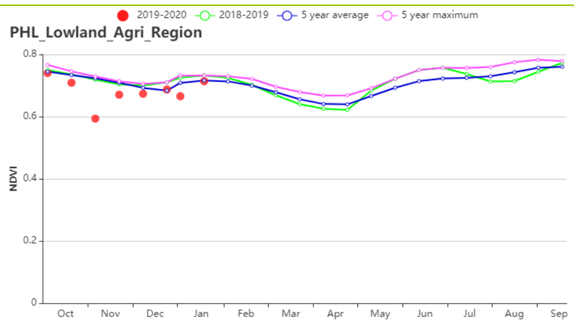



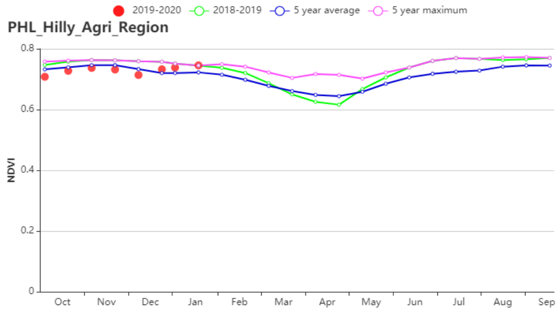

(b) Crop condition development graph based on NDVI (c) Maximum VCI



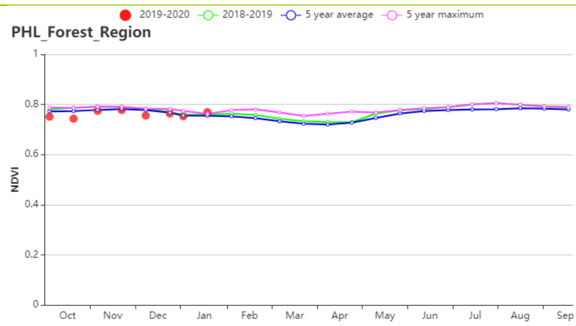




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles

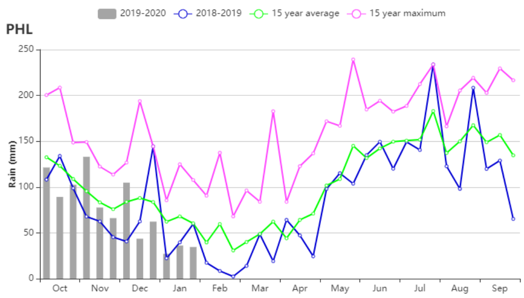


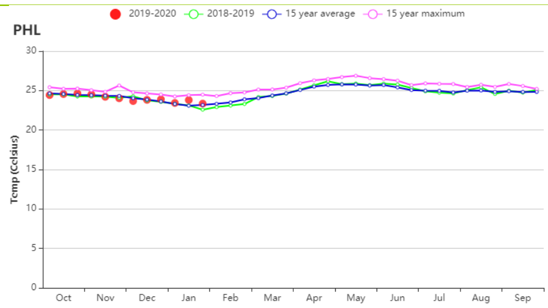




(f) Crop condition development graph based on NDVI (Northern lowlands of Mindanao to western Visayas region (left)，Negros and central Visayas Islands region (right))




(g) Crop condition development graph based on NDVI(Forest islands region)




(h)Rainfall index (i)Temperature index

**Table 3.61** Philippines's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Lowland region** | 769 | -12 | 23.6 | 0.0 | 1000 | 8 |
| **Hilly region** | 1123 | -7 | 26.0 | 0.2 | 1199 | 9 |
| **Forest region** | 1004 | -20 | 24.2 | 0.1 | 1155 | 8 |

**Table 3.62** Philippines's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Lowlands region** | 622 | 4 | 100 | 0 | 0.98 |
| **Hilly region** | 811 | 10 | 98 | 0 | 1.00 |
| **Forest region** | 755 | 6 | 100 | 0 | 0.98 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL **POL** ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

# [POL] Poland

In Poland, the period covers the harvest of maize and the sowing of winter wheat in October 2019, and the early growth stages of winter wheat. Due to significant higher temperature (+2.2°C), national NDVI was above the maximum of the last 5 years from late November 2019 to January 2020, despite of a low rainfall (-20%). In this monitoring period, the Cropped Arable Land Fraction (CALF) was close to average (100%) and VCIx was 1.02.

As shown by the crop condition development graph, sowing was concluded in October, mainly under favorable conditions. Temperatures and soil moisture conditions were favorable for early development of plants. However, temperature was close to the maximum of the last 15 years in December and significantly higher than average. This means that in Poland, crops are particularly vulnerable to frost damage in the event of a cold air intrusion. Furthermore, pest and disease pressure can be expected to be higher than usual following a mild winter. In addition, the drier than average weather mainly affected soil moisture and ground water replenishment, rather than having a direct impact on crops. The situation needs further monitoring.

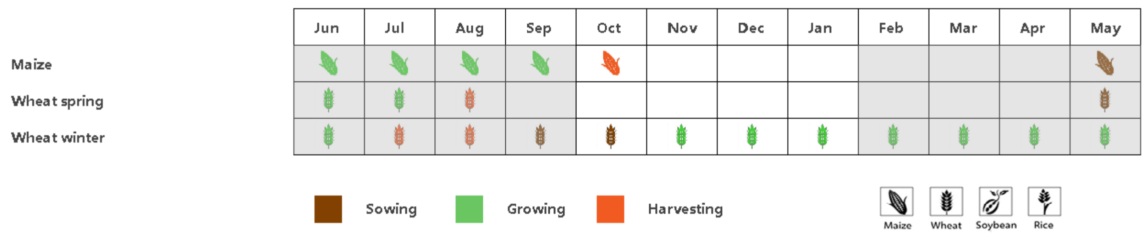
**Regional analysis**

Four agro-ecological zones (AEZ) are examined more closely below. They include the **Northern oats and potatoes area** (the northern half of: west Pomerania, eastern Pomerania and Warmia-Masuria), the **Northern-central wheat and sugar-beet area** (Kuyavia-Pomerania to the Baltic sea), the **Central rye and potatoes area** (Lubusz to South Podlaskie and northern Lublin), and the **Southern wheat and sugar-beet area** from southern Lower Silesia to southern Lublin and Subcarpathia along the Czech and Slovak borders. The listed administrative units correspond to voivodeships.

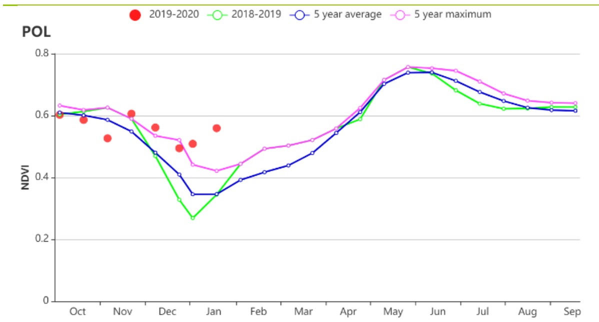
The **Northern oats and potatoes area** and the **Northern-central wheat and sugar-beet area** recorded both drier and warmer conditions compared to the average (RAIN -13% and -17%, TEMP +2.3°C and +2.2°C, respectively). RADPAR was below average in the two areas (-9% and -7%, respectively). The areas also had high CALF (100%) and VCIx (1.01 and 1.07). Crop conditions are satisfactory but need further monitoring.

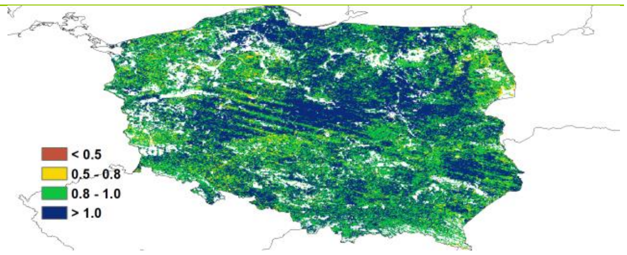
Different from above two regions, RADPAR in **Central rye and potatoes area** and the **Southern wheat and sugar-beet area** was above average (+3% and +10%, respectively). Meanwhile, weather in the two regions was both drier and warmer than average (RAIN -25% and -15%, TEMP +2.2°C and +2.1°C, respectively). High CALF and VCIx were observed for both. The crop conditions are assessed as good for this period.

**Figure 3.36 Poland's crop condition, October 2019 - January 2020**

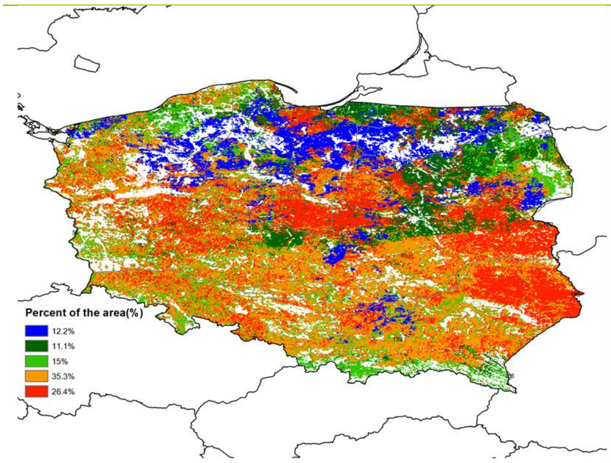


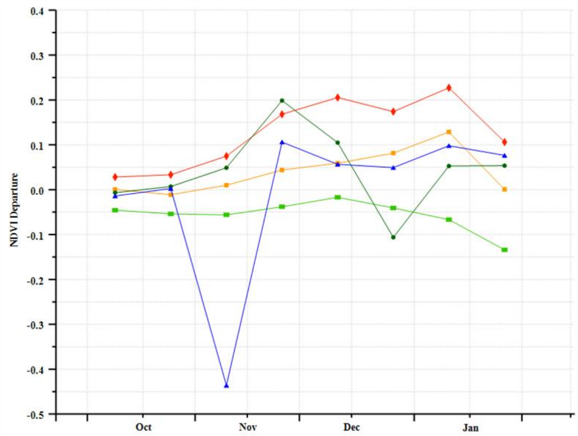

(a). Phenology of major crops



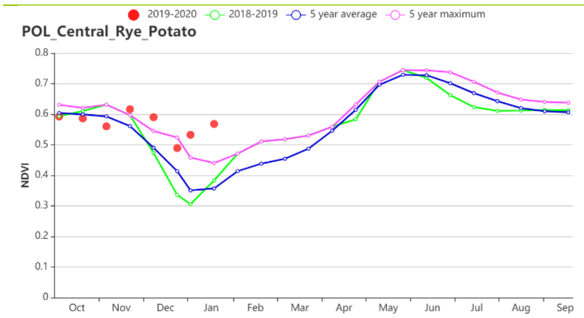



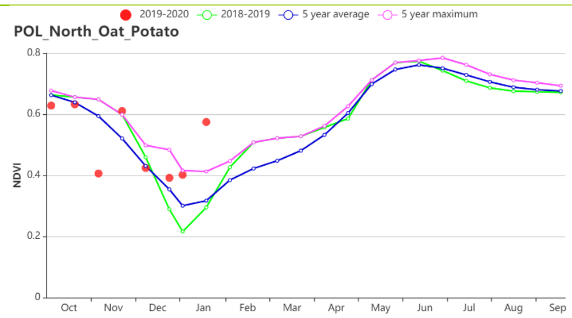

(b) Crop condition development graph based on NDVI (c) Maximum VCI



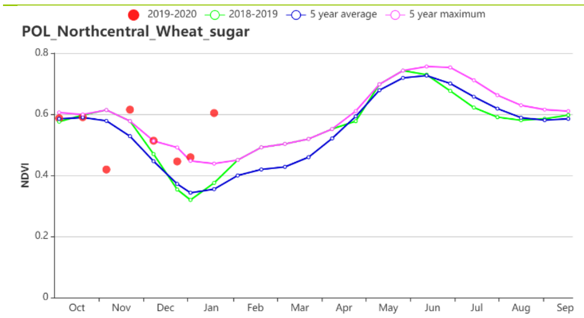



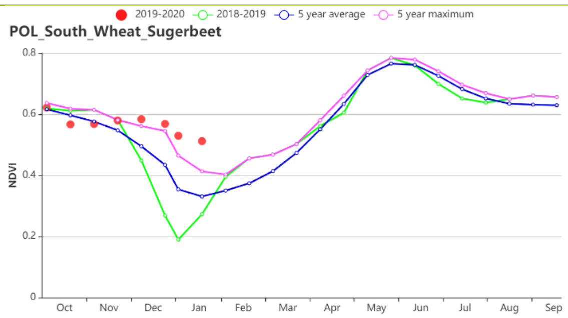

(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



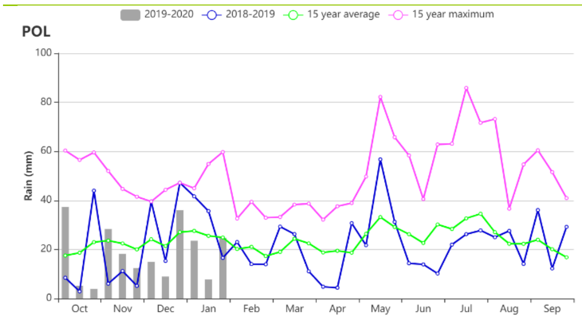




(f) Crop condition development graph based on NDVI, Central rye and potatoes area (left) and Northern oats and potatoes area (right).

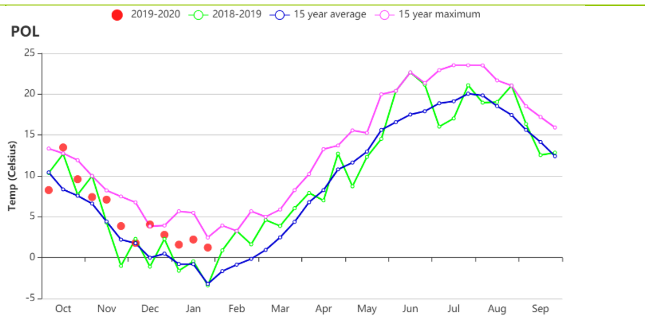



(g) Crop condition development graph based on NDVI, Northern-central wheat and sugar beet area (left) and Southern wheat and sugar beet area (right).




(h) Rainfall index




(i) Temperature Index

**Table 3.63 Poland's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Central rye and potatoes area | 276 | -13 | 5.3 | 2.3 | 152 | -9 |
| Northern oats and potatoes areas | 232 | -17 | 5.6 | 2.2 | 169 | -7 |
| Northern-central wheat and sugarbeet area | 205 | -25 | 5.6 | 2.2 | 205 | 3 |
| Southern wheat and sugarbeet area | 222 | -15 | 4.6 | 2.1 | 278 | 10 |

**Table 3.64 Poland's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Central rye and potatoes area | 37 | 4 | 100 | 0 | 1.01 |
| Northern oats and potatoes areas | 43 | 6 | 100 | 1 | 1.07 |
| Northern-central wheat and sugarbeet area | 52 | 19 | 100 | 1 | 1.03 |
| Southern wheat and sugarbeet area | 58 | 6 | 100 | 1 | 1.00 |

# [ROU] Romania

The reporting period includes the harvest of the 2019 maize crop and the planting of the 2019-2020 winter wheat, which started in September. Overall, crop conditions were favorable, yet the agroclimatic indicators fluctuated. Rainfall was 35% lower than average; TEMP, RADPAR and BIOMSS were higher by 2.1°C, 9% and 10%, respectively. The nationwide NDVI profile shows that crop conditions were below average in October, but then improved to above average. The temperature was higher than average and close to the 15 year maximum. Rainfall was lower than average during the reporting period. Higher temperatures provided a favorable environment for winter wheat while the decrease of rainfall could limit crop growth.

The NDVI profiles show that most of the eastern and southern areas experienced an increase in December. The increase of biomass shows that the crop condition was favorable for winter wheat.

**Regional analysis**

More spatial detail is provided below for three main agro-ecological zones: the **Central mixed farming and pasture Carpathian hills** (160), the **Eastern and southern maize, wheat and sugar beet plains** (161) and the **Western and central maize, wheat and sugar beet plateau** (162).

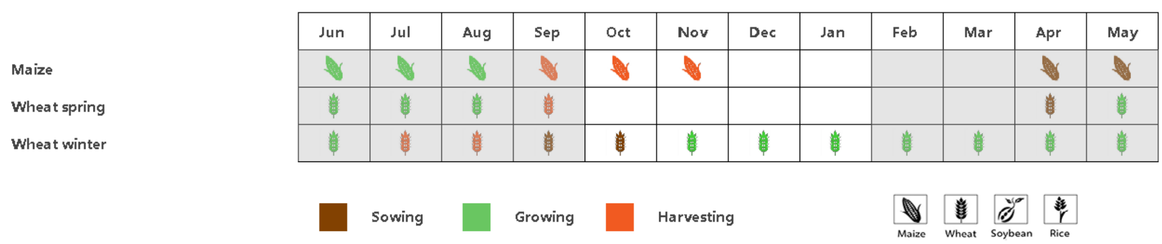
For the **Central mixed farming and pasture Carpathian hills**, compared to the 15YA, rainfall decreased by as much as 29%, while temperature and radiation were both up (TEMP +2.0℃ , RADPAR +9%) and BIOMSS increased by 9%. According to NDVI development, crop condition was better than average in December and January. The regional average VCI maximum was at 0.83. The NDVI spatial distribution shows that NDVI was fair throughout the reporting period. As the central mixed farming and pasture Carpathian hills occupies only a small fraction of cropland in Romania, this region's fair NDVI cannot represent much of Romania crop production.

For the E**astern and Southern maize, wheat and sugar beet plains**, rain decreased 40%, temperature increased 2.3℃, radiation increased 8% and biomass increased 10%. The NDVI development graph shows that crop condition was better than average after November. VCI max value of this region was 0.87 and according to the distribution map, VCI values were increasing in December in most of the central and middle region, especially in the southeast area of this sub-region (counties of Tulcea and Constanta), representing about 14.3% of the national cropland.

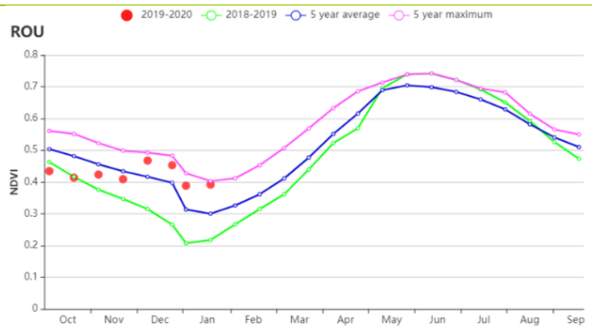
For the **Western and central maize, wheat and sugar beet plateau**, rainfall was lower than average by 34%, temperature and radiation were somewhat higher (TEMP +1.8℃, RADPAR +10%) and biomass increased 11%. Spatial NDVI profiles show that crop condition was higher than average in December and January and this could be due to the increase of temperature. Maximum VCI of this region was 0.80, a bit low and the spatial distribution was between 0.5 and 0.8. The spatial NDVI distribution shows that NDVI in most of this sub region has a small rising trend during October to December (green line).

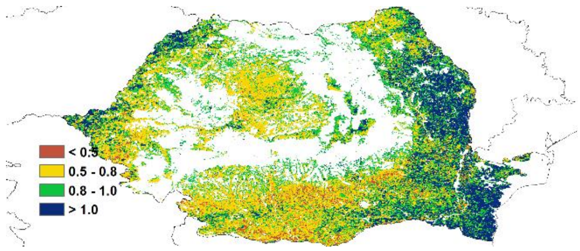
Overall, crop condition was fair in Romania during this reporting period due to the good temperature condition.

**Figure 3.37 Romania's crop condition, October 2019 - January 2020**

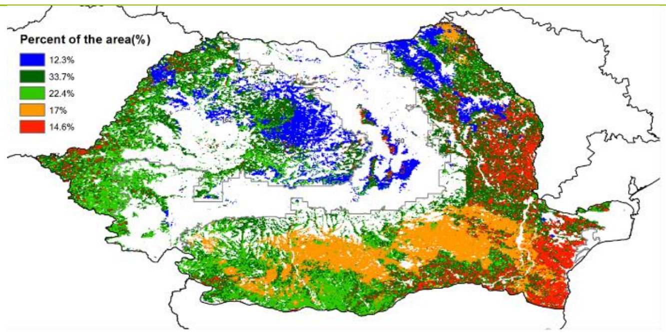


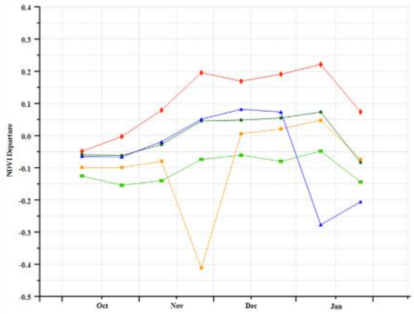

(a). Phenology of major crops



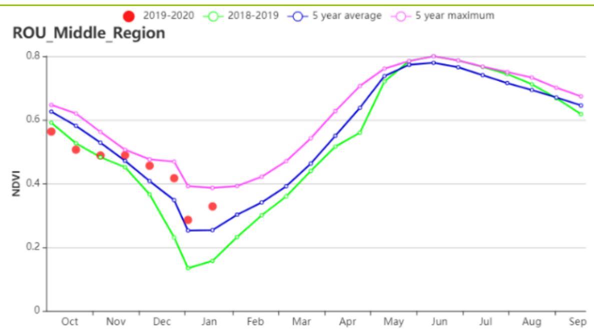



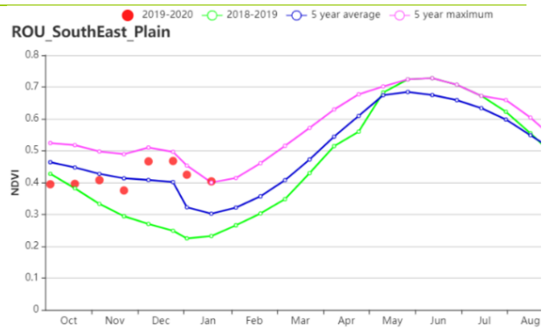

(b) Crop condition development graph based on NDVI (c) Maximum VCI



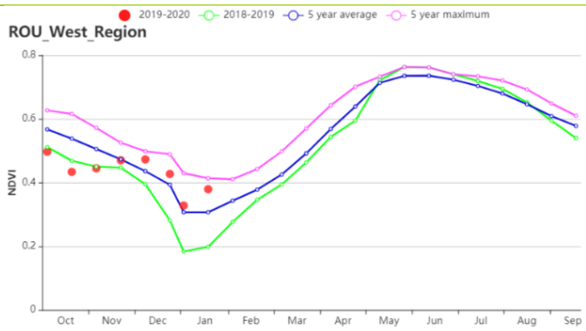




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles

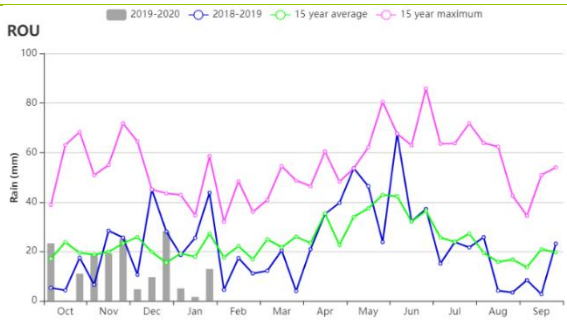


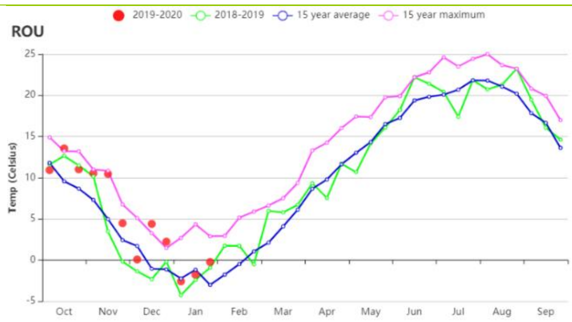




(f) Crop condition development graph based on NDVI (Central mixed farming and pasture Carpathian hills (left) and Eastern and southern maize, wheat and sugarbeet plains (right))




(g) Crop condition development graph based on NDVI (Western and central maize, wheat and sugar beet plateau)




(h) Rainfall index (i) Temperature index

**Table 3.65** Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Central mixed farming and pasture Carpathian hills | 196 | -29 | 3.4 | 2 | 408 | 9 |
| Eastern and southern maize, wheat and sugar beet plains | 142 | -40 | 6.3 | 2.3 | 417 | 8 |
| Western and central maize, wheat and sugar beet plateau | 165 | -34 | 4.8 | 1.8 | 406 | 10 |

**Table 3.66** Romania's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Central mixed farming and pasture Carpathian hills | 76 | 9 | 95 | -1 | 0.83 |
| Eastern and southern maize, wheat and sugar beet plains | 98 | 10 | 80 | 7 | 0.87 |
| Western and central maize, wheat and sugar beet plateau | 86 | 11 | 91 | 0 | 0.8 |

# [RUS] Russia

This monitoring period covers the sowing of winter crops (mainly winter wheat and barley) in October, followed by early vegetative growth and the subsequent dormant period.

At the national level, the data show that in October NDVI was below the 5-year average. But from the beginning of November to the end of January it was equal to the 5-year maximum.

Precipitation in October was higher than in previous year and just above the 15-year average. In November, it dropped below average, but recovered to similar levels as the 15YA starting from December.

The temperature in October was close to the 15-year maximum. Then in November it dropped below the 15-year average, but starting from December, it reached close to maximum levels observed over the last 15 years.

Main regions of winter crop production (Central and Central black soil regions, Northern and Southern Caucasus, Middle Volga) showed positive NDVI departure with VCI above 0.8.

Due to a very warm winter, NDVI values were reaching the 5-year maximum. However, the lack of snow cover caused some concern, since it increased the risk of frost damage. Overall, the crop conditions in Russia were favorable during the monitoring period.

**Regional analysis**

In South Caucasus the amount of precipitation was below the 15-year average by 37%. The temperature was 1.2°C higher than the 15-year average. RADPAR was 12% above 15-year average. As a result of warm weather, the biomass increased by 16% relative to the 5-year average. Cropped area was 36% above the 5-year average. The VCI was 0.93.

NDVI at the beginning of the period was equal to the 5-year average. In November it reached 5-year maximum and stayed at that level in December and January.

In **Northern Caucasus** precipitation decreased significantly (by 38% relative to the 15-year average). The temperature increased by 2.4°C compared to the 15-year average. RADPAR value was 13 % above to the 15-year average. Due to the increase in RADPAR and in temperature, biomass value increased by 32%. Cropped area was 59% above the 5-year average. The VCI was 0.95.

NDVI value in October exceeded the 5-year average, but did not reach a 5-year maximum. In early November, the NDVI reached a 5-year maximum, but before mid-December, it decreased and stayed between the 5-year average and the 5-year maximum. From mid-December to the end of the analyzed period, NDVI was significantly higher than the 5-year maximum.

In **Central Russia** the temperature increased by 3.6°C relative to the 15-year average, and the amount of precipitation decreased by 2%. RADPAR decreased by 19%. Decrease in RADPAR combined with lower precipitation resulted in biomass decrease by 4% as compared to the 5-year average.Cropped area was down by 3% compared the 5-year average. VCI index was 0.83.

At the beginning of the period, NDVI was below the 5-year average. But in mid-November, the NDVI exceeded the 5-year maximum. During December it was equal to the 5-year average and reached a 5-year maximum in January.

In **Central black soils region** the temperature in this period increased by 3.1°C compared to the 15-year average. Rainfall was 20% below 15-year average and RADPAR decreased by 4%. But the amount of biomass increased by 16%. Cropped area increased by 13% relative to the 5-year average. VCI was 0.90.

Throughout October, NDVI was below the 5-year average, but in November, it reached a 5-year maximum and by the middle of the month was well above that value. At the beginning of December, there was a sharp decline in NDVI value. It dropped below the 5-year average. But from mid-December to the end of this monitoring period, NDVI value was equal to the 5-year average.

In **Middle Volga region** temperature and rainfall increased by 2.8°C and 4% as compared to the 15YA. But RADPAR value decreased by 8%. Biomass increased by 9% compared to 5-year average. Cropped area was 23% above the 5-year average. VCI was 0.87.

For most of the period from October to November, NDVI was equal to the 5-year maximum. Then it dropped and became equal to the 5-year average.

In **Ural and western Volga region** the amount of precipitation increased by 7% and the temperature was up by 2.3°C relative to the 15-year average. RADPAR was above the15-year average by 3%. Biomass increased by 26% compared to the 5-year average. Cropped area was 34% above the 5-year average. VCI was 0.83.

Between mid-November and January NDVI was at the 5-year average. In October and early February, it exceeded the 5-year average, but did not reach the 5-year maximum.

In **Western Siberia** rainfall increased by 21% and temperature increased by 2.6° C relative to the 15-year average. RADPAR decreased by 1%. Biomass increased by 17% relative to the 5-year average. Cropped area was 49% above the 5-year average. The VCI was 0.85.

Between October and December NDVI was equal to the 5-year average. An exception occurred in early November when the NDVI exceeded the 5-year maximum.

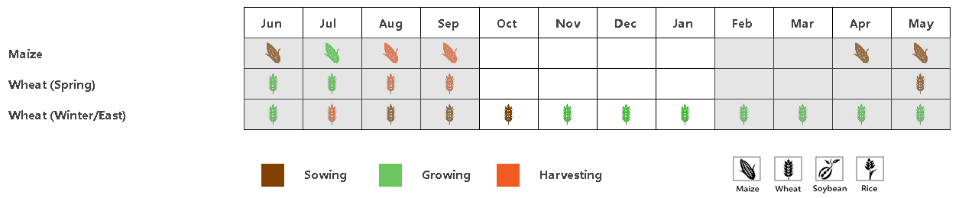
In **Middle Siberia** the amount of precipitation decreased by 5% relative to the 15-year average, while the temperature increased by 0.7°C. RADPAR increased by 2%. Biomass was by 9% above the 5-year average. Cropped area increased by 102% compared the 5-year average. VCI was 0.98.

In October NDVI exceeded the 5-year average and reached the 5-year maximum by the end of the month. From mid-November to mid-December, NDVI was below the 5-year average. But since mid-December, NDVI was equal to the 5-year average.

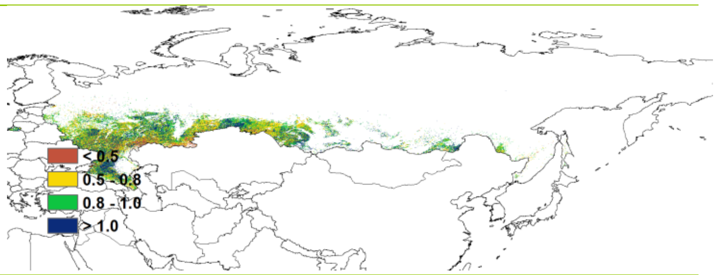
In **Eastern Siberia** the temperature increased by 0.5°C relative to the 15-year average, and the amount of precipitation decreased by 12 %. RADPAR increased by 4%. Biomass increased by 10% relative to the 5-year average. Cropped area was down by 9% as compared to the 5-year average. VCI was 0.78.

In the period from October to early November and from mid-November to the end of January, the NDVI was below the 5-year average and below last year's level. It touched the 5-year average only in early November.

**Figure 3.38 Russia's crop condition, October 2019 - January 2020**

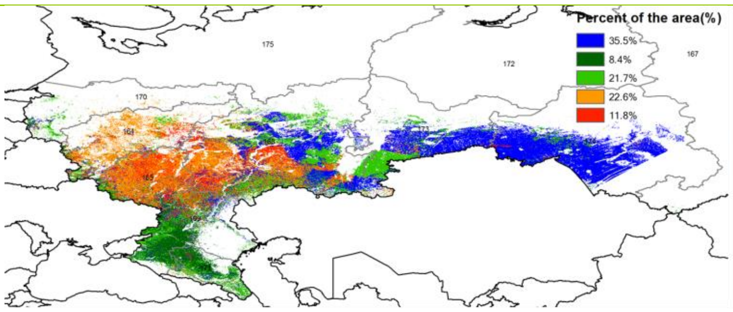


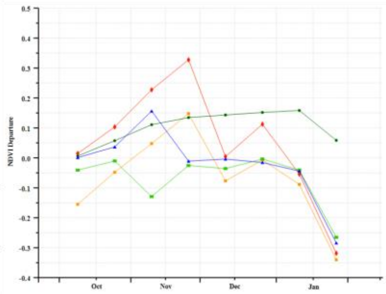

(a). Phenology of major crops




(b) Crop condition development graph based on NDVI

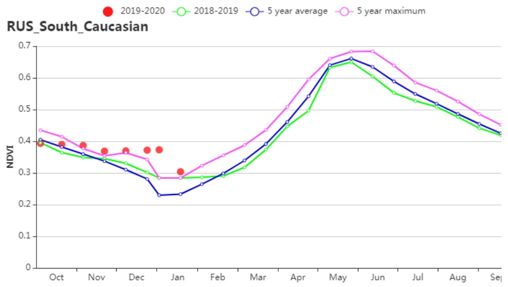
(c) Maximum VCI

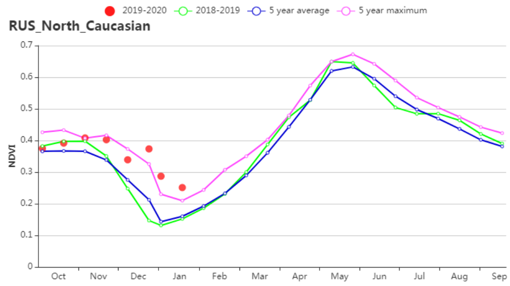


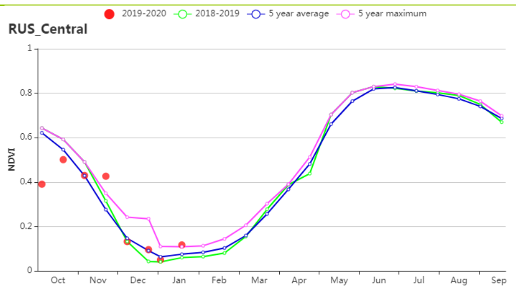

(d) Spatial NDVI patterns compared to 5YA

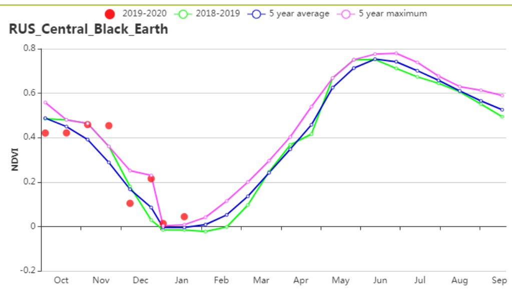
(e) NDVI profiles



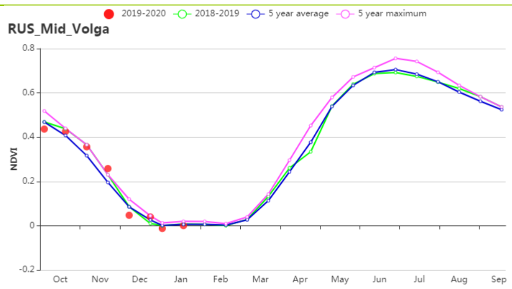



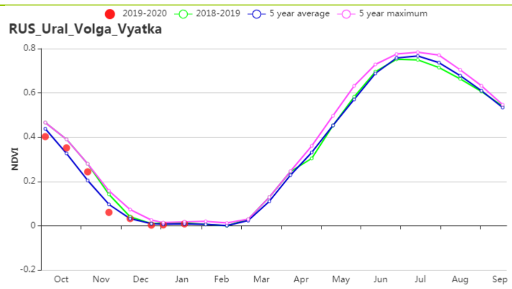

(f) Crop condition development graph based on NDVI (Southern Caucasus (left) and Northern Caucasus (right))



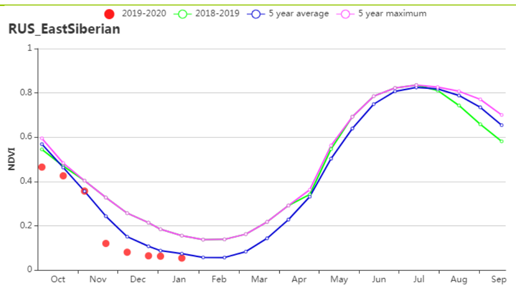



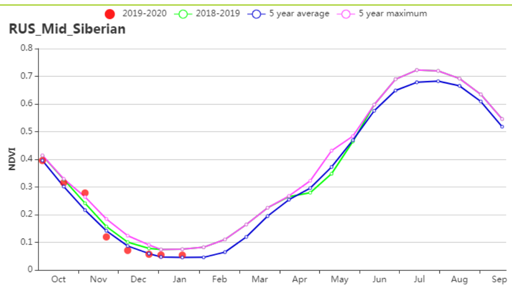

(g) Crop condition development graph based on NDVI (Central Russia (left) and Central black soils area (right))



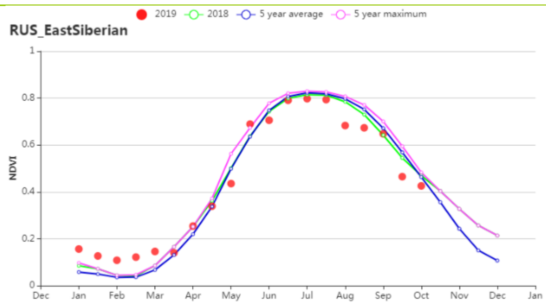




(h) Crop condition development graph based on NDVI (Middle Volga (left) and Ural and western Volga region (right))

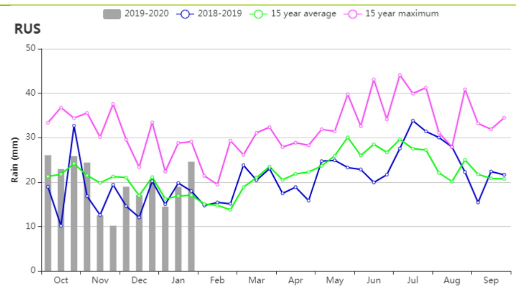


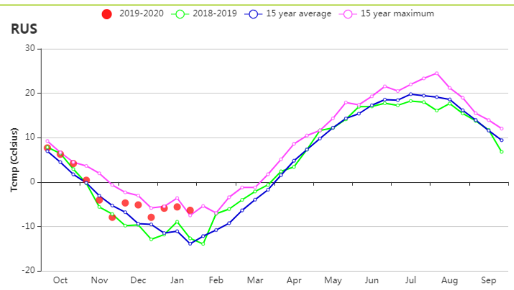

(i) Crop condition development graph based on NDVI in the Eastern Siberia (left) and the Middle Siberia (right)




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




(k) Rainfall index




(l) Temperature index

**Table 3.67 Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Central Russia | 297 | -2 | 1.6 | 3.6 | 107 | -19 |
| Central black soils area | 217 | -20 | 2 | 3.1 | 188 | -3 |
| Eastern Siberia | 191 | -12 | -9.7 | 0.5 | 363 | 4 |
| Middle Siberia | 119 | -5 | -11.7 | 0.7 | 319 | 2 |
| Middle Volga | 274 | 4 | -1.4 | 2.8 | 161 | -8 |
| Northern Caucasus | 160 | -38 | 4.7 | 2.4 | 366 | 13 |
| South Caucasian | 157 | -37 | 3.5 | 1.2 | 471 | 12 |
| Ural and western Volga region | 200 | 7 | -4.8 | 2.3 | 177 | 3 |
| Western Siberia | 268 | 21 | -5.7 | 2.6 | 206 | -1 |

**Table 3.68 Russia's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Central Russia | 21 | -4 | 96 | -3 | 0.83 |
| Central black soils area | 39 | 16 | 79 | 13 | 0.9 |
| Eastern Siberia | 43 | 10 | 85 | -9 | 0.78 |
| Middle Siberia | 31 | 8 | 53 | 102 | 0.98 |
| Middle Volga | 29 | 9 | 73 | 23 | 0.87 |
| Northern Caucasus | 90 | 32 | 63 | 59 | 0.95 |
| South Caucasian | 103 | 16 | 69 | 36 | 0.93 |
| Ural and western Volga region | 28 | 25 | 65 | 34 | 0.83 |
| Western Siberia | 30 | 17 | 49 | 24 | 0.85 |

# [THA] Thailand

This monitoring period covers the harvest of the main rice and the start of the second rice season. Temperature (TEMP +0.6℃) and radiation (RADPAR +10%) were above average, while the BIOMSS decreased 4%, due to low rainfall (RAIN, -43%). At the country level, crop conditions were slightly below the five-year average at the beginning of the monitoring period and kept gradually declining. NDVI departure profiles clustering shows that in 21.9% of the country crop condition was above average before mid-January. These patches mostly appear in the Central double and triple-cropped rice lowlands and Western and southern hill areas. In almost half of the cropped area, the situation was close to average before the end of October, but dropped to below average for the rest of the monitoring period. In 11.3% of cultivated area, the crop condition was below average at the start of the monitoring period but recovered to close to average by the end of January. Altogether, considering the favorable VCIx value of 0.90, the crop conditions are assessed as slightly below average.

**Regional analysis**

The regional analysis below focuses on some of the above mentioned agro-ecological zones. They include **Central double and triple-cropped rice lowlands** (176), **South-eastern horticulture area** (177), **Western and southern hill areas** (178), **Single-cropped rice north-eastern region** (179). The numbers correspond to the labels in the VCIx and NDVI profile maps.

Compared to average, **Central double and triple-cropped rice lowlands** experienced sunnier and drier conditions. Temperature (TEMP +0.8℃) and radiation (RADPAR +8%) were above average accompanied by lower rainfall (RAIN -45%). All of these led to an average estimate for BIOMSS (BIOMSS +1%). The NDVI development graph shows that crop condition was slightly below the five-year average. This is confirmed by a fair VCIx value of 0.86. Overall, the situation was close to average.

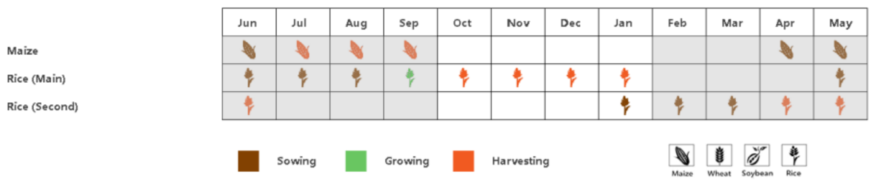
Indicators for the **South-eastern horticulture area** follow the same patterns as those for the **Central double and triple-cropped rice lowlands**: temperature (TEMP +0.5℃) and radiation (RADPAR 9%) were above average but accompanied with significantly lower rainfall (RAIN -46%), leading to an increase of biomass production potential (BIOMSS +8%). According to the NDVI development graph, however, the crop conditions were slightly below average during this monitoring period.

Crop conditions in the **Western and southern hills** were similar to other regions in the country: temperature (TEMP +0.3℃), and radiation (RADPAR +11%) were above average, while the BIOMSS decreased by 2% mainly due to the significantly lower rainfall (RAIN -35%). According to the NDVI development graph, crop conditions were below average. Overall, the situation was slightly below but close to average.

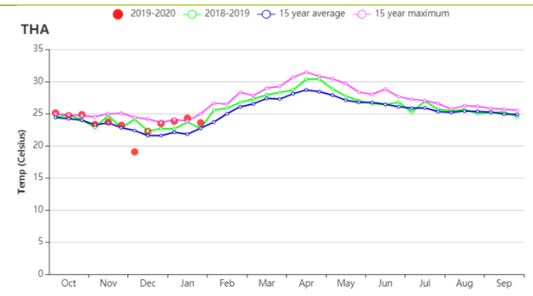
The rainfall in the **Single-cropped rice north-eastern region** suffered the highest decline (-62%) among all regions, while the temperature (TEMP +0.8°C) and radiation (RADPAR +11%) were above. BIOMSS (-12%) was estimated to be below average values, which was in agreement with below average NDVI values.

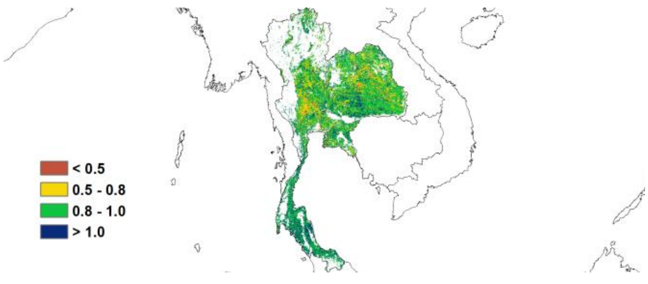
At the national level, most arable lands were cropped during the season and had favorable VCIx values around 0.90. CropWatch projections are that the crop conditions during this monitoring period were slightly below average.

**Figure 3.39 Thailand's crop condition, October 2019 - January 2020**



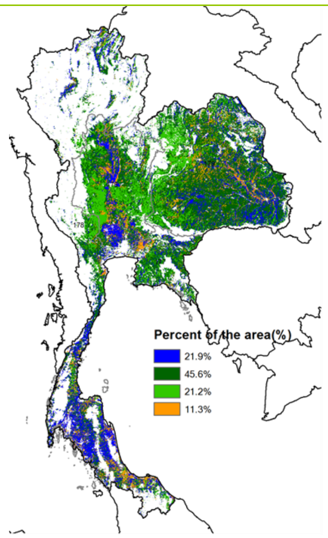

(a). Phenology of major crops

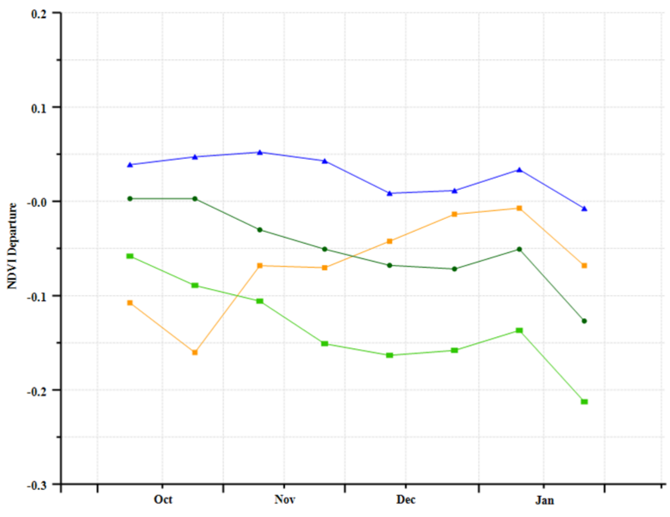



(b) Crop condition development graph based on NDVI

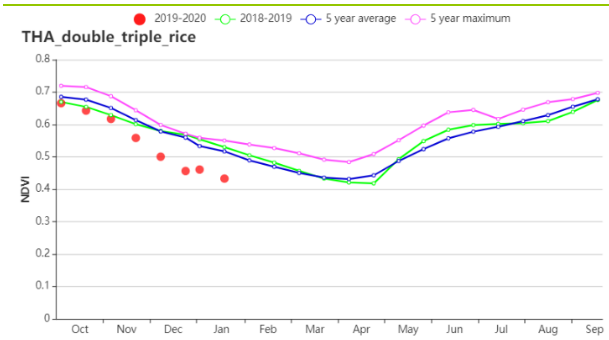
(c) Maximum VCI

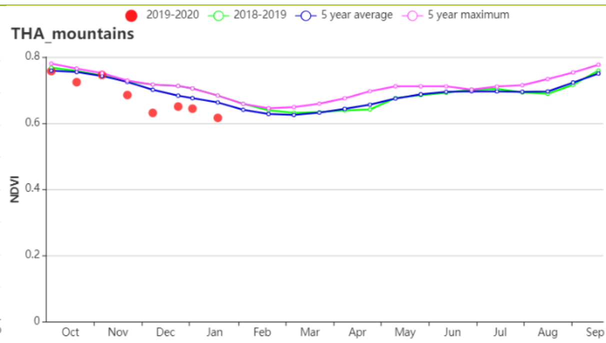


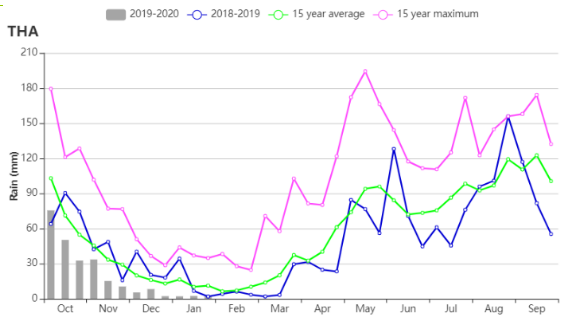

(d) Spatial NDVI patterns compared to 5YA

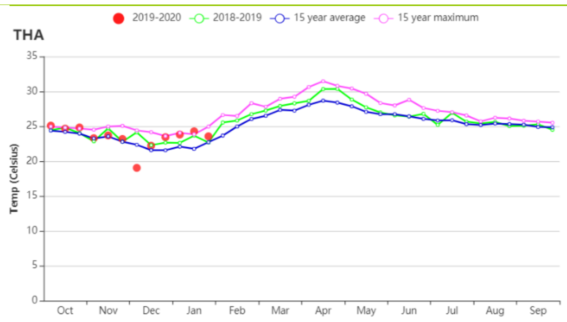
(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Central double and triple-cropped rice lowlands (left) and Western and southern hill areas (right))




(h) Rainfal profiles

(i) Temperature profiles

**Table 3.69 Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Central double and triple-cropped rice lowlands** | 203 | -45 | 24.4 | 0.8 | 1150 | 8 |
| **South-eastern horticulture area** | 201 | -46 | 25.4 | 0.5 | 1182 | 9 |
| **Western and southern hill areas** | 373 | -35 | 22.7 | 0.3 | 1189 | 11 |
| **Single-cropped rice north-eastern region** | 106 | -62 | 23.4 | 0.8 | 1155 | 11 |

**Table 3.70** **Thailand's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Central double and triple-cropped rice lowlands** | 554 | 1 | 99 | 0 | 0.86 |
| **South-eastern horticulture area** | 674 | 8 | 99 | 0 | 0.90 |
| **Western and southern hill areas** | 589 | -2 | 100 | 0 | 0.95 |
| **Single-cropped rice north-eastern region** | 513 | -12 | 100 | 0 | 0.88 |

# [TUR] Turkey

At the beginning of this reporting period, maize and rice harvests were reaching the completion, while winter wheat planting was in progress. NDVI was slightly lower than the five-year average during the monitoring period, execpt in late December and early January. Both temperature and radiation were above average (TEMP +1.2℃, RADPAR +4%), but rainfall was below average (RAIN, -14%). The resulting potential biomass was above average (BIOMSS, +9%). The cropped arable land fraction (CALF) increased by 3% and the maximum VCI (VCIx) was 0.74.

The spatial NDVI patterns almost exactly correspond with the spatial distribution of VCIx. NDVI was close to or slightly above average in 16.2% of the croplands, mostly in the lowlands along the Syrian border and the Mediterranean, and the western parts including the provinces of Edirne, Kirklareli, Takirdag, Balikesir, Manisa, Izmir, Aydin, and Mugla. On the contrary, NDVI was below the average during the whole monitoring period in 62.9% of the croplands marked in light green and orange. These areas are mainly located in the midwestern and mideastern parts including the provinces of Eskiselir, Afyon, Isparta, Erzurum, Mus, ingol, Konya, Ankara, Kirikkale, Kisrsehir, Nevsehir, Aksaray, K.Maras, Diyarbakir, Malatya, Elazig, and Bingol, indicating below optimal crop conditions. Crop conditions of winter crops largely depend on the timely water supply after winter period.

**Regional analysis**

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

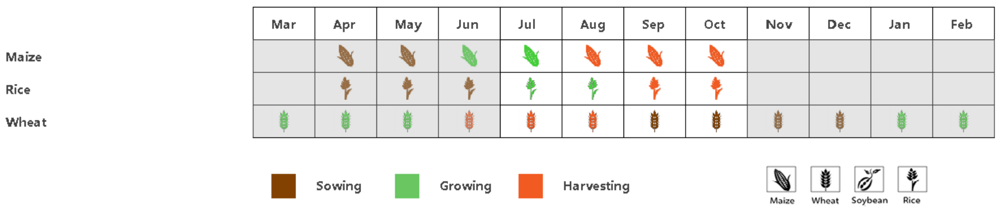
In the **Black Sea zone**, the NDVI was close to or slightly below average in October, early November, early December and late January, while the NDVI was above average in late November, late December, and early January. Radiation and temperature were well above average (RADPAR +6%, TEMP+ 1.4℃), and rainfall was below average (RAIN -15%), resulting in an average biomass. VCIx reached 0.94 and CALF was up 2%.

The **Central Anatolian region** had below average NDVI during the monitoring period except late December. Both radiation and temperature were above average (RADPAR +4%, TEMP+ 1.4℃), while rainfall was below average (RAIN, -16%). The potential biomass production was above average (BIOMSS +4%), and CALF decreased by 9%.

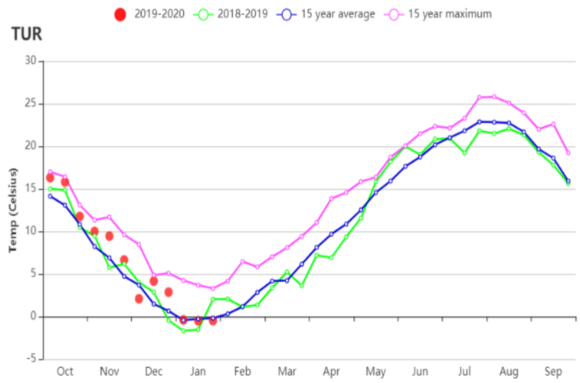
In the **Eastern Anatolian plateau**, the NDVI was below average from October to November, and then dropped to below 0.2 starting in December. This zone experienced the highest precipitation shortage among the four AEZs (RAIN -23%). Weather was relatively warm (TEMP +1.0℃) while sunshine was good (RADPAR +5%). Biomass was up slightly (BIOMSS +5%) mainly because of favorable temperatures. The cropped arable land fraction (CALF) was below average by 23%, indicating that the utilization rate of cultivated land is quite low.

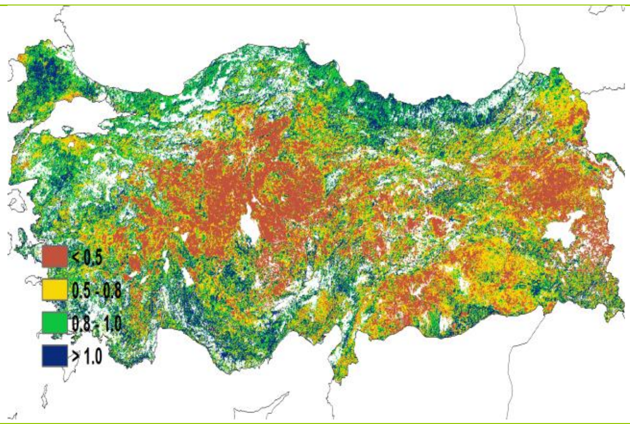
As shown by the NDVI profile in the **Marmara Aegean Mediterranean lowland zone**, the NDVI was very close to average during the whole monitoring period. The rainfall was below average (RAIN -7%) with the smallest decline relative to the average among the four AEZs, while the radiation and temperature were above the average (RADPAR +3%, TEMP+ 1.2℃). Both BIOMSS and the CALF were up compared with its respective average, by 14% and 13%. The VCIx was 0.86. Crop production prospects are estimated to be favorable.

**Figure 3.40 Turkey's crop condition, October 2019 - January 2020**



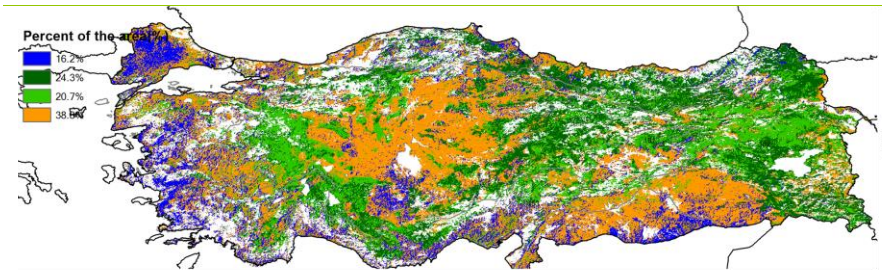
(a). Phenology of major crops

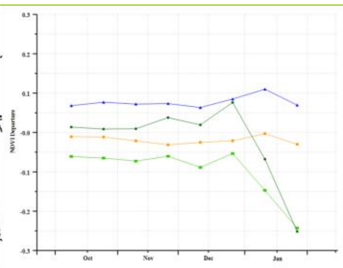



(b) Crop condition development graph based on NDVI

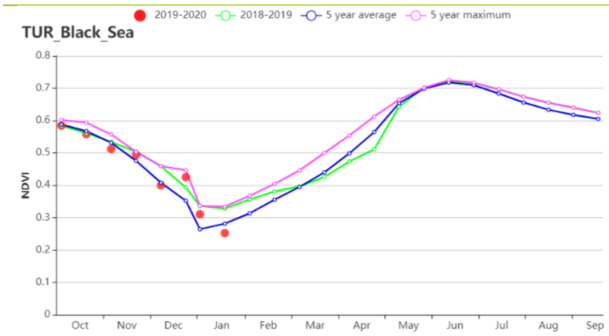
(c) Maximum VCI

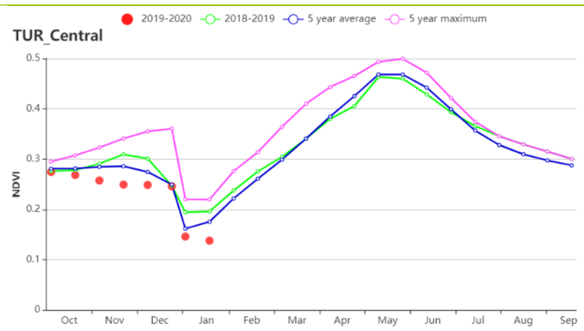


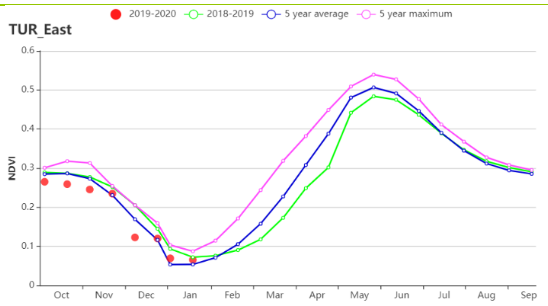
(d) Spatial NDVI patterns compared to 5YA

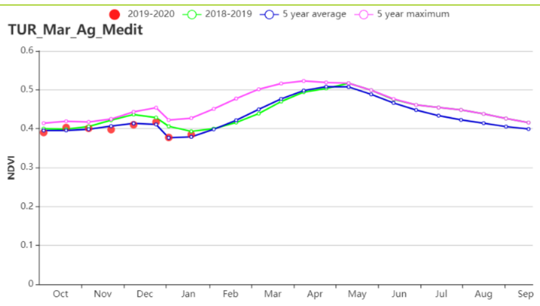
(e) NDVI profiles




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




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

**Table 3.71 Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Black Sea region** | 378 | -15 | 5 | 1.4 | 504 | 6 |
| **Central Anatolia region** | 217 | -16 | 5.5 | 1.4 | 604 | 4 |
| **Eastern Anatolia region** | 259 | -23 | 2.8 | 1 | 637 | 5 |

| Region | RAIN | | TEMP | | RADPAR | |
| --- | --- | --- | --- | --- | --- | --- |
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Marmara Agean Mediterranean lowland region | 382 | -7 | 10 | 1.2 | 605 | 3 |

**Table 3.72 Turkey's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
| --- | --- | --- | --- | --- | --- |
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Black Sea region | 115 | 0 | 79 | 2 | 0.94 |
| Central Anatolia region | 143 | 12 | 17 | -9 | 0.65 |
| Eastern Anatolia region | 111 | -3 | 12 | -23 | 0.67 |
| Marmara Agean Mediterranean lowland region | 185 | 14 | 64` | 13 | 0.86 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR **UKR** USA UZB VNM ZAF ZMB

# [UKR] Ukraine

The main Ukrainian grain crops are spring barley, winter wheat and maize. This monitoring period covers the harvest of maize in October and November, as well as the vegetative growth stages of winter wheat, which is planted in September and October.

The whole country experienced a much dryer and warmer fall-winter period than normal. Amount of rainfall was 34% below average and average temperature reached 4.6 °C, which was 2.6 °C higher as compared to the 15-year average. These conditions were favorable for maize harvest and sowing of winter wheat. The agronomic indicators correspondingly showed that potential biomass significantly increased by 26%, cropped arable land fraction (CALF) increased by 24% and maximum vegetation condition index (VCIx) reached 0.96. Noteworthy is a region with low VCIx concentrated around Cremea and Nykolayiv. The nation wide NDVI profile showed that the crop development surpassed the 5-year maximum starting in late December. In general, good prospects for winter wheat can be expected.

**Regional analysis**

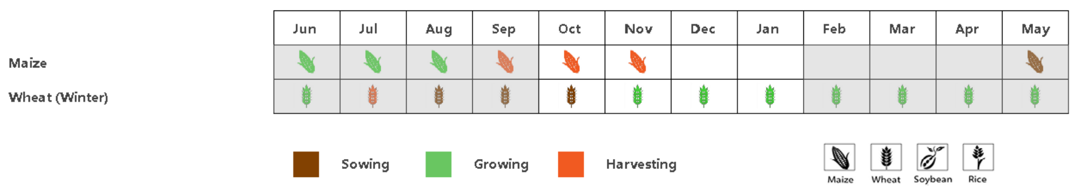
Based on cropping system, climatic zones and topographic conditions, regional analyses are provided below for four agro-ecological zones (AEZ), including the **Central wheat area**, **Northern wheat area**, **Eastern Carpathian hills**, and **Southern wheat and maize area**. The four AEZs shared generally similar patterns of crop development conditions in this period.

In agroclimatic aspects, all of the four AEZs recorded deficient rainfall ranging from -23% in **Eastern Carpathian hills** (Lviv, Zakarpattia and Ivano-Frankivsk oblasts) to -35 % in **Northern wheat area** (Rivne, Zhytomyr and Kiev oblasts), higher temperature ranging from + 2.3 to + 2.8°C and higher radiation from +7% to +9%, respectively.

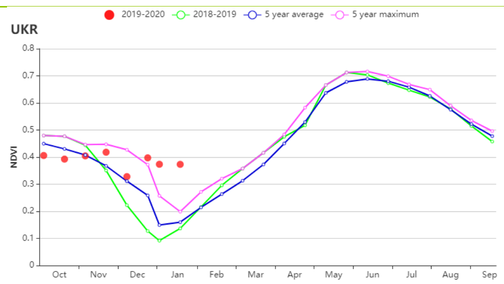
Agronomic indicators showed that the potential BIOMSS in the AEZs was up by 9 to 28% compared with the 5-year average; CALF in **Central wheat area** (Poltava, Cherkasy, Dnipropetrovsk and Kirovohrad Oblasts) and **Southern wheat and maize area** (Mykolaiv, Kherson and Zaporizhia oblasts) substantially increased by 33% and 73% respectively, with both regions reaching 71%. Maximum VCI in four AEZs were stable at high values above or around 0.9, except for the Cremea (0.8) and Nykolayiv (0.5).

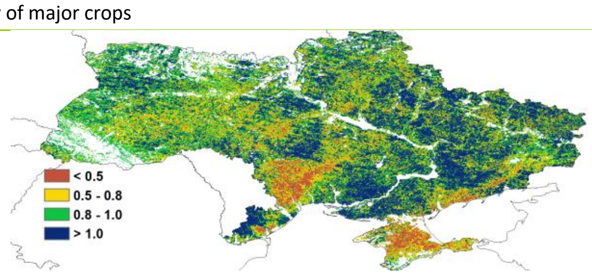
The NDVI development graph indicated that the crop condition in all AEZs experienced a below average situation in October, closed to average in November and then gradually improved to above average starting in December and surpassed the 5 year maximum in January.

**Figure 3.41 Ukraine's crop condition, October 2019 - January 2020**



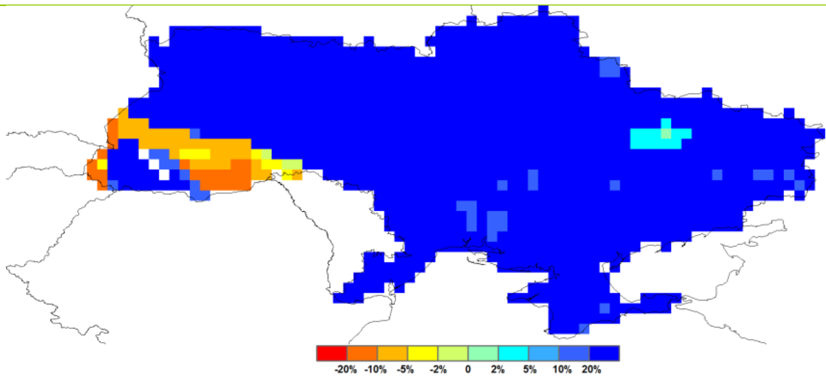

(a). Phenology of major crops



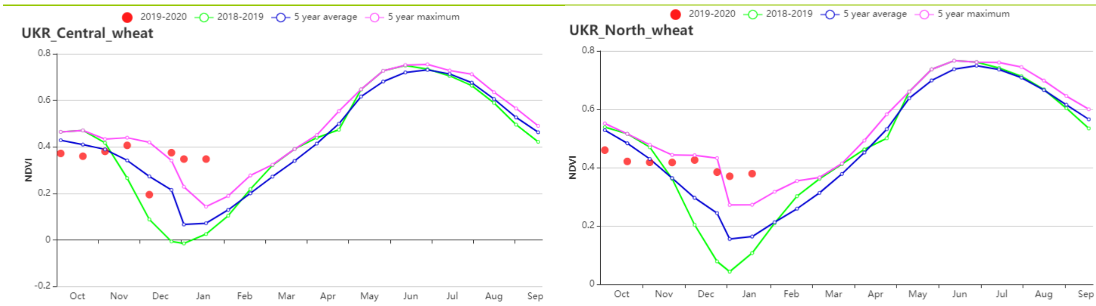




(b) Crop condition development graph based on NDVI

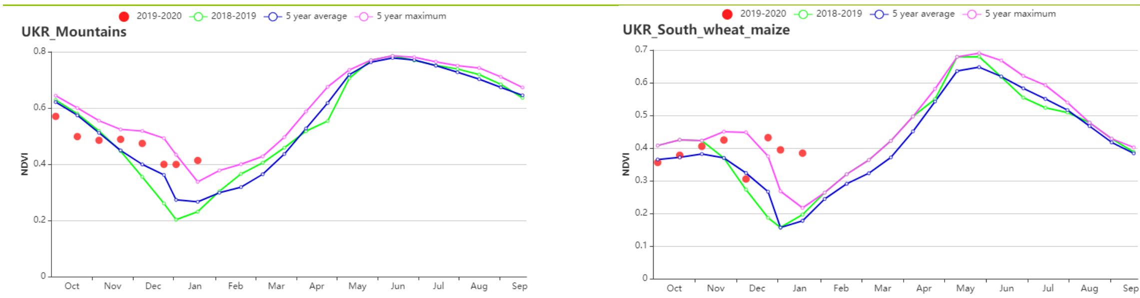
(c) Maximum VCI



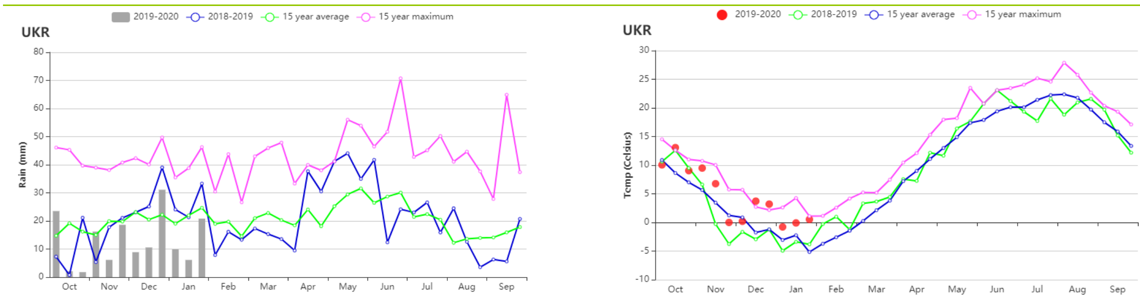

(d) Potential biomass departure from 5YA




(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 3.73 Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Central wheat area | 151 | -34 | 4.2 | 2.8 | 284 | 7 |
| Northern wheat area | 199 | -23 | 3.9 | 2.3 | 318 | 8 |
| Eastern Carpathian hills | 159 | -35 | 4.2 | 2.8 | 246 | 7 |
| Southern wheat and maize area | 140 | -37 | 5.2 | 2.4 | 338 | 9 |

**Table 3.74 Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Central wheat area | 68 | 27 | 71 | 33 | 1.00 |
| Northern wheat area | 64 | 9 | 96 | 0 | 0.89 |
| Eastern Carpathian hills | 58 | 28 | 85 | 3 | 0.94 |
| Southern wheat and maize area | 87 | 28 | 71 | 73 | 0.99 |

# [USA] United States

This monitoring period lasts from October, 2019 to January, 2020. It covers the late harvesting season of summer crops in 2019 and the sowing period of winter crops in 2020. In the last bulletin, growing situation of the 2019 summer crops had been reported. This analysis will focus on agroclimatic conditions and their potential impact on the 2020 winter crops. In general, the crop condition of winter wheat was mixed.

In this monitoring period, cloudy-rainy weather was sweeping through most parts of the United States. The precipitation was 18% above average, temperature was 0.1 ℃ below average, and RADPAR was 4% below average. In the key winter wheat production zones, significantly above average precipitation occurred in the southern Plains covering Kansas, Oklahoma, and Texas, and the precipitation was 19%, 66% and 9% above average respectively at state level. Abundant rainfall replenished soil moisture for growth of winter crops. In contrast, the other important winter crop zones of the United States, the Pacific Northwest and California received below average precipitation, including Washington (-4%), Oregon (-19%), Montana (-10%), Idaho (-13%) and California (-22%). Due to limited water demand in the early-growth stage and dormancy period, the shortage of precipitation has limited impact on growth of winter wheat in this reporting period.

The positive influence of agro-climatic condition on winter crops in the southern Plains was captured by the map of potential biomass departure, compared to the 15-year average. The potential biomass of the southern Plains was 10% to 20% above the average. Due to the deficit of precipitation, a negative potential biomass departure was widely observed in the northwest of United States and in California where the potential biomass was 20% below the average. The spatial pattern of NDVI departure clusters represented variations of crop condition. It is interesting to note that slightly below average crop conditions occurred in the southern Plains with better agro-climatic condition. This could be attributed to the uncropped land fraction during the current stage as shown on the cropped and uncropped arable land map. Due to the rainfall deficit, NDVI departures indicated that crop condtions in eastern Washington state deteriorated greatly. Although suffering precipitation shortage, the crop condition in California fluctuated up and down but was generally close to average due to irrigation.

In short, CropWatch estimated that the growth situation of winter wheat was acceptable in the southern Plains, while the situation of winter crops in the northwest and California should be watched in the next bulletin.

**Regional Analysis**

In this section, only the three agro-ecological zones (AEZs) dominated by winter crops were analyzed, they are the Southern Plains, Northwest, and California.

**1. Southern Plains**

As the top winter crop producing zone of United States, precipitation of the southern Plains was 25% above average, the temperature was 0.2 ℃ below, and RADPAR was 3% below average. The significant above average precipitation can replenish soil moisture and stimulate the growth of winter wheat after wintering period. Compared to the 5-year average, the fraction of cropped arable land was 4% below the average.

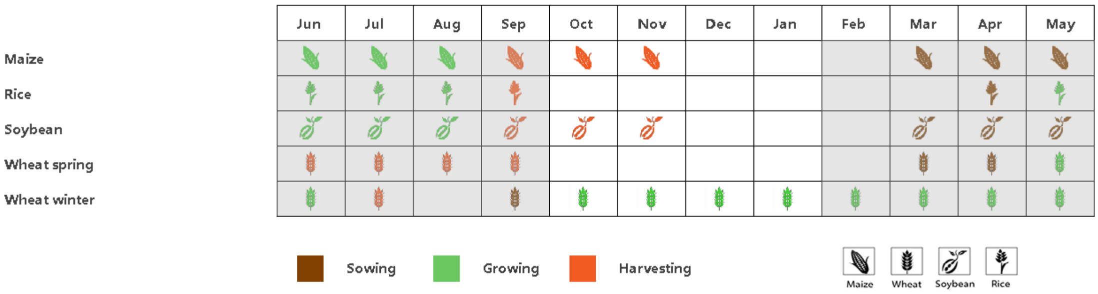
**2. Northwest**

In this monitoring period, the Northwest was short of precipitation. It was 13% below average compared to the 15-year average. Other agro-climatic indices were close to average, such as temperature (-0.4℃) and RADPAR (1%). Due to the shortage of precipitation the crop condition converted from above average to below average. Crop condition in this region should be watched closely considering the increase of water demand in next reporting period.

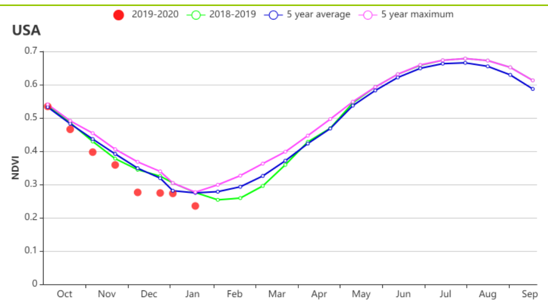
**3. California**

In this reporting period, California suffered severe shortage of precipitation. Compared to the 15-year average, precipitation was significantly 22% below the average. In this Mediterranean climate, this period is critical because of the predominantly cool and rainy weather. Due to a shortage of water, the crop condition was below average at the early growing stage before wintering, while it recovered to the 5-year average at the end of January. This could be attributed to the positive effects of irrigation. In summary, CropWatch estimated that the crop growth would be near average.

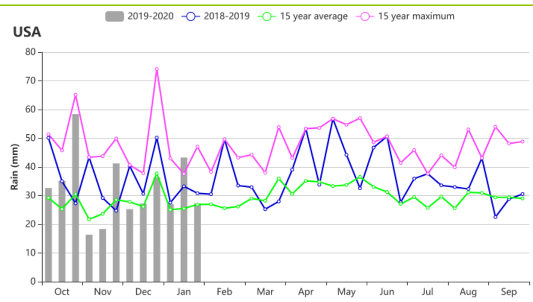
**Figure 3.42 United States's crop condition, October 2019 - January 2020**



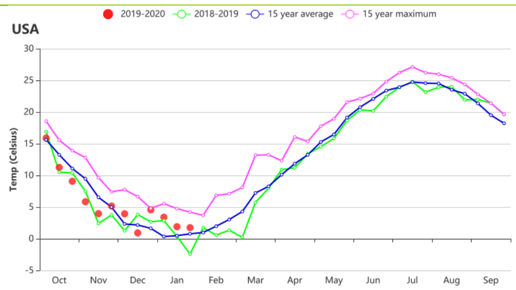

(a). Phenology of major crops



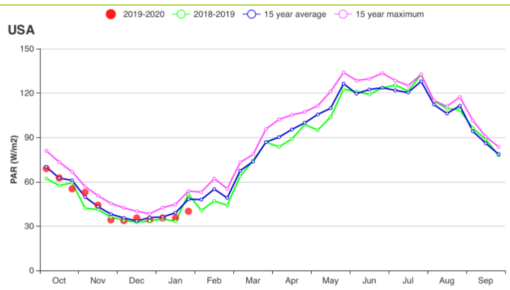

(b) Crop condition development graph based on NDVI



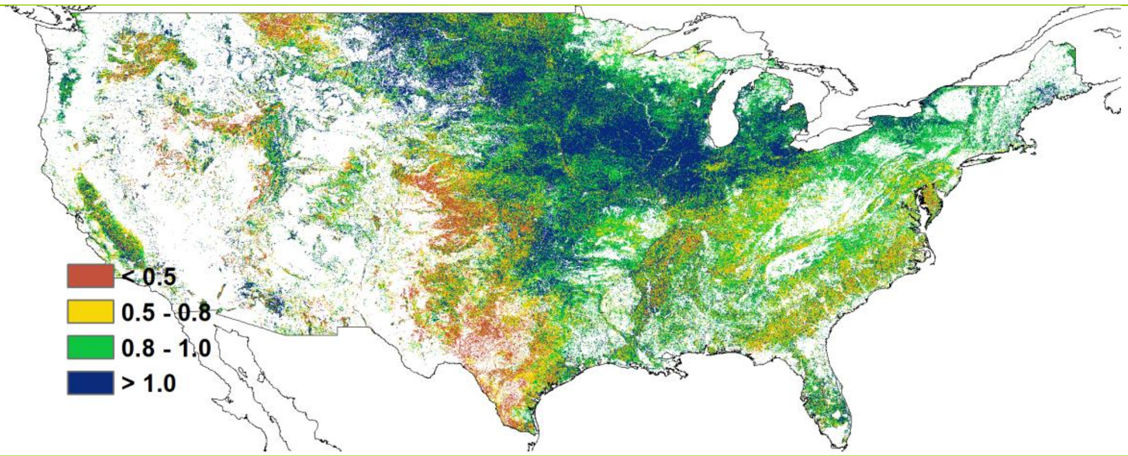

(c) Rainfall profiles



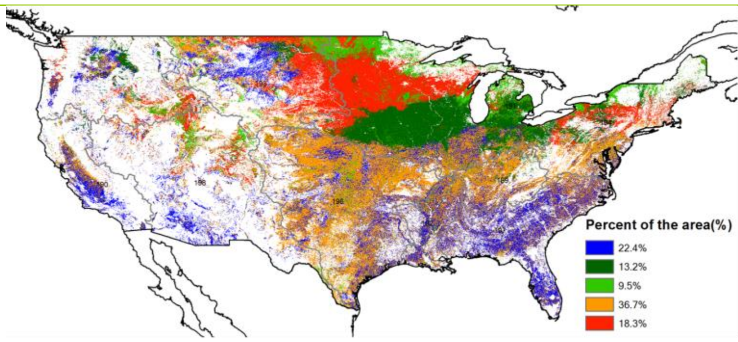

(e) Temperature profiles

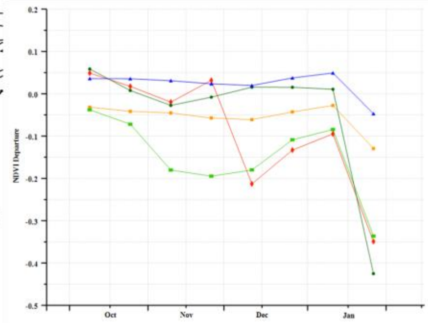



(f) Profiles of photosynthetic active radiation

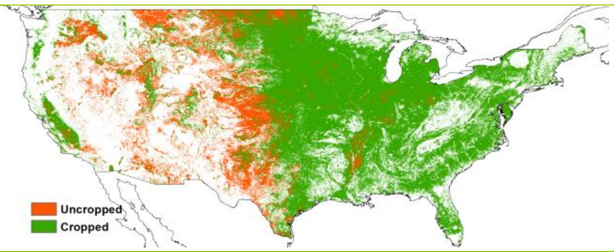


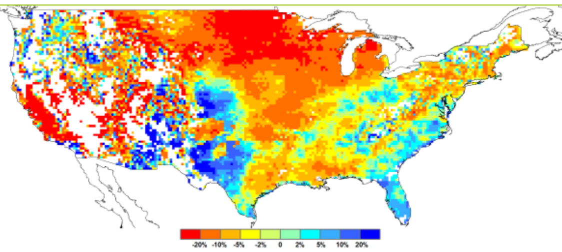

(g) Maximum VCI



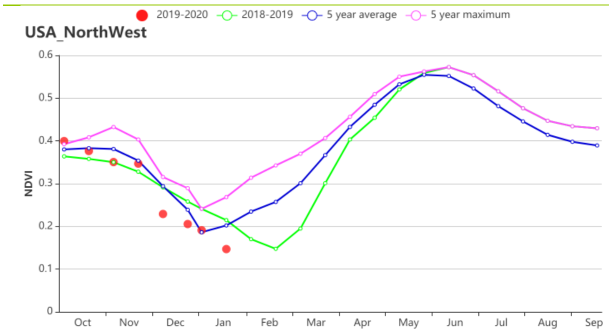


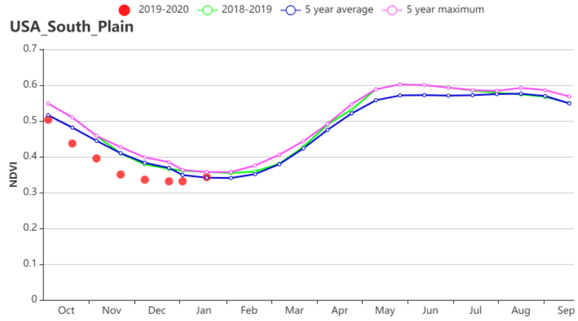

(h) Spatial NDVI patterns compared to 5YA (i) NDVI profiles



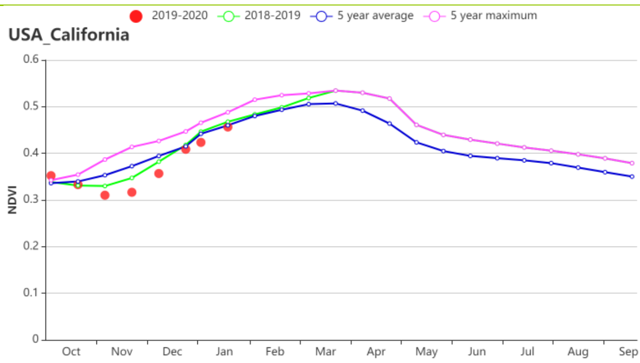



(j) Cropped and uncropped arable land (k) Potential biomass departure from 5YA






(l) Crop condition development graph based on NDVI (North West (left) and South Plain (right))




(m) Crop condition development graph based on NDVI for California

**Table 3.75** United States's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Southern Plains** | 329 | 25 | 9.3 | -0.2 | 648 | -3 |
| **Northwest** | 400 | -13 | 1.2 | -0.4 | 408 | 1 |
| **California** | 275 | -22 | 9.7 | -0.1 | 663 | 3 |

**Table 3.76** **United States's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020.**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Southern Plains** | 195 | -2 | 66 | -4 | 0.78 |
| **Northwest** | 72 | -3 | 45 | 11 | 0.86 |
| **California** | 116 | -22 | 74 | 20 | 0.90 |

# [UZB] Uzbekistan

The report covers the sowing stage and early growth of winter wheat to the end of January in Uzbekistan. Among the Crop Watch agro-climatic indicators, RAIN and TEMP were below average (by 14% and 0.1 °C) with RADPAR close to average. BIOMSS fell 1% compared to the five-year average. As shown by the NDVI development graph, crop condition was close to the five-year average in October and slightly below the five-year average from November to January. According to the NDVI profile maps, 48.1% of the agriculture land had above five-year average conditions from November to late December in most parts of Namangan, Qarshi, Qunghirot, Chimbay, Takhtakupyr, Urganch, Beuni, Turtkul and some parts of Samarqand, Termez, Bukhoro, Denau provinces. In other regions, crop conditions were slightly below average. The precipitation above the 5-year maximum in early October was beneficial for germination of winter wheat. The following rainfall deficit did not have much negative effects on winter wheat in that period. Winter wheat will require more water in the next months when the rapid growth phase starts. Overall, the conditions for winter wheat were normal to slightly unfavorable.

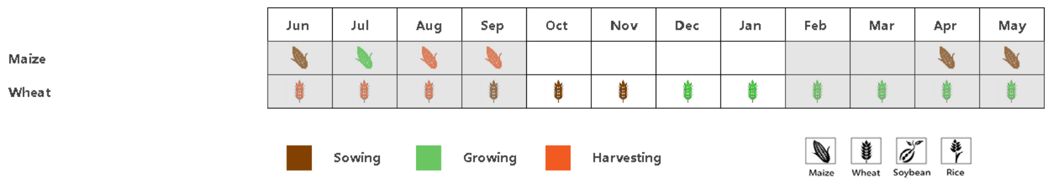
**Regional analysis**

Additional information is provided below for two agro-ecological zones: The Eastern hilly cereals zone and the Aral Sea cotton zone.

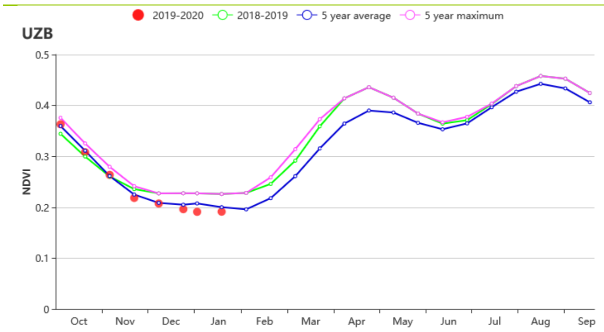
In the Eastern hilly cereals zone, NDVI was close to the five-year average in October, and below average from November to January. RAIN and TEMP were below average (by -13% and -0.2°C, respectively) while RADPAR was close to average.

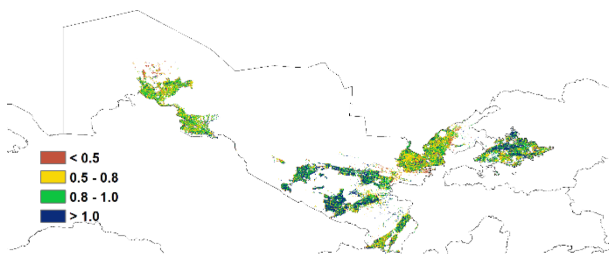
In the Aral Sea cotton zone, crop condition was below average in October and close to the average in early November and early December.  Precipitation was well below average during the monitoring period (RAIN -47%) but temperature and radiation were above (TEMP 0.7°C and RADPAR 5%). The BIOMSS index decreased by 30%.

**Figure 3.43 Uzbekistan's crop condition, October 2019 - January 2020**



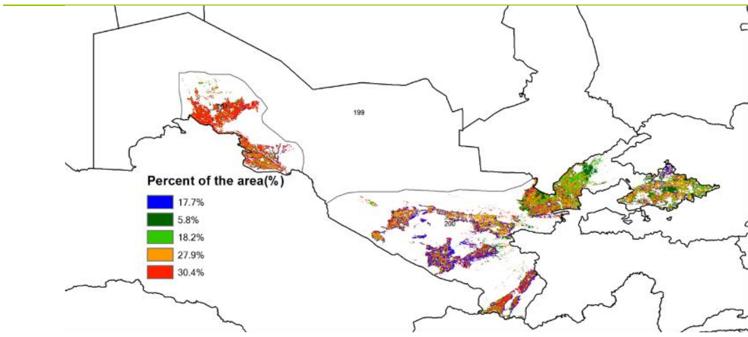

(a). Phenology of major crops



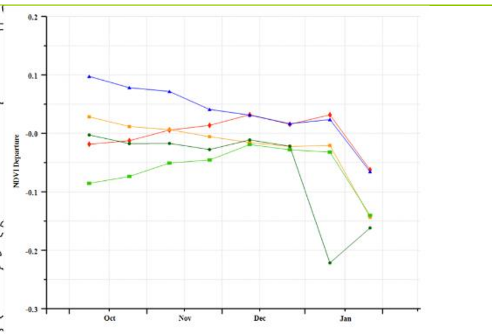




(b) Crop condition development graph based on NDVI

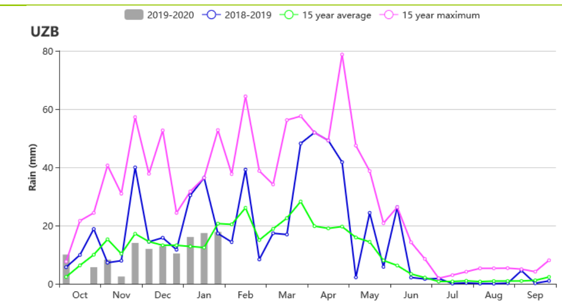
(c)  Maximum VCI



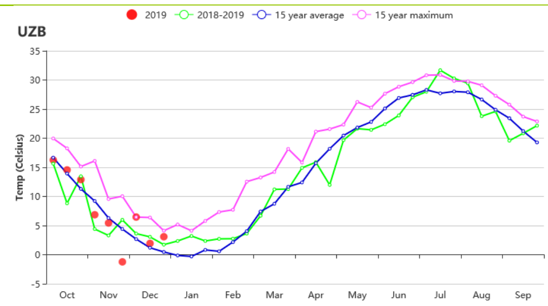

(d) Spatial NDVI patterns compared to 5YA



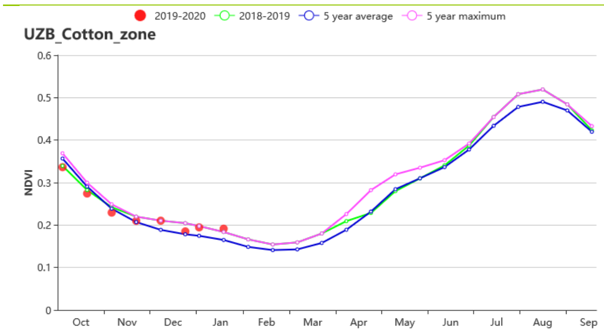

(e) NDVI profiles

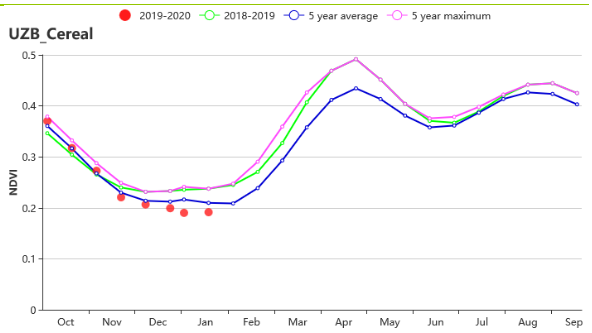



(f) Rainfall profiles




(g) Temperature profiles




(f) Crop condition development graph based on NDVI Aral Sea cotton region (left) Central region with sparse crops (right)

**Table 3.77 Uzbekistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Eastern hilly cereals zone | 139 | -13 | 5.6 | -0.2 | 624 | 1 |
| Aral Sea cotton zone | 31 | -47 | 4.5 | 0.7 | 566 | 5 |

**Table 3.78 Uzbekistan's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| Eastern hilly cereals zone | 130 | 5 | 31 | 51 | 0.91 |
| Aral Sea cotton zone | 69 | -30 | 8 | 61 | 0.80 |

# [VNM] Vietnam

Vietnam is the world's second largest exporter of rice. The monitoring period covered the growth of the 10th month rice, as well as the sowing of winter and spring rice. Most of the rice cultivation regions are distributed over the northern Red River delta and the Mekong Delta in the south. Crop condition development graph based on NDVI were mostly below average, especially from November 2019 to January 2020. The spatial NDVI patterns compared to the five-year average indicated that 29.1% regions were above average, with below average values in the other region. CropWatch indicators showed that RADPAR (+11%), CALF (1.0), temperature(+0.4°C), BIOMSS (+1%) and VCIx (0.97), but total rainfall (416mm) was below average by 28%.Overall crop condition in the country is unsatisfactory.

**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).

In the **Central Highlands** both RAIN and TEMP were below average (-43% and -0.4°C, respectively), while RADPAR was above 16%.Although rainfall is below normal, high VCIx(0.99)values and cropped arable land fraction(1.0) marked BIOMSS increased 2% compared to average.

The situation in the **Mekong River Delta** was conditioned by low precipitation (RAIN -34%) and average temperature (TEMP +0.2°C) and abundant sunshine (RADPAR +12%). BIOMSS was above average (+8%). VCIx (0.95) and CALF (+0.3%) described fair to good condition. The crop condition development graph based on NDVI showed that crop condition was closed to the 5 years average. Output is likely to be about the average.

Mostly unfavorable climatic conditions dominated the **North Central Coast** over the reporting period. Rainfall was 30% below average by a wide margin. Temperature (+0.7°C), CALF (+3%) and RADPAR (+14%) were increased, but BIOMSS was unchanged compared to be average.

**North East** recorded 450 mm of rainfall over four months (RAIN +22%). Temperature (+0.9°C) and RADPAR was average. The decrease in BIOMSS was 5% compared to the 5 years average. The NDVI profile confirmed the condition of crop was closed to average. Crop condition development graph based on NDVI showed condition above average in this region,.

**North West** recorded low RAIN (-13%), above average RADPAR (+11%) and temperature (+0.8°C). As a result BIOMSS increased by 4% compared with average (15YA). VCIx (0.98) and CALF (1.0) were high. The crop condition development graph of NDVI indicated below average crop condition from October 2019 to January 2020 and maximum occurred in November.

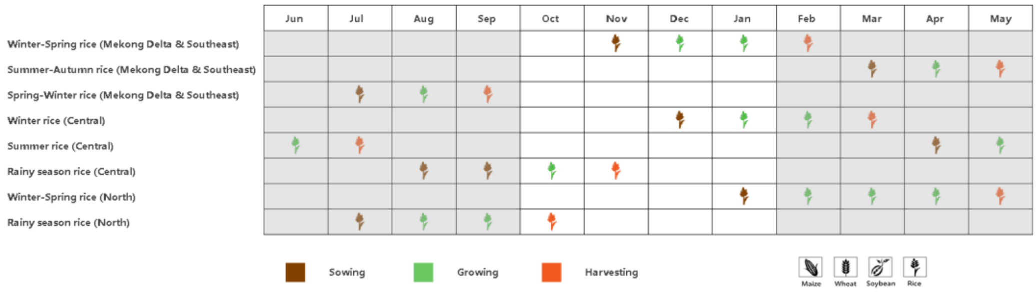
In the **Red River Delta**, rainfall was 22% above the average and the temperature was up by 0.8°C. Both RADPAR and BIOMSS were all up by 2%. This region is known for the wide cultivation of rice. The crop condition development graph of NDVI was closed to average and crop conditions turned to be below average in December. The VCIx (0.94) and CALF (+4%) also confirmed the favorable crop conditions.

In the **South Central Coast**, the average rainfall was 44% below average and TEMP (-0.4°C) was closed to average. RADPAR was above average (+21%, respectively).Despite the high reduction in rainfall, BIOMSS was below average (-1%) and the crop condition was below the average in November. Overall, VCIx (0.99) indicated moderate conditions in this region.

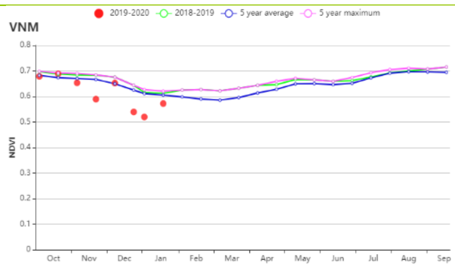
In the **South East of Vietnam**, crop condition was closed to average from October to December in 2019, but was below average since January 2020. The agro-climatic condition showed that rainfall (-47%, respectively), TEMP (+0.2°C), RADPAR (+10%), VCIx (0.97), and CALF (+1%) compared to be the average.

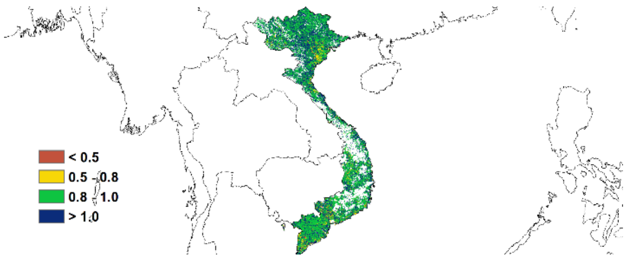
Due to the decrease of rainfall and dry weather, BIOMSS decreased by 3%, which indicated unsatisfactory crop conditions.

**Figure 3.44 Vietnam's crop condition, October 2019 - January 2020**



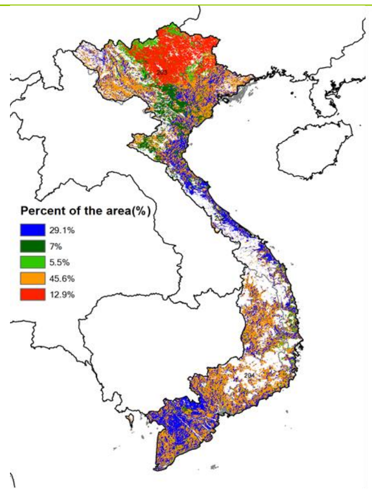

(a). Phenology of major crops

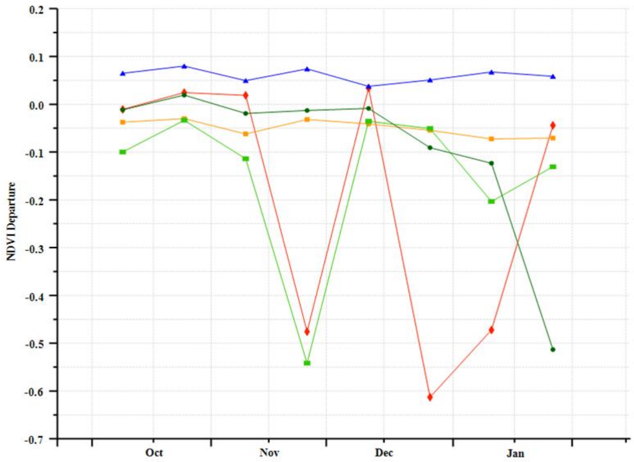



(b) Crop condition development graph based on NDVI

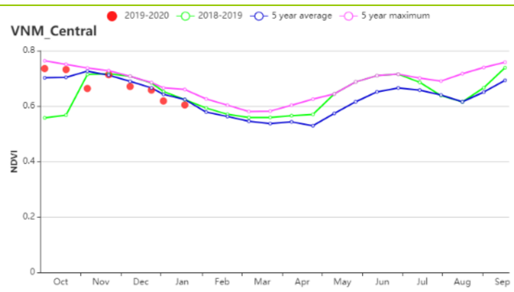
(c) Maximum VCI

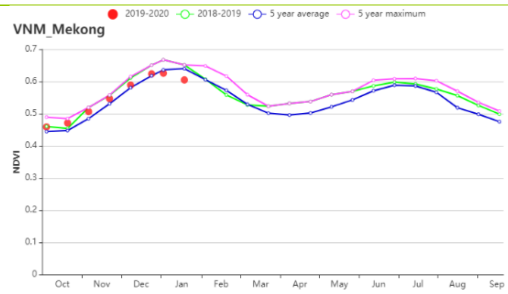


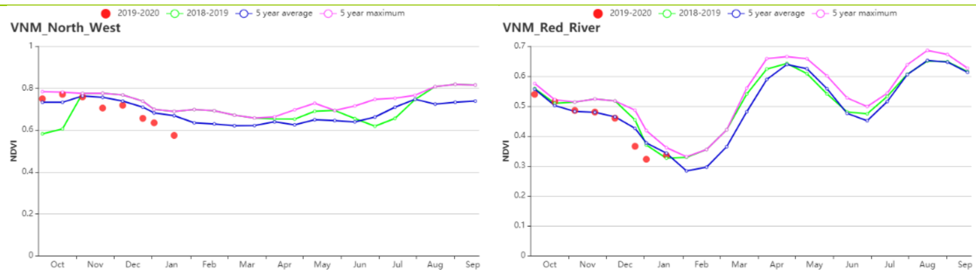

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

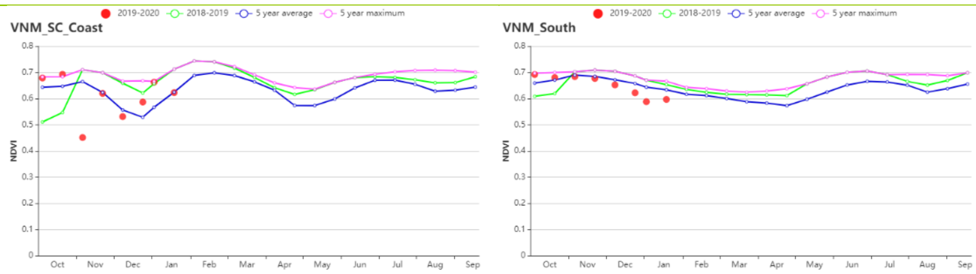


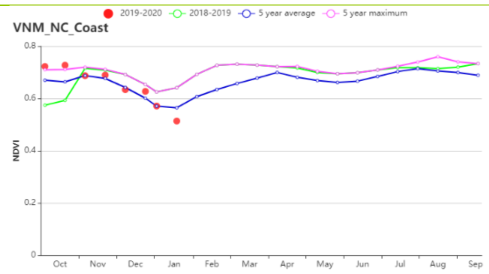

(f) Crop condition development graph based on NDVI Central Highlands Vietnam (left), and Mekong River Delta (right).




(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 Vietnam

**Table 3.79 Vietnam's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019-January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Central Highlands** | 288 | -43 | 20.5 | -0.4 | 1083 | 16 |
| **Mekong River Delta** | 496 | -34 | 26.1 | 0.2 | 1226 | 12 |
| **North Central Coast** | 472 | -30 | 18.9 | 0.7 | 767 | 14 |
| **North East** | 450 | 22 | 16.8 | 0.9 | 673 | 0 |
| **North West** | 228 | -13 | 16.5 | 0.8 | 865 | 11 |
| **Red River Delta** | 538 | 22 | 20.0 | 0.8 | 671 | 2 |
| **South Central Coast** | 636 | -44 | 19.8 | -0.4 | 848 | 21 |
| **South East** | 328 | -47 | 25.1 | 0.2 | 1202 | 10 |

**Table 3.80 Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA/15YA, J October 2019-January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Central Highlands** | 552 | 2 | 100 | 0 | 0.95 |
| **Mekong River Delta** | 781 | 8 | 93 | 3 | 0.95 |

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
| --- | --- | --- | --- | --- | --- |
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **North Central Coast** | 389 | 0 | 97 | 3 | 0.99 |
| **North East** | 309 | -5 | 100 | 0 | 0.99 |
| **North West** | 379 | 4 | 100 | 0 | 0.98 |
| **Red River Delta** | 378 | 2 | 94 | 3 | 0.94 |
| **South Central Coast** | 450 | -1 | 98 | 3 | 0.99 |
| **South East** | 678 | -3 | 96 | 1 | 0.96 |

# [ZAF] South Africa

The current reporting period corresponds to the sowing and early growth stages of maize and soybean, while wheat was harvested by the end of November. Rainfall was close to the average of the last 15 years with 268 mm. It was warmer (+0.2°C) and sunnier with RADPAR at + 3%. These weather conditions led to an increase in the estimated BIOMSS by 2%, and 79% of the cropland area was cultivated, with a 29% increase in cropped area as compared to the last 5 years average.

Generally, the crop conditions based on the NDVI graph were below average until the end of December and then improved to above average in January. This was not the case for all cropped areas since the NDVI clustering map indicated that the conditions of 36.7% of the cropped area remained below the average during the whole period. These areas are mostly located in coastal regions in the Eastern and Western Cape provinces and showed a low value of VCIx (< 0.5) based on the VCIx map; however, the nationwide maximum VCI was high (0.91).

All these CropWatch parameters indicated high variability, but overall favorable conditions. The best conditions were observed for the northeastern provinces, which are known for the predominant maize cultivation. The recent above average rainfalls were beneficial for the summer crops and the sowing progress was 31% in advance compared to the same period last year. CropWatch forecasts a good maize production prospect for this season. The coastal regions in Eastern and Western Cape presented below average NDVI indicating low wheat output which was harvested by the end of 2019.

**Regional analysis**

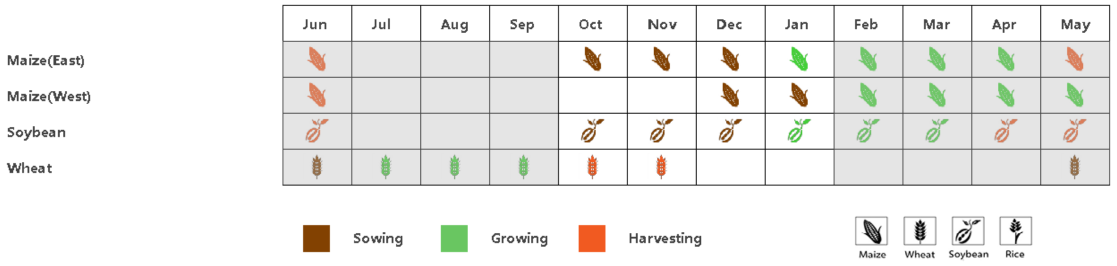
CropWatch adopts three agro −ecological zones (AEZs) relevant for crop production in South −Africa. The first zone is **the Humid Cape Fold Mountains**; the second zone is **the Mediterranean zone**, while the third zone is **the Dry Highveld and Bushveld maize areas**, by far the most relevant zone in terms of food production.

In **the Humid Cape Fold Mountain zone**, a drop in rainfall by 12% below the average has occurred with an increase of the average temperature by 0.4 °C and 4% above average RADPAR. The reduction in rainfall with this hot and sunny weather was leading to below-average crop conditions during October and November and then turned to be close to average in December and above-average crop conditions in January. The impact of rainfall reduction was not significant since the CropWatch agronomic measures indicated that the BIOMSS was 1% above the average and the maximum VCI value was high (0.86).

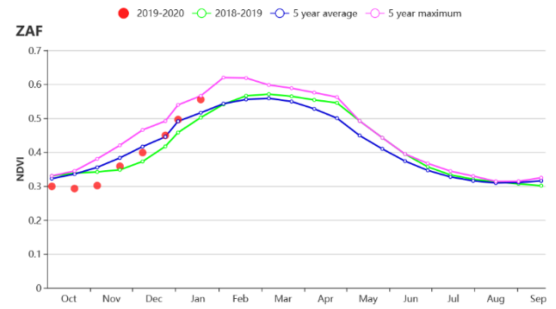
In **the Mediterranean zone**, the average rainfall was 28% above the average, and the temperature was colder by 0.4°C. The RADPAR was also 1% below the average. However, the nationwide NDVI shows that the zone well known for wide cultivation of wheat was at the end of growing season and by the end of November, all wheat had already been harvested. The conditions based on the NDVI graph were above the average, except in October. The CALF indicated that only 36% of the cropland area in the zone was cultivated with a reduction in the cropped area by 40% compared to the last 5 years average. Hence, the estimated BIOMSS was 2% below the average and the VCIx value was low (0.32).

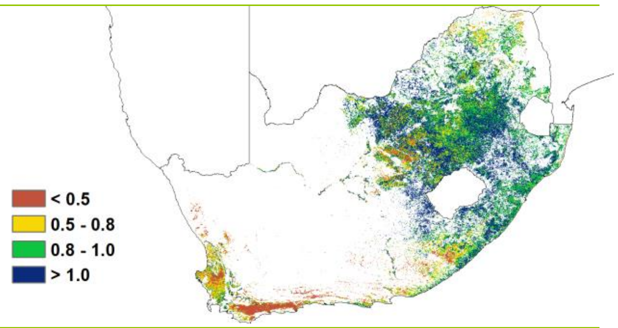
In **Dry Highveld and Bushveld maize areas**, the average rainfall was higher by 4% compared to the average, and the temperature rose by 0.3 °C with sunny weather (RADPAR, 4% above average). This zone is the main zone for maize cultivation and these favorable weather conditions led to an increase in estimated BIOMSS by 3% and high VCIx value (0.99). These conditions were not so great at the beginning of the reporting period since the NDVI graph that describes crop conditions indicated below-average conditions in October and November but subsequently the conditions improved by December and reached maximum values by the end of January.

**Figure 3.45 South Africa's crop condition, October 2019 - January 2020**

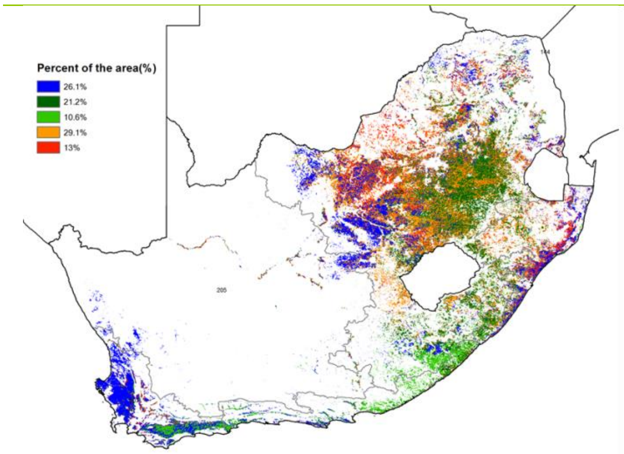


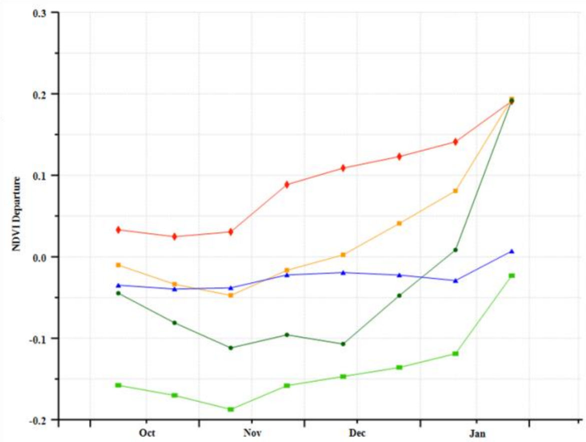

(a). Phenology of major crops



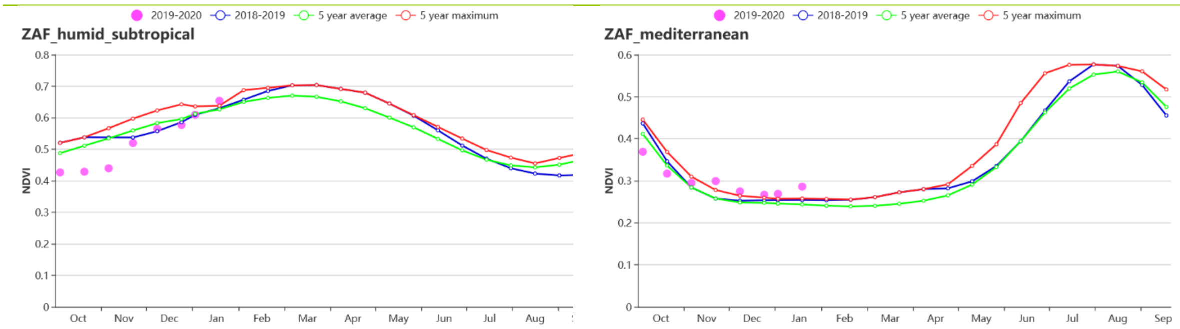




(b) Crop condition development graph based on NDVI (c) Maximum VCI

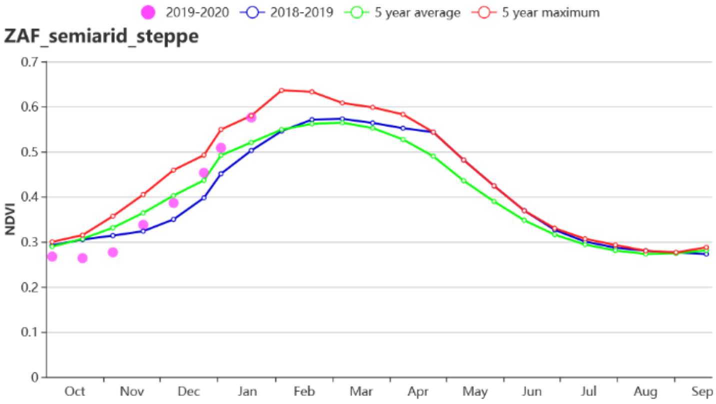


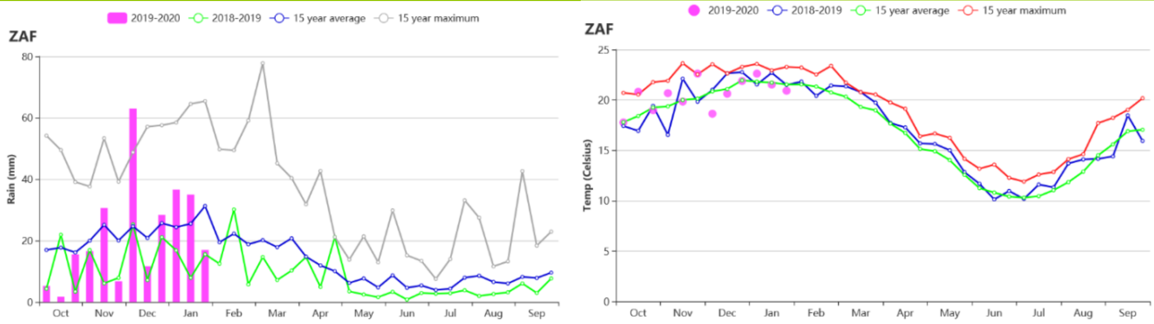

(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles




(f) Crop condition development graph based on NDVI (Humid Cape Fold Mountains (left) and Mediterranean wheat zone (right))




(f) Crop condition development graph based on NDVI (Dry Highveld and Bushveld maize zone)




(g) Time series profiles of precipitation (left) and temperature (right)

**Table 3.81 South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Humid Cape Fold Mountains** | 345 | -12 | 20 | 0.4 | 1308 | 4 |
| **Mediterranean Zone** | 147 | 28 | 18.1 | -0.4 | 1569 | -1 |
| **Dry Highveld and Bushveld** | 271 | 4 | 20.9 | 0.3 | 1533 | 4 |

**Table 3.82 South Africa's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Humid Cape Fold Mountains** | 694 | 1 | 94 | 4 | 0.86 |
| **Mediterranean Zone** | 733 | -2 | 36 | -40 | 0.32 |
| **Dry Highveld and Bushveld** | 829 | 3 | 83 | 45 | 0.99 |

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KGZ KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF **ZMB**

# [ZMB] Zambia

During this reporting period, irrigated wheat was harvested with an estimated national production of 150,000 MT while main field crops were planted following the onset of the rainy season in October/November. The previous seasons resulted in a decline of rainfed cereal production in two consecutive years to below-average levels, mainly driven by rainfall deficits.

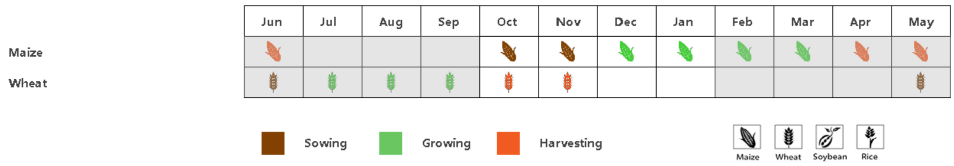
Countrywide the average rainfall was at 962 mm, 12% above the 15 year average, average temperatures at 23.7 °C (+0.1) and solar radiation of 1315 MJ/m2. These conditions resulted in potential biomass production of 786 g DM/m2 (+2%), total cropped land at 98% (+9%) and maximum VCI of 0.89. Delayed onset of the rainfall in October and early November affected crop establishment in some parts of the country. However rainfall returned to average levels thereafter.

**Regional Analysis**

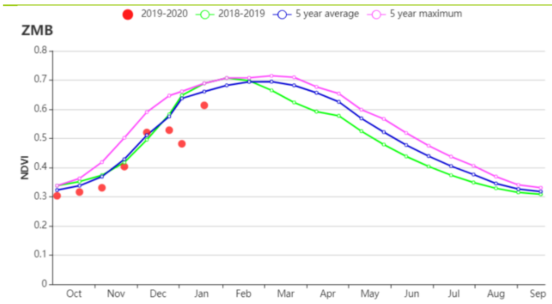
The three agro-ecological zones (AEZs) indicated that the cumulative rainfall received in all the agro-ecological zones was above the 15 year average (>3%), except for the **Luangwa-Zambezi Rift Valleys** where the deviation was negative (-1%). Based on the temperature profiles, average temperature for the regions varied from 21.9°C to 25.3°C with negligible departure from 15 year average. Similarly the sunshine radiation for the three agro-ecological zones was above 1200 MJ/m2. These indicators are reflected in positive BIOMSS departures in the **Luangwa-Zambezi Rift Valley** (+11%) and **West-Semiarid zone** (+4%) while **Northern high rainfall zone** (-7%) and Central, eastern and southern plateau (-1%) recorded negative departures.

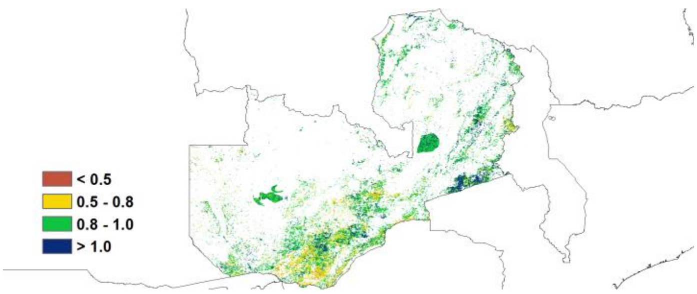
The Cropped Arable Land Fraction (CALF) was above 98% across all the AEZs except for Luangwa-Zambezi Rift Valley (95%). Similar positive trends were observed for the maximum VCI. The NDVI showed a large negative outlier in January, presumably due to cloud cover. Values for all regions were above average by the end of January. Overall, these agronomic indicators showed more favorable crop conditions as compared to the previous year and hence an expected potential increase for the 2020 cereal harvest.

**Figure 3.46 Zambia's crop condition, October 2019 - January 2020**



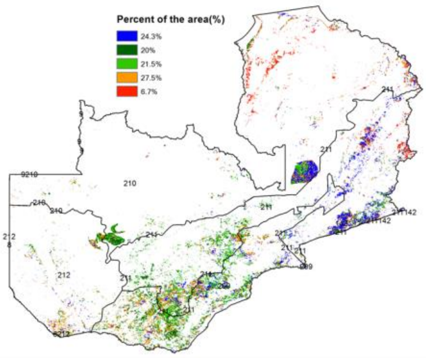

a). Phenology of major crops

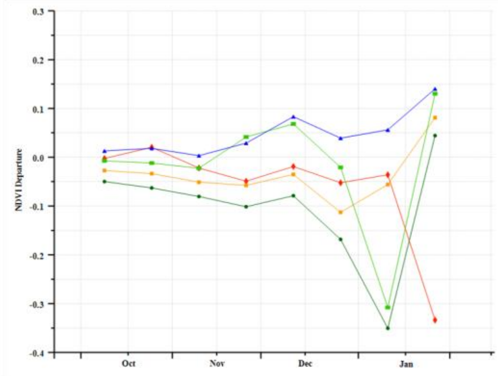



(b) Crop condition development graph based on NDVI

(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

**Table 3.83 Zambia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2019 - January 2020**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Luanguwa Zambezi rift valley** | 780 | -1 | 25.3 | +0.5 | 1409 | 0 |
| **Northen high rainfall zone** | 1193 | +20 | 21.9 | -0.2 | 1211 | -2 |
| **Central-eastern and southern plateau** | 914 | +14 | 24.0 | +0.1 | 1337 | +1 |
| **Western semi-arid plain** | 811 | +3 | 24.7 | -0.2 | 1310 | -1 |

**Table 3.84 Zambia's agronomic indicators by sub-national regions, current season's values and departure from 15YA/5YA, October 2019 - January 2020**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 15YA (%) | Current | Departure from 5YA (%) | Current |
| **Luanguwa Zambezi rift valley** | 895 | +11 | 95 | +6 | 0.83 |
| **Northen high rainfall zone** | 683 | -7 | 99 | +1 | 0.93 |
| **Central-eastern and southern plateau** | 760 | -1 | 98 | +17 | 0.91 |
| **Western semi-arid plain** | 852 | +4 | 99 | +2 | 0.90 |