

Chapter 3. Core countries

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

3.1 Overview

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.

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 tons of the covered commodities. There are only 20 countries that rank among the top ten exporters of maize, rice, wheat and soybeans respectively. The United States and Argentina rank among the top ten of all four crops, whereas Brazil, Ukraine and Russia rank among the top ten of three crops.

Maize: Maize exports have been dominated by just 4 countries: USA, Brazil, Argentina and the Ukraine. Together, they have supplied three quarters of maize being traded internationally. This may change this year due to the war in the Ukraine. During this monitoring period, rainfed maize was produced in the southern hemisphere, whereas in India, Bangladesh and Myanmar maize was grown in the dry winter months under irrigation. Production in these countries, as well as in South Africa and Paraguay is mainly for domestic consumption, with limited exports. After some drier conditions in December, rainfall improved in Argentina and during the January to April period, rainfall was more than 30% above the 15YA. CALF was high, and thus above-average production can be expected. In Brazil, conditions were sub-optimal for the 1st maize, which is mainly grown in the south, due to drought conditions. However, conditions greatly improved thanks to more abundant rainfall for the second maize crop, which is usually sown after soybean. Rainfall was below average during the monitoring period in India. However, rainfall during the dry winter season is generally very low, and farmers rely on irrigation for maize production during the winter

months. The main maize production season is during the monsoon (Kharif), and production during the winter months (Rabi) contributes only about 15% to the total production. With temperatures and solar radiation being close to normal, average maize production can be expected for India during the monitoring period. South Africa is the largest maize exporter in Africa. Sowing was delayed because of lack of rainfall, and slightly below average production can be expected. Maize production in Kenya was greatly reduced by the severe drought conditions. Maize planting started in April in North America and Europe. So far, weather conditions have been favorable, although the weather has been cooler than normal in the USA and drier than normal in most of Western Europe. Weather conditions in the Ukraine are rather favorable, but the war causes large uncertainties.

Rice: Conditions for winter (Rabi) season rice production were generally favorable in India, the largest rice exporter. The region of irrigated dry season (Boro) rice production is limited to West Bengal, Telangana, Andhra Pradesh and Assam. However, Boro rice yields are much higher than those obtained in the Kharif (rainy) season. Another region with important dry season rice production is Southeast Asia. Thailand and Vietnam rank in the 2nd and the 3rd position of exporting countries. In these two countries, crop conditions were favorable. Water levels in the Mekong have recovered to average levels, enabling the farmers to irrigate their rice crops during the dry season. Conditions for the other important rice producing countries and regions, such as the Philippines and Indonesia were generally favorable. Hence, all in all, rice production is stable at a global level.

Wheat: Spring wheat sowing in Australia, Canada, Northern USA, Russia and Kazakhstan started in April. Depending on the local conditions, the sowing period lasts until May or early June. So far, soil moisture conditions have been rather favorable in these countries. Wheat tends to be grown in drier regions, where water is the limiting factor, except for the Indo-Gangetic Plain and the North-China Plain, where wheat is irrigated. In these two regions, conditions for wheat production have generally been favorable. Most wheat in India, apart from Punjab and Haryana had been harvested by the time the heat wave hit the country in mid March. In Punjab and Haryana, most fields were hit in the midst of the grain filling period. The terminal heat stress caused a high percentage of shriveled grains and yield reduction by 15-20% in these two states. Winter wheat is an important crop in the drought stricken Maghreb, Near and Middle East. The drought caused significant yield reductions in all countries of these regions, except for Egypt, where all wheat is irrigated with water from the Nile river. The south of the USA is also affected by drought conditions. Significant yield reductions are to be expected for Texas, Oklahoma and Kansas. Abundant rain in recent weeks has caused rather favorable conditions for the upcoming planting period of wheat in Argentina, Brazil and Australia.

Soybean: In the USA, Canada and the Ukraine, soybean sowing started at the end of this monitoring period, in late April. Soil moisture conditions are mostly favorable in these countries, but the war causes high uncertainties for the Ukrainian production. Conditions in May will determine the area planted and crop establishment. Argentina, Brazil, Paraguay and Uruguay produce more than half of the world's soybeans traded on the international market. Conditions in Brazil for soybean production were unfavorable due to drought conditions from October to December. In Argentina, where a high percentage of soybean is sown after the wheat harvest in December, conditions were favorable.

Weather anomalies and biomass production potential changes

(1) Rainfall

Rainfall in Brazil was below average during the previous and remained below average during this monitoring period as well, but rainfall levels were in general sufficient and evenly spread to ensure good conditions for finishing off the first season crop and ensuring good growth for the second season maize crop. In Argentina, rainfall had been below average from mid December to early January. This had a negative impact on crops sown in October. However, soybean, which is usually sown in December and January, benefitted from above average rainfall during the January to April period. Conditions for maize production were generally favorable as well. Below average rainfall caused unfavorable conditions in Peru, Ecuador and Colombia. In Central America, however, rainfall was above average, although this was the dry season. Main crop production will start in May. Conditions in Mexico were near average. In the South-west of the USA and California, the severe drought conditions continued. The important winter wheat production states of Texas and Kansas, Colorado as well as the north-west of Oklahoma were affected by a severe rainfall deficit, ranging between 10 to 30% below average. Rainfall conditions in the more northern states and in the Canadian Prairies were normal to above average, although in some regions, excessive soil moisture causes delays in sowing of the summer crops. In Europe, the UK, France, the Iberian Peninsula, as well as Italy and all countries in the South-East experienced a moderate to severe precipitation deficit. These drought affected countries are important winter cereal producers. Other important winter cereal producers, such as Germany, Poland and the Ukraine experienced close to normal conditions. Russia west of the Urals, as well as Kazakhstan, had average to above average precipitation, creating a favorable environment for wheat production. Conditions for winter cereal production in the Maghreb, the Near and Middle East as well as in Central Asia were highly unfavorable: Wheat yields in countries and regions that rely mostly on rainfed wheat production, such as Morocco and Syria, as well Central and Eastern Anatolia and the Kurdish regions in Turkey, Irak and Iran were reduced due to severe precipitation deficits. The drought conditions in Afghanistan continued, although high rainfall in January had brought some relief. Another region that was affected by drought was the Horn of Africa. Especially in Kenya and Tanzania, crop production was reduced. While conditions were mixed in southern Africa, an uneven distribution of rainfall hampered crop production in most countries of southern Africa. In India and Bangladesh most production of winter wheat is irrigated, hence the drier than usual precipitation had little impact on crop production. Rainfall was above average for China, causing favorable conditions for winter wheat production and land preparation for the upcoming rice growing season. In South-East Asia, above average rainfall generated favorable conditions for rice production, which was aided by normal water flow levels in the Mekong river. In Australia, high rainfall helped establish good moisture conditions for the upcoming wheat growing season.

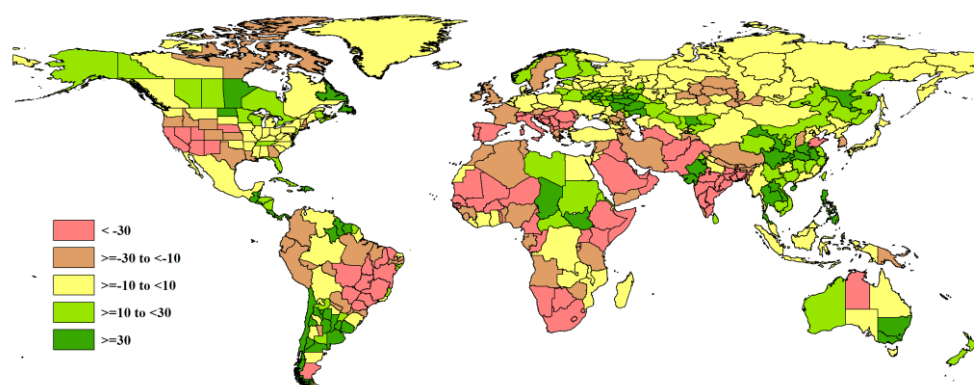


Figure 3.1 National and subnational rainfall anomaly (as indicated by the RAIN indicator) of January to April 2022 total relative to the 2007-2021 average (15YA), in percent

(2) Temperatures

Temperatures are insofar important for crop production, as they control the start of the growing season and early crop growth in temperate regions. For planting of maize and soybean, soil temperatures need to be at least at 10°C in order to ensure an even germination. Untimely freezing conditions, which usually occur at the beginning and end of the growing season can cause large damage or even kill crops. Among the main crops covered in this report, only wheat can withstand freezing temperatures. Excessive heat with temperatures higher than 32°C, in combination with dry conditions, can cause yield reductions for wheat due to terminal heat stress, as experienced in Pakistan and the northwest of India in March. Temperatures above 35°C can cause pollen sterility in maize. Taking these points into consideration, the temperature departures in South America and Africa did not have a big impact on crop production. In North America, the below average temperatures caused a slight delay for planting of maize in the corn belt. The above average temperatures in Russia, which were centered around the Urals, accelerated spring green-up of the winter crops.

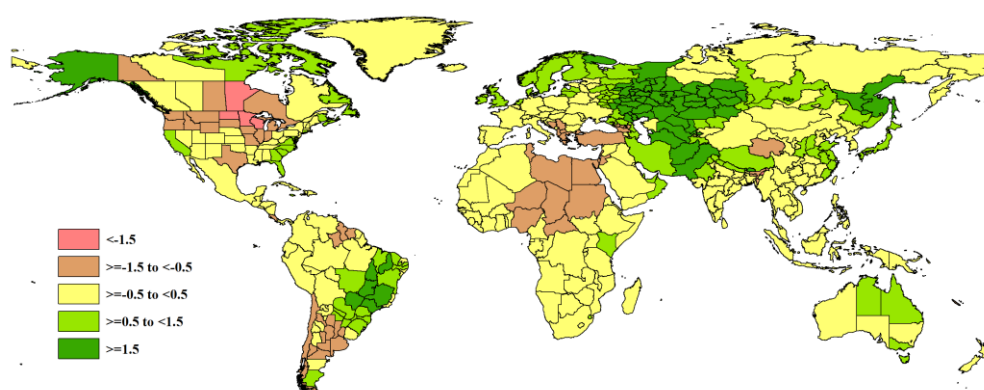


Figure 3.2 National and subnational temperature anomaly (as indicated by the TEMP indicator) of January to April 2022 average relative to the 2007-2021 average (15YA), in °C

(3) RADPAR

The pattern of solar radiation departures tends to mirror the rainfall departures. Rainy conditions are generally accompanied by increased cloud cover and therefore, lower solar radiation. Rainfall deficits tend to go together with clear skies and above average solar radiation. In Argentina, most of the important crop producing provinces had average to slightly below average solar radiation levels. Below average solar radiation levels were also observed for the south of Brazil and Paraguay. Further north, up to the southern corn belt of the USA, radiation levels were mostly above average,

especially in the USA. Its northern states, as well as most of Canada, experienced below average radiation levels. All of Europe, apart from Russia and the Ukraine, had sunnier conditions than usual. In Africa, solar radiation was 1 to 3% below average for Tunisia, Egypt, Sudan, Zimbabwe, Mozambique and Madagascar. The largest negative departures were observed for Namibia and Libya. Solar radiation levels were above average in the Near and Middle East, as well as in South Asia. Conditions were more cloudy than usual in China, Myanmar and North Korea. The important rice producing countries Thailand, Vietnam, Laos, the Philippines and Indonesia had average to strongly above average solar radiation levels.

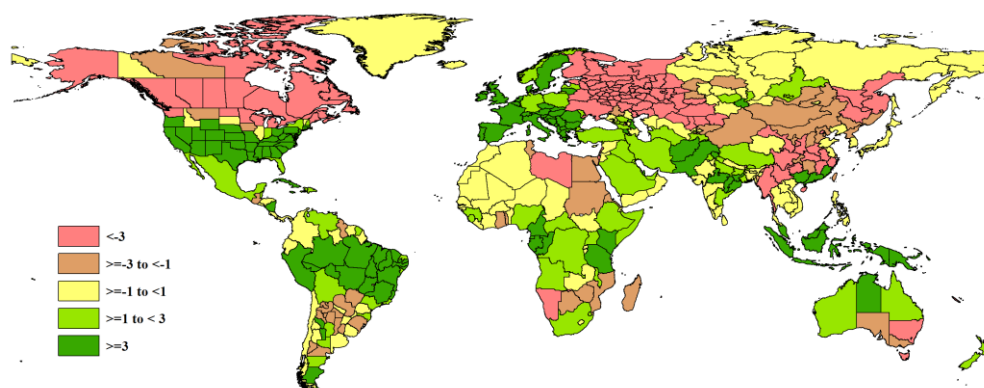


Figure 3.3 National and subnational sunshine anomaly (as indicated by the RADPAR indicator) of January to April 2021 total relative to the 2007-2021 average (15YA), in percent

(4) Biomass accumulation potential

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 high latitude regions, temperature may also become the most critical limiting factor. The strong positive departure ($> +10\%$) for potential biomass production for most of Argentina indicates that conditions were favorable. To the contrary, the important crop production regions in Brazil had a negative departure by more than -10% . Conditions were average for most of the other regions in South and Central America. Mexico, the USA apart from the Southeast and Canada had negative (-5 to -10%) to strongly negative departures. Similarly, most of southern and eastern Europe had a mix of negative to strongly negative departures. Conditions in the north of Europe as well as most of Russia west of the Urals and Kazakhstan had average to strongly above average conditions. In the Near and Middle East, as well as the Maghreb, negative to strongly negative departures dominated. Similarly, the Horn of Africa and southern Africa as well as the West African countries bordering the Sahel had a strong negative departure. Neutral to strongly above average solar radiation levels dominated most of Asia. Only the east coast of India, Bangladesh, Shandong province in China as well as South Korea had a negative departure of potential biomass production. Conditions were strongly above average for Inner Mongolia, and the Loess Plateau in China, as well as Southeast Asia.

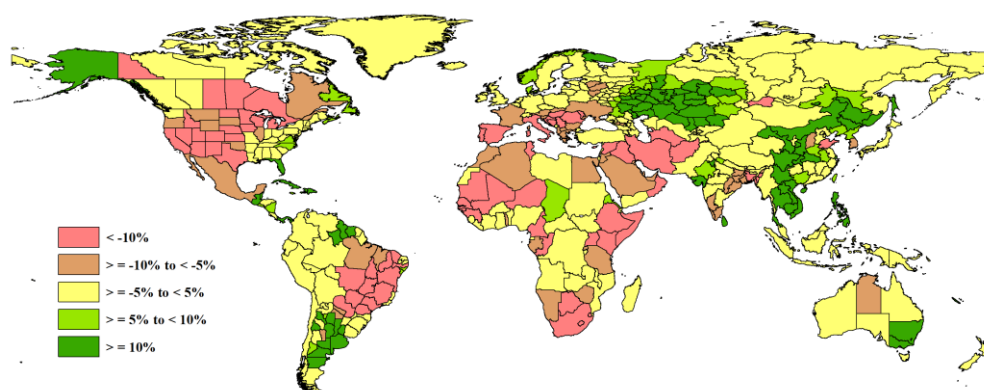


Figure 3.4 National and subnational sunshine anomaly (as indicated by the RADPAR indicator) of January to April 2022 total relative to the 2007-2021 average (15YA), in percent

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 January to April period to the previous season and the five-year average (5YA) and maximum; (c) Maximum Vegetation Condition Index over arable land (VCIX) for January to April 2022 by pixel; (d) Spatial NDVI patterns up to January to April 2022 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 agro-ecological zones (AEZ) within a country, again comparing the January to April 2022 period to the previous season and the five-year average (5YA) and maximum.

Refer to Annex A, Table A.1-A.11 for additional information about indicator values by country. Country agricultural profiles can be explored at with the CropWatch Explore module of the cloud.cropwatch.com.cn website. CropWatch provides open access to the module.

Figures 3.5 - 3.45; Crop condition for individual countries ([AFG] Afghanistan to [ZMB] Zambia) including agro-ecological zones (AEZ) from January to April 2022.

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
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[AFG] Afghanistan

Winter and spring wheat are the main cereals sown in Afghanistan. Most winter wheat is grown in the northern border provinces and is harvested in May. Spring wheat was planted between March and April.

The proportion of irrigated cropland in Afghanistan is 54% and agro-meteorological conditions play an important role in the growth of almost half of the crops. Rainfall is note the major influential factor.

The agro-climatic conditions showed that RAIN decreased by 41%, TEMP increased by 2.2°C and RADPAR increased by 5%. Affected by the decrease of RAIN, BIOMSS decreased by 11%. The CALF decreased by 1%, and VCIx was 0.52.

Last year's drought resulted in a shortage of food and insufficient seed supply. Additionally, the poor economy has limited the farmers' ability to prepare the land and plant the crops. The actual areas of winter wheat are far lower than normal, and a large amount of farmland was left fallow. Short-term heavy rainfall in Kandahar and its north caused a flooding disaster in January. According to meteorological data precipitation was significantly above average and even reached a 15-year maximum in January. According to the spatial distribution of NDVI profiles, the overall crop conditions at the national level in Afghanistan were below average in January. As shown in the spatial NDVI profiles and distribution map, the growth of crops on 34.3% of the crop land area was lower than the average level, mainly distributed in central Afghanistan. Crop conditions in eastern Afghanistan that is under irrigation were also lower than the 5-year average due to the damaged irrigation facilities. 23% of the total cropped areas were positive, mainly in northern Afghanistan. However, 12.3% of the cropped land areas were below average after March due to the continuing drought conditions in March and April. Additionally, about 42.7% of total cropped areas were near average levels, mainly distributed in southern Afghanistan. Maximum VCI shows similar results. Overall, the prolonged drought and conflict led to the poor crop conditions. Prospects for crop production are unfavorable.

Regional analysis

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

The RAIN in the Central region with sparse vegetation was 126 mm (-56%). The TEMP was 3.2°C (+3.3°C), and the RADPAR was 1052 MJ/m² (+6%). According to the NDVI-based crop condition development graph, the NDVI was lower than the 5-year average level in January and February and then near the average level between March and April. CALF had increased by 7% and VCIx was 0.61.

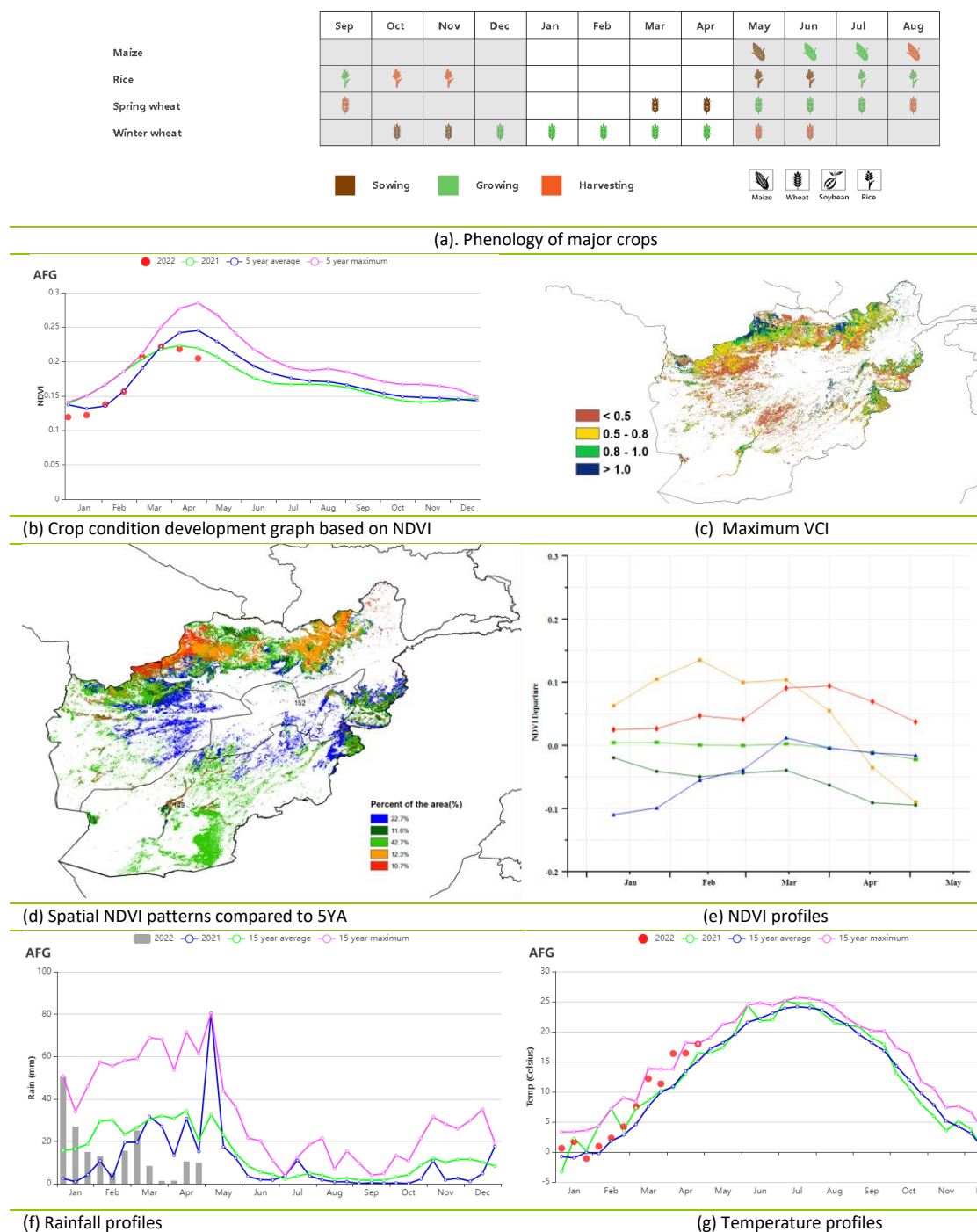
The Dry region recorded 125 mm of rainfall (RAIN -44%), TEMP was higher than average at 11.1°C, RADPAR was 868 MJ/m², and BIOMSS decreased by 15%. According to the NDVI-based development graph, crop conditions were lower than the 5YA during the monitoring period. CALF in this region was only 4% and VCIx was 0.28.

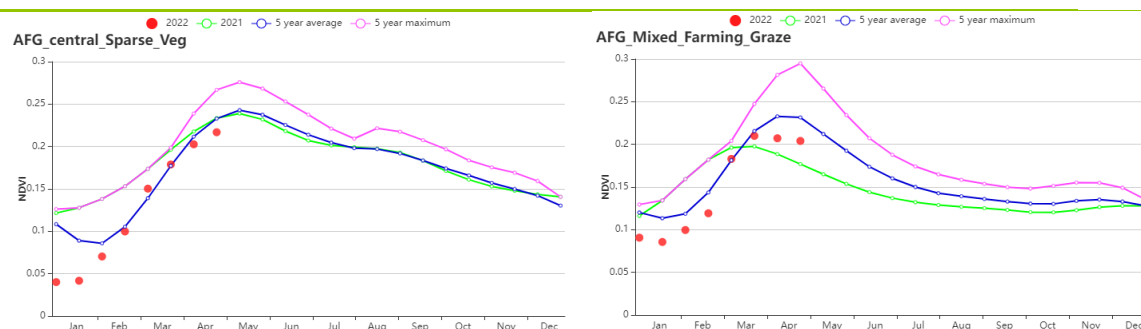
In the Mixed dry farming and irrigated cultivation region, the following indicator values were observed: RAIN 248 mm (-42%); TEMP 5.2°C (+1.8°C); RADPAR 950 MJ/m² (+7%); BIOMSS decreased by 8%. CALF was 6% above average. According to the NDVI-based crop condition development graph, NDVI was above the average level in the first three months, but crop conditions were below average after March due to the decreased rainfall, and VCIx was 0.70.

The Mixed dry farming and grazing region recorded 155 mm of rainfall (RAIN -30%). TEMP was 8.5°C (+2.2°C) and RADPAR was 1021 MJ/m² (+4%). CALF was 8%. It had decreased by 17%

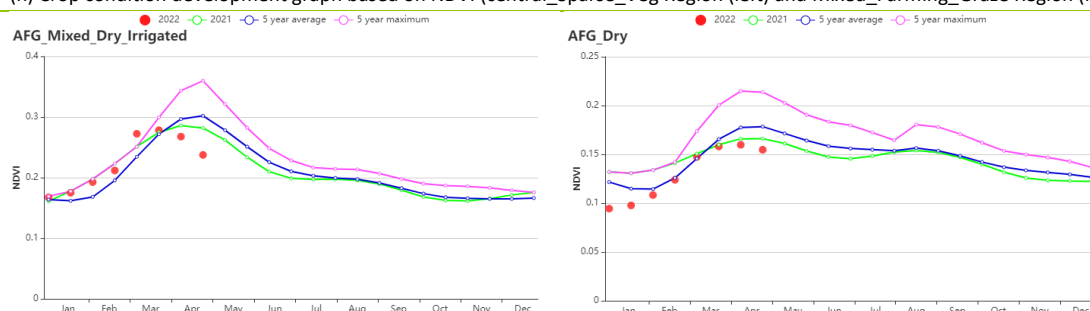
compared to the 5YA. According to the crop condition development graph, the NDVI was much lower than the 5YA throughout the monitoring period. Crop conditions in this region were below average, and VCIx was 0.49.

Figure 3.5 Afghanistan's crop condition, January - April 2022





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



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

Table 3.1 Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Central region with sparse vegetation	126	-56	3.2	3.3	1052	6	349	-8
Dry region	125	-44	11.1	2.6	1103	5	396	-15
Mixed dry farming and irrigated cultivation region	248	-42	5.2	1.8	950	7	448	-8
Mixed dry farming and grazing region	155	-30	8.5	2.2	1021	4	442	-9

Table 3.2 Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central region	7	7	0.61
Dry region	4	-12	0.28
Dry and irrigated cultivation region	20	6	0.70
Dry and grazing region	8	-17	0.49

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[AGO] Angola

During the current January-April 2022 monitoring period, maize and rice were at the growing and harvesting stages in Angola. In April, land preparation for wheat planting had started. The proportion of irrigated cropland in Angola is only 2% and agro-meteorological conditions play a decisive role in the growth of crops.

The agroclimatic indicators for this period reveal that the country received less rainfall when compared to the average of the past fifteen years (RAIN -14%). Also, the temperature was slightly below the average (TEM -0.1°C). The photosynthetic active radiation was 1198 MJ/m², 2% higher than that of the 15YA. The national potential biomass production decreased by 2%. In general, the nationwide NDVI profile trended below average until early April and recovered to average levels by the end of this reporting period. The NDVI spatial patterns show that 53% of the cultivated area was near the average for the past five years. For the whole country, the VCIx value was 0.88 and the CALF was near average. Conditions were average, except for the arid zone in the south, which was affected by the precipitation deficit.

Regional Analysis

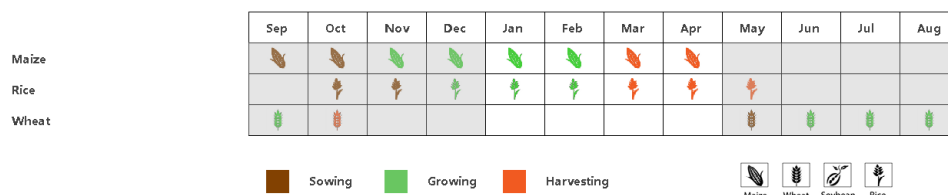
Considering the cropping systems, climate zones and topographic conditions, CropWatch has divided Angola into five agroecological zones (AEZs): the Arid zone (5), Central Plateau (6), Humid zone (7), Semi-arid zone (8) and Sub-humid zone (9).

Depending mostly on precipitation, agriculture in the agroecological regions was affected by the significant decreases recorded in precipitation over all the regions. This indicator decreased by 19% in the Arid zone, 12% in the Central Plateau, 13% in the Humid zone and Sub-humid zone and 16% in the Semi-arid zone. Temperature decreased by 0.2°C, 0.3°C and 0.6°C in the Sub-humid zone, Central Plateau and Arid zone, respectively. Meanwhile, in the Humid and Semi-arid zone, the temperature was near the average of the past fifteen years. In the Humid Zone, rainfall decreased by 13%, whereas RADPAR increased by 8%. Increases in radiation were also observed in Central Plateau (+3%) and the Sub-humid zone (+4%). The regional total biomass production decreased by 1% in the Arid zone, Humid zone and Sub-humid zone, while in the Semi-arid zone it decreased by 2% and in the Central plateau, it increased by 2%.

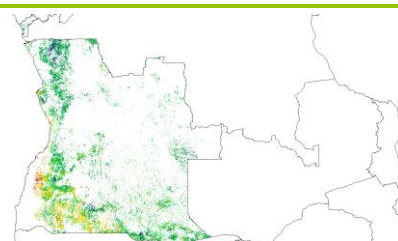
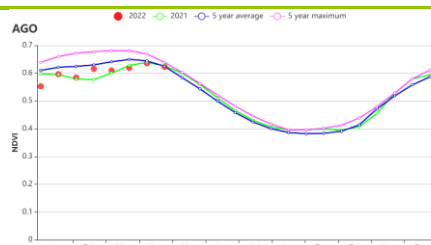
The regional crop conditions development graph based on NDVI reveals that except for the Central plateau, crop conditions were below the average of the past five years from early January to early April (when conditions improved) in all remaining regions. Only the Central plateau experienced near-average crop conditions throughout the monitoring period.

Regarding the agronomic indicators, CALF was near the average for the past five years in the Humid zone, Semi-arid zone and Sub-humid zone. In the Arid zone, the CALF decreased by 1% while in the Central plateau, it increased by 1%. The maximum VCIx in the agroecological regions varied from 0.79 (in the Arid zone) to 0.92 (in the Humid zone).

Figure 3.6 Angola's crop condition, January – April 2022

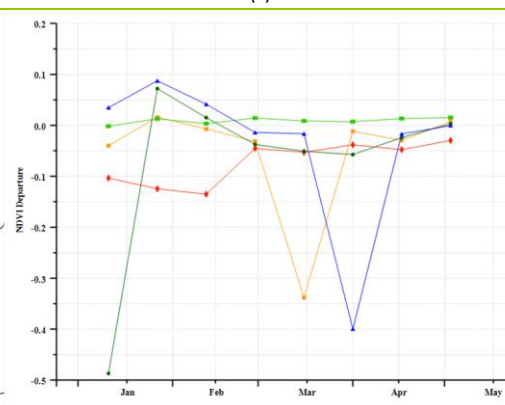
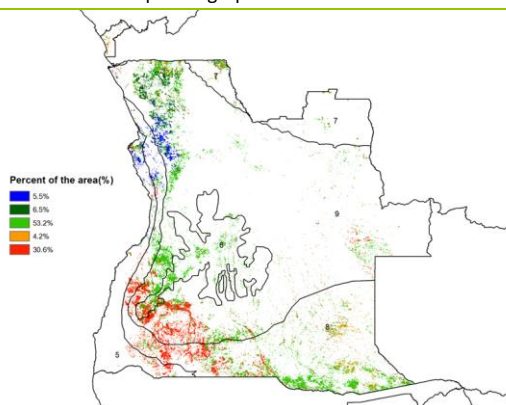


(a). Phenology of major crops



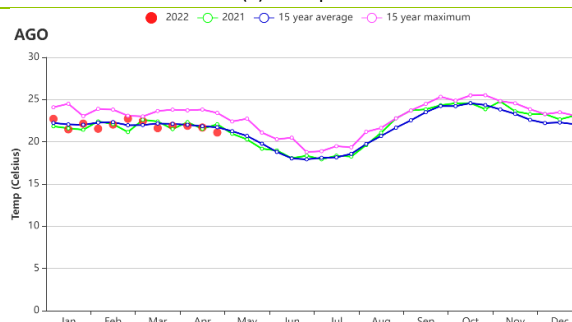
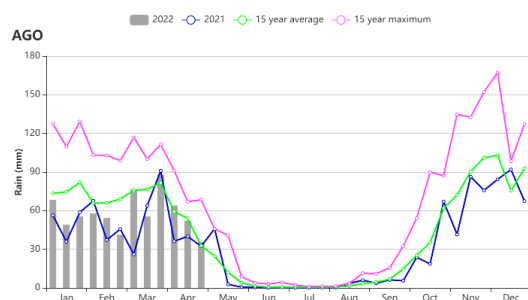
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



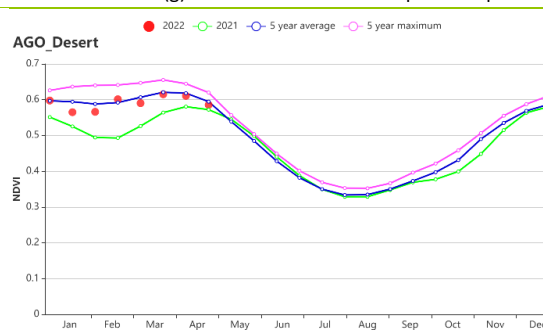
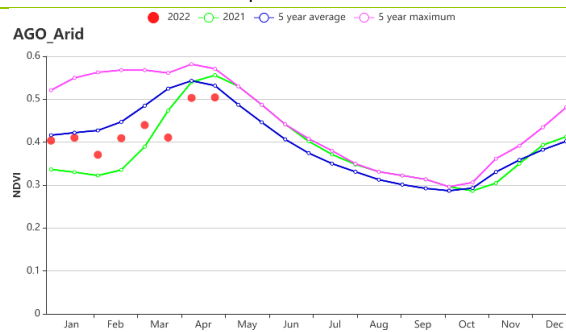
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



(f) National time-series rainfall profiles

(g) National time-series temperature profiles



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

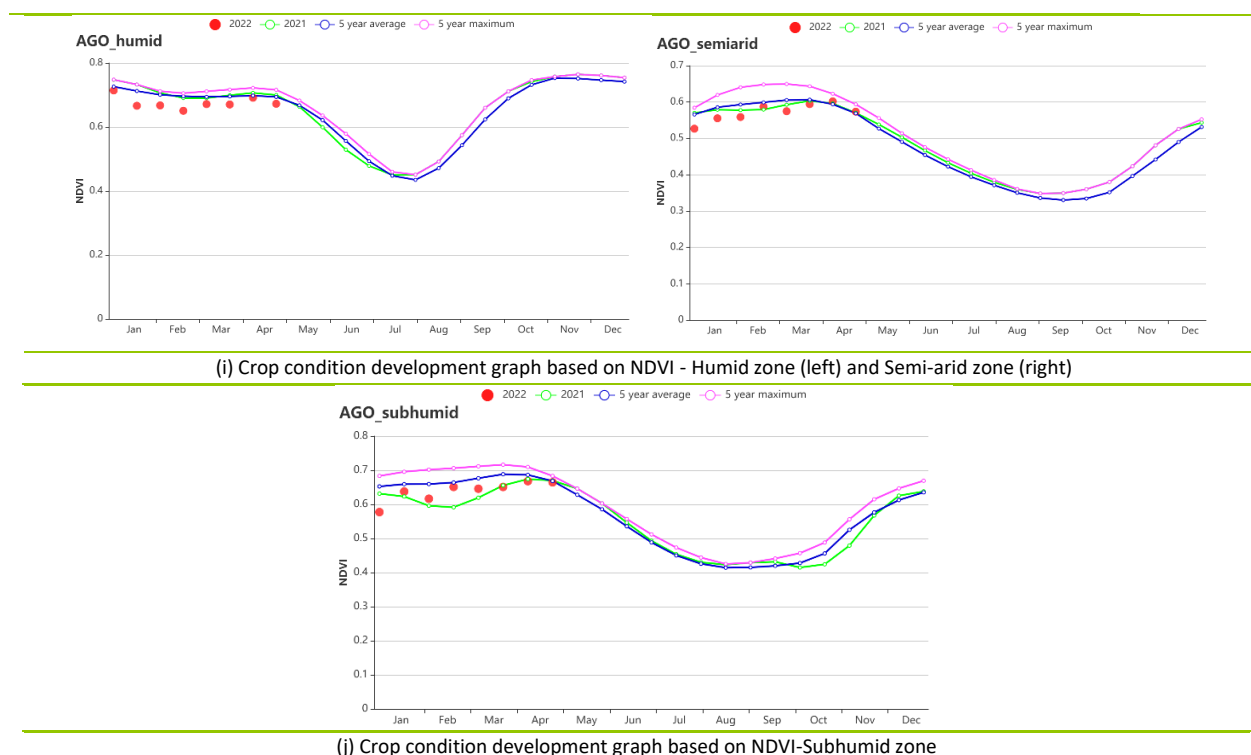


Table 3.3 Angolas's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Arid region	447	-9	24.4	-0.6	1246	0	1048	-1
Central Plateau	823	-12	17.9	-0.3	1154	3	1231	2
Humid zone	906	-13	22.4	0.1	1248	8	1458	-1
Semi-Arid Zone	530	-16	22.6	0.0	1186	-1	1117	-2
Sub-humid zone	796	-13	21.4	-0.2	1201	4	1282	-1

Table 3.4 Angolas's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January – April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Arid region	83	-1	0.79
Central Plateau	99	1	0.88
Humid zone	100	0	0.92
Semi-Arid Zone	98	0	0.85

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Sub-humid zone	93	-3	0.87

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[ARG] Argentina

The report covers the harvesting period for early soybean, early maize and rice, and the main growing period for late soybean and late maize. The proportion of irrigated cropland in Argentina is only 9% and agro-meteorological conditions play a decisive role in the growth of crops. For the whole country, rainfall showed a positive anomaly of 34%, TEMP showed a slight negative anomaly (-0.5°), RADPAR showed a 0.4% negative anomaly and BIOMSS a 8% positive anomaly. The rainfall profiles showed negative anomalies at the end of December and the beginning of January. They explain the negative NDVI anomalies observed at the beginning of the reporting period. High rainfall observed at the end of January and February could have accelerated the crop development reducing negative anomalies and generating positive anomalies in NDVI at the end of the reporting period. TEMP profile showed quite temporal variability with positive anomalies at the beginning of the reporting period followed by alternating sub-periods with no or negative anomalies. In general, conditions were rather favorable, better than the poor conditions observed at the end of the last reporting period.

Regional Analysis

CropWatch subdivides Argentina into eight agro-ecological zones (AEZ) based on cropping systems, climatic zones, and topography; they are identified by numbers on the NDVI departure cluster map. During this monitoring period, most crops were grown in the following four agro-ecological zones: Chaco, Mesopotamia, Humid Pampas, and Subtropical Highlands. The other agro-ecological zones were less relevant for this period. In Chaco and Subtropical Highlands main crops are soybean and maize. Main crops in Pampas and South Mesopotamia are soybean, maize and wheat, while in North Mesopotamia, rice is the main crop.

RAIN showed positive anomalies in all the AEZs: Humid Pampas (+57%), Mesopotamia (+35%), Chaco (+26%) and Subtropical Highlands (+26%). TEMP showed a slight positive anomaly in Mesopotamia (+0.2°) and negative anomalies in Humid Pampas (-1°), Subtropical Highlands (-0.5°) and Chaco (-0.1°). RADPAR showed no anomalies in Humid Pampas and slight negative anomalies in Chaco (-2%), Mesopotamia (-1%) and Subtropical Highlands (-1%). BIOMSS showed positive anomalies in all the AEZs: Humid Pampas (+16%), Mesopotamia (+7%), Chaco (+4%) and Subtropical Highlands (+4%).

CALF was complete (100%) and showed no anomalies in Chaco, Mesopotamia and Subtropical Highlands and showed a positive anomaly in Humid Pampas with a current value of 99%. Maximum VCI showed good conditions for the four AEZs: Humid Pampas (0.91), Chaco (0.89), Subtropical Highlands (0.88) and Mesopotamia (0.84).

For the whole country, the crop condition development graph based on NDVI showed negative anomalies during most of the reporting period, except for March, when values were near the 5-year average. Negative anomalies were also observed during December last year. Nevertheless, main agricultural areas showed some improvement in conditions. Chaco and Mesopotamia showed negative anomalies during part of December last year, January and February and no or positive anomalies during March and April. Subtropical Highlands showed no anomalies only in March and negative anomalies during the rest of the period. Humid Pampas showed negative anomalies during January and February (with similar values as last year), positive anomalies during March and no anomalies during April.

Spatial distribution of NDVI profiles showed homogeneous and heterogeneous spatial patterns for the different AEZs. Chaco and Mesopotamia were dominated by two profiles distributed homogeneously (red and light green) with higher presence of red in the North and of the light

green profile in the South. Both profiles started with negative anomalies and finished the reporting period with nearly no anomalies. Except for the first period, the light green profile (South of these AEZs) showed higher values than the red profile. Part of Humid Pampas showed a profile with positive anomalies during the end of February and March (dark green), but was also covered by the blue profile with quite stable and near average values. Center and Center West of Humid Pampas showed a NDVI profile with positive anomalies during most of the period and lower values at the beginning and end of the reporting period (orange profile). Subtropical highlands showed a mixture of several profiles (blue, red and light green).

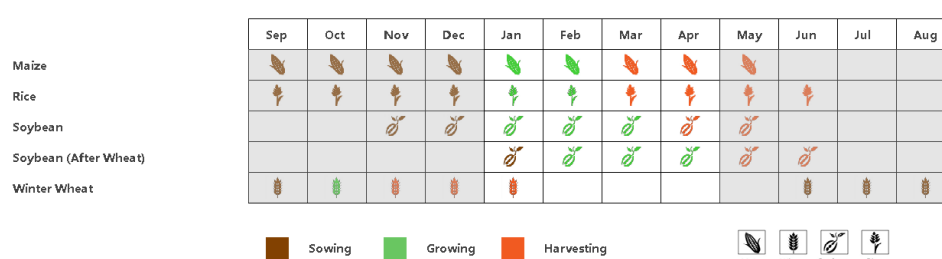
Maximum VCI showed in general good conditions with values higher than 0.8. Some areas showed intermediate values like North and South of Humid Pampas.

Production outlook

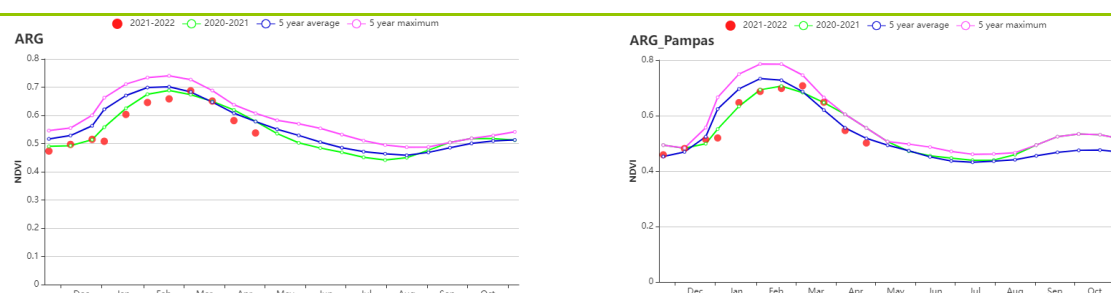
Based on CropWatch area and yield monitoring, Argentina's maize yield increased 1.8%, accompanying a 1.1% expansion of maize area and production increased by 2.9% at 54,971 thousand tonnes. While rice growing area remained as 2021, the yield of rice decreased and production decreased 2.9% at 1,849 thousand tonnes. Soybean increased in yield (+2.1%) while area decreased (-1.8%), the production increased 0.3% at 51,775 thousand tonnes.

In summary, total rainfall showed positive anomalies. But it was not regularly distributed, showing times of negative anomalies. VCIx and BIOMSS showed good conditions. NDVI profiles started with low values following poor rainfall conditions observed during December and January, but showed a tendency to increase at the end of this reporting period.

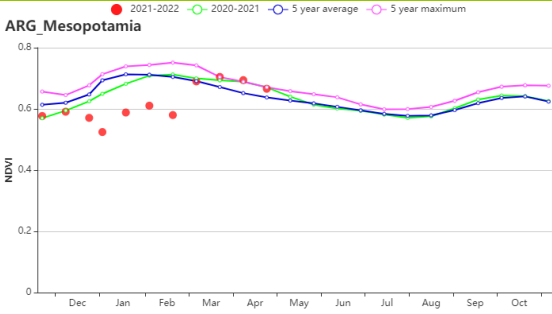
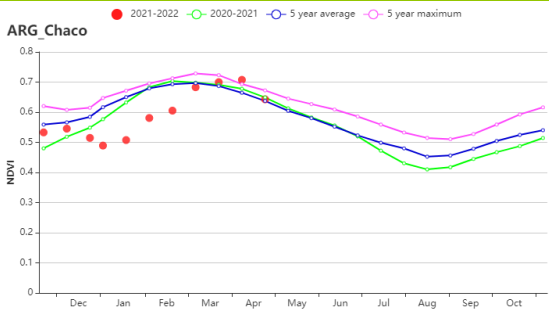
Figure 3.7 Argentina's crop condition, January - April 2022



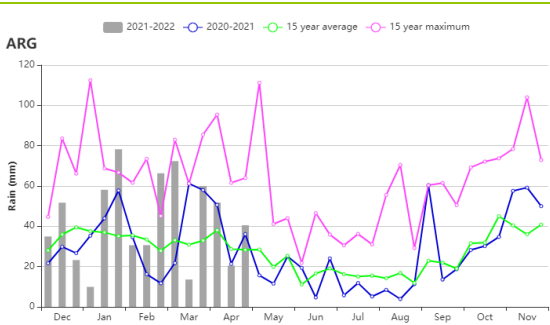
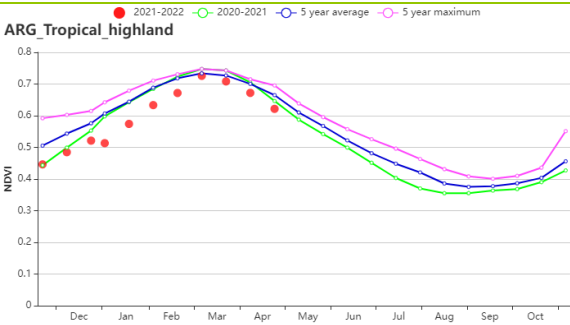
(a). Phenology of major crops



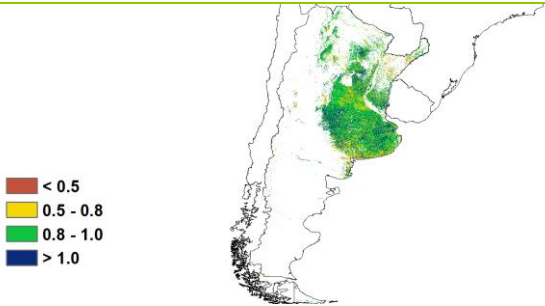
(b) Crop condition development graph based on NDVI (c) Crop condition development graph based on NDVI (Pampas)



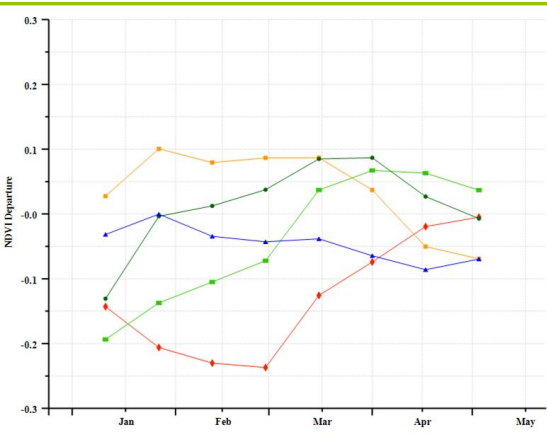
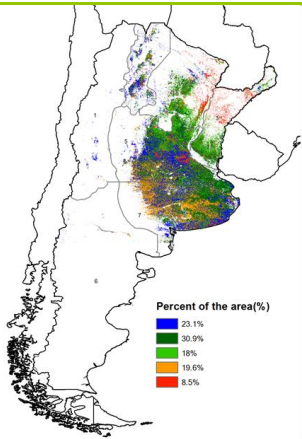
(d) Crop condition development graph based on NDVI (Chaco) (e) Crop condition development graph based on NDVI (Mesopotamia)



(f) Crop condition development graph based on NDVI (Subtropical Highlands) (g) Time series rainfall profile (Pampas)



(h) Time series of temperature profile (i) Maximum VCI



(j) Spatial distribution of NDVI profiles

Table 3.5 Argentina's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January 2022 – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Chaco	572	26	24.6	-0.1	1123	-2	1074	4
Mesopotamia	664	35	23.6	0.2	1174	-1	1112	7
Humid Pampas	424	57	20.6	-1.0	1207	0	929	16
Subtropical highlands	992	26	20.1	-0.5	1085	-1	1141	4

Table 3.6 Argentina's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January 2022 – April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Chaco	100	0	0.89
Mesopotamia	100	0	0.84
Humid Pampas	99	1	0.91
Subtropical highlands	100	0	0.88

Table 3.7 Argentina's crop production in 2022

	2020-2021		2021-2022		
	Yield (thousand tonnes)	Area change (%)	Yield change (%)	Production (thousand tonnes)	Production change (%)
Maize	53440	1.1	1.8	54971	2.9
Rice	1901	0.0	-2.9	1846	-2.9
Soybean	51608	-1.8	2.1	51775	0.3

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NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[AUS] Australia

In Australia, the harvest of wheat and barley ended in January. The sowing of wheat will start in May. Therefore, the vegetation conditions reported here have limited relevance.

The proportion of irrigated cropland in Australia is only 9% and agro-meteorological conditions play a decisive role in the growth of more than 90% crops. In the current period, Australia had relatively wet weather with abundant rainfall (RAIN, +18%), which will be beneficial for the planting of wheat and barley in the next period. The temperature (TEMP +0) and radiation (RADPAR -2%) were both close to average. Above-average biomass accumulation potential (+10%) was expected. Additionally, CALF increased by 27% compared with the recent five-year average, while the maximum VCI was 0.90.

The conditions in the four main wheat production states were similar. They all received above-average rainfall (New South Wales, +64%; South Australia, +9%; Victoria, +36%; Western Australia, +11%). But only New South Wales (+24%) and Victoria (+36%) had positive biomass estimates.

The NDVI profile was generally close to the maximum levels observed over the past 5 years.

Regional analysis

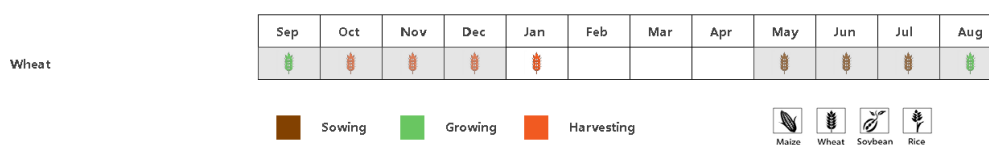
This analysis adopts five agro-ecological zones (AEZs) for Australia, namely the Arid and Semi-arid Zone (marked as 18 in NDVI clustering map), Southeastern Wheat Zone (19), Subhumid Subtropical Zone (20), Southwestern Wheat Zone (21), Wet Temperate and Subtropical Zone (22). The Arid and Semi-arid Zone, in which hardly any crop production takes place, was not analyzed.

The three southeast AEZs, including Southeastern wheat zone, Sub-humid subtropical zone, and Wet temperate and subtropical zone, had similar departures of the agro-climatic indicators: abundant rainfall (+47%, +15%, +23%), average temperature (+0.1°C, -0.1 ° C, +0.3°C) and slightly less sunshine (-3%, -3%, -4%). Mainly due to the rainfall, biomass accumulation potential were favorable (+18%, +9%, +10%). The CALF in these three AEZs had increased (+37%, +43%, +4%) and maximum VCI were 0.84, 0.88 and 0.85, respectively. Conditions were favorable in these zones.

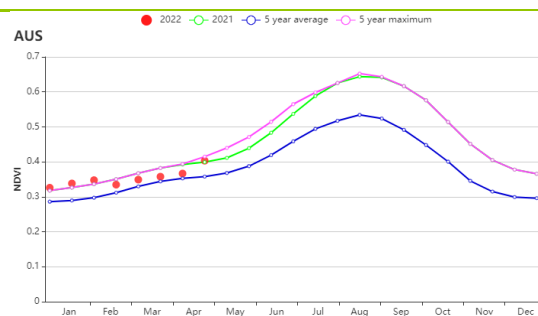
The departures from the 15YA of the agro-climatic indicator in the Southwestern Wheat Zone were relatively small. All indicators were slightly above average (RAIN +5; TEMP +0.2°C; RADPAR +2%; BIOMSS +5%, CALF +29%), while the maximum VCI was 1.06.

Overall, the agro-climatic indicators in the reporting period, especially rainfall, predict a favorable prospect for the coming wheat planting season in Australia.

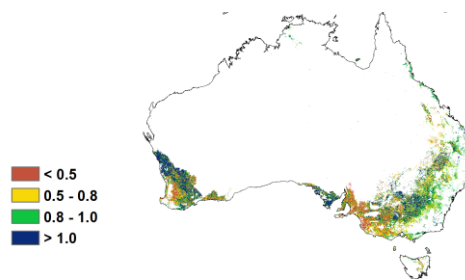
Figure 3.8 Australia's crop condition, January - April 2022



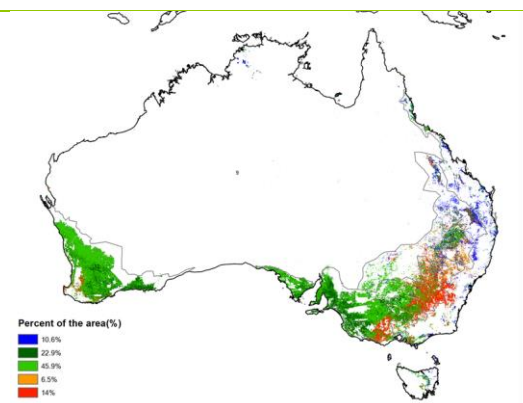
(a). Phenology of major crops



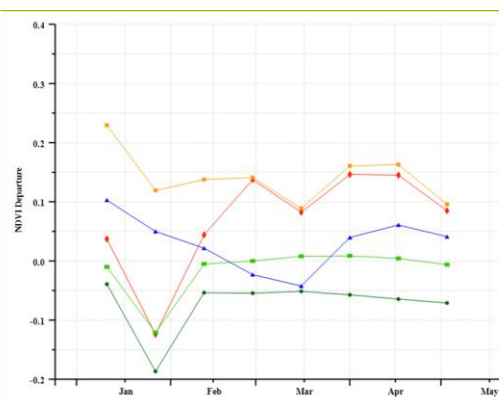
(b) Crop condition development graph based on NDVI



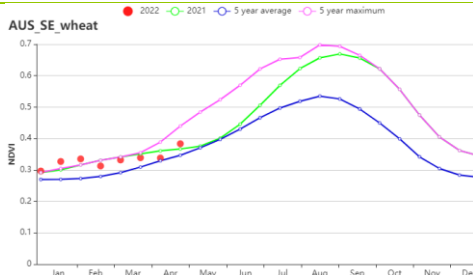
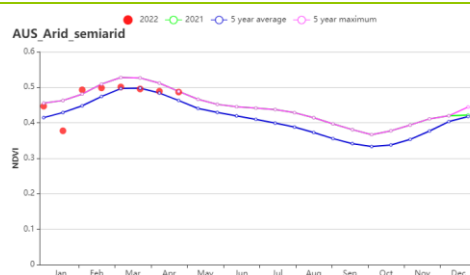
(c) Maximum VCI



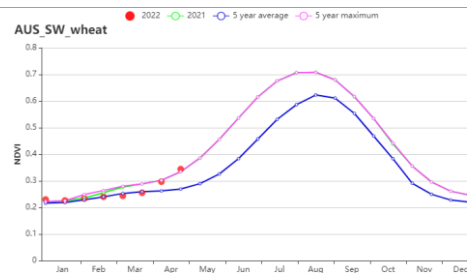
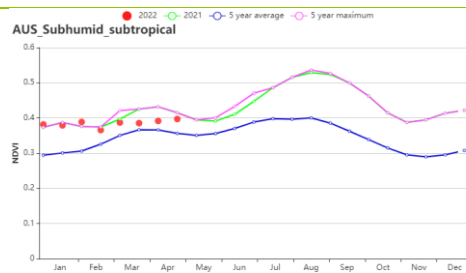
(d) Spatial NDVI patterns compared to 5YA



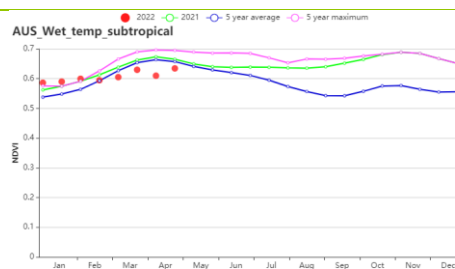
(e) NDVI profiles



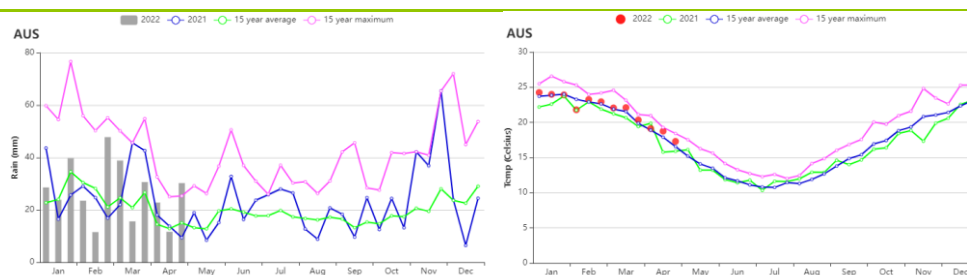
(f) Crop condition development graph based on NDVI (Arid and semiarid zone (left) and Southeastern wheat area (right))



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



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



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

Table 3.8 Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2021

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Arid and semiarid zone	624	-17	26.8	0.8	1289	4	967	-4
Southeastern wheat area	233	47	21.0	0.1	1165	-3	752	18
Subhumid subtropical zone	274	15	23.5	-0.1	1208	-3	845	9
Southwestern wheat area	113	5	21.3	0.2	1261	2	615	5
Wet temperate and subtropical zone	497	23	19.9	0.3	1090	-4	932	10

Table 3.9 Australia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2021

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Arid and semiarid zone	71	4	0.89
Southeastern wheat area	42	37	0.84
Subhumid subtropical zone	58	43	0.88
Southwestern wheat area	19	29	1.06
Wet temperate and subtropical zone	98	4	0.85

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[BGD] Bangladesh

During the previous monitoring period, rainfall was below average in October and early November. This caused a poor establishment of the winter cereals. Winter wheat was the major crop in the field during this monitoring period. The proportion of irrigated cropland is only 53% and agro-meteorological conditions play a decisive role. Rainfall is not the major influential factor.

The sowing of spring wheat started in March. During this monitoring period, rainfall and temperature were above the 15YA (RAIN +15%, TEMP +0.4°C), whereas solar radiation was below average (RADPAR -11%). This resulted in a potential biomass decrease (-4.1%). Agronomic indicators did not show a satisfactory vegetation condition index (VCIx 0.7) while the cropped arable land fraction (CALF) decreased by about 26%. The NDVI profile shows very low values in January and February, presumably due to snow cover. Cooler than normal temperatures in March and April had slowed the development of the crops. The spatial patterns of NDVI profiles shows large fluctuations. In most of the areas VCIx was low during this time. Crop conditions were below average during this monitoring period.

Regional analysis

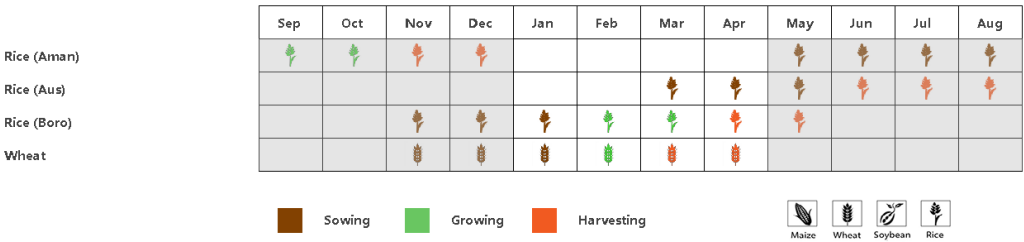
Based on cropping system, climatic zones and topographic conditions, regional analyses are provided for three agro-ecological zones (AEZ): Northern Belarus (028, Vitebsk, northern area of Grodno, Minsk and Mogilev), Central Belarus (027, Grodno, Minsk and Mogilev and Southern Belarus (029) which includes the southern halves of Brest and Gomel regions.

Northern Belarus suffered drop in radiation (-11%), while temperature and rainfall were above average (TEMP +0.4°C, RAIN +18%). This condition resulted in a potential biomass decrease by 4%. Agronomic indicators showed that CALF dropped sharply compared to the 5YA level (-43%). VCIx was rather low as well (VCIx 0.67). Starting from January, the regional NDVI development curve was close to but below the long-term average.

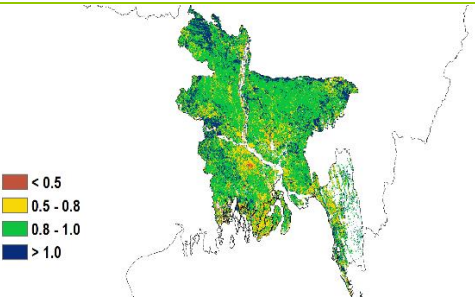
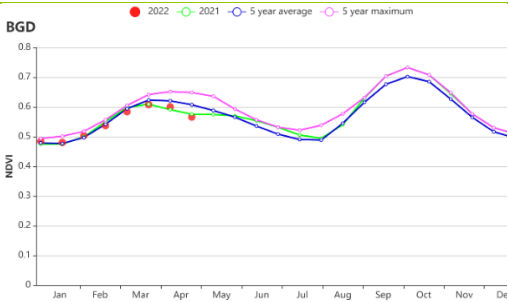
Central Belarus was also affected by low photosynthetically active radiation (RADPAR -11%), while temperature and rainfall were above the 15YA (TEMP +0.3°C, RAIN +16%). The VCIx had a value of 0.76, and CALF was 76%. The potential biomass was also expected to decrease (-4%). Similar to Southern Belarus, the NDVI growth curve started to improve to close to the average trend from January to March, but dropped below the 5YA level in April.

Radiation in Southern Belarus was significantly lower by 13%, while temperature and rainfall were higher by 0.2°C and 9%, respectively. Potential biomass was also estimated to decrease by 4%. And like Central Belarus, CALF and VCIx were 74% and 0.76 respectively.

Figure 3.9 Bangladesh's crop condition, January -April 2021

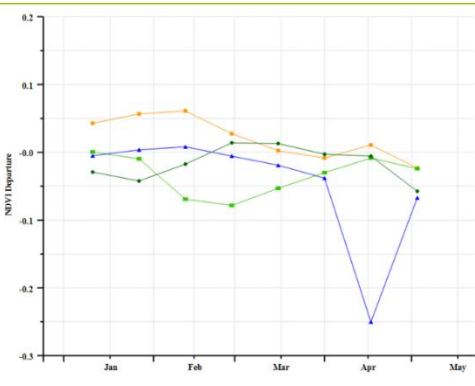
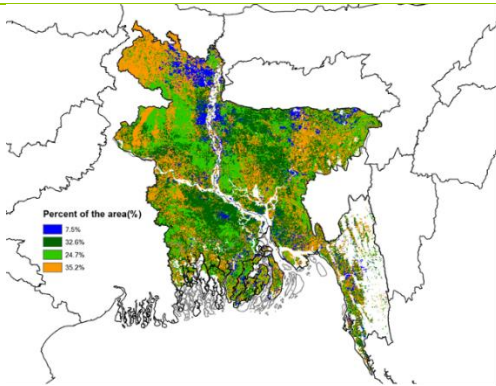


(a). Phenology of major crops



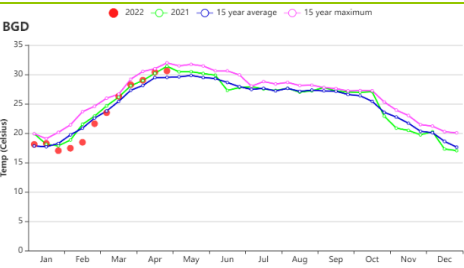
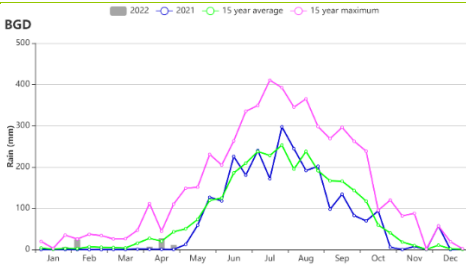
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



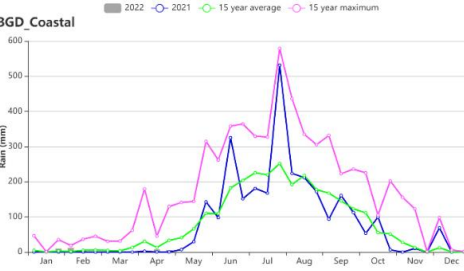
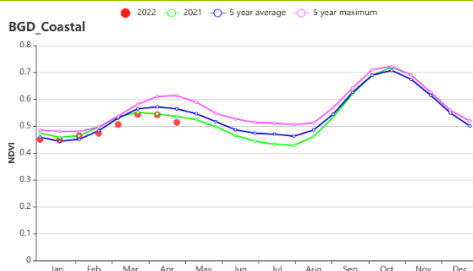
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

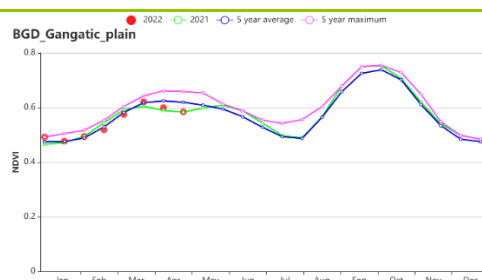


(f) Rainfall profiles

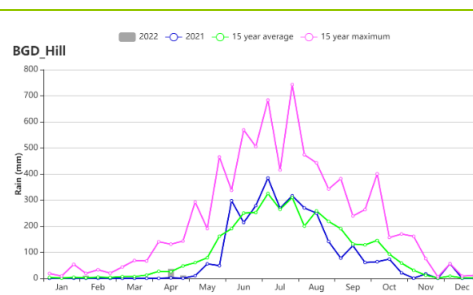
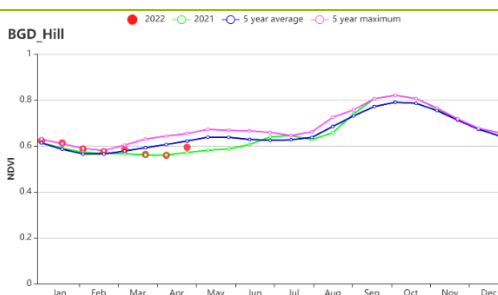
(g) Temperature profiles



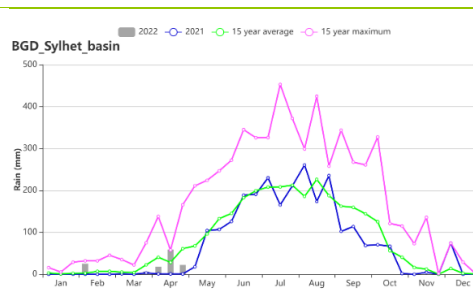
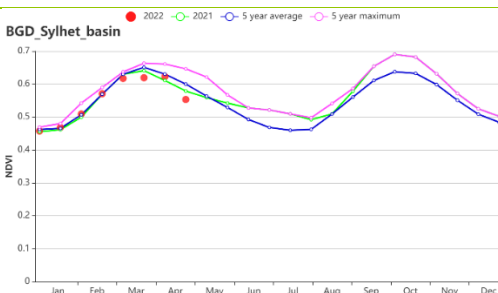
(h) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Coastal region



(i) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Gangetic plain



(j) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Hills



(k) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Sylhet basin

Table 3.10 Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Coastal region	41	-65	24.4	-0.1	1248	2	509	-13
Gangetic plain	56	-45	23.7	0.0	1170	0	493	-11
Hills	69	-52	22.4	-0.1	1246	-1	511	-13
Sylhet basin	135	-27	22.8	-0.2	1143	-2	574	-7

Table 3.11 Bangladesh's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Coastal region	86	1	0.82

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Gangetic plain	97	0	0.9
Hills	97	1	0.88
Sylhet basin	99	0	0.90

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

[BLR] Belarus

Winter wheat was the major crop in the field during this monitoring period. The sowing of spring wheat started in March. The proportion of irrigated cropland in Belarus is only 0.4% and agro-meteorological conditions play a decisive role in the growth of almost all crops. Rainfall and temperature were above the 15YA (RAIN +15%, TEMP +0.4°C), whereas solar radiation was below average (RADPAR -11%). This resulted in a potential biomass decrease (-4.1%). Agronomic indicators did not show a satisfactory vegetation condition index (VCIx 0.7) while the cropped arable land fraction (CALF) largely decreased by about 26%. The NDVI profile shows very low values in January and February, presumably due to snow cover. Cooler than normal temperatures in March and April might slow the development of the crops. The spatial patterns of NDVI profiles show that around 71.5% of cropped areas had approached the 5-year average levels, but they experienced a notable drop from March to April and in most of the areas VCIx was low during this time.

Because ice and snow cover in previous report period might have delayed the sowing and growing of crops, combined with solar radiation deficit and rainy weather in this season, the emergence and growth of plants did not propose a prominent remote sensing signature as usual in this season. This might be the main reason why agronomic indicators (CALF 64%, VCIx 0.72) did not present very favorable conditions for crops during current monitoring period. And more accurate information about crop growth from better observation of CALF and VCIx in the following season is needed.

Regional analysis

Based on cropping system, climatic zones and topographic conditions, regional analyses are provided for three agro-ecological zones (AEZ): Northern Belarus (028, Vitebsk, northern area of Grodno, Minsk and Mogilev), Central Belarus (027, Grodno, Minsk and Mogilev and Southern Belarus (029) which includes the southern halves of Brest and Gomel regions.

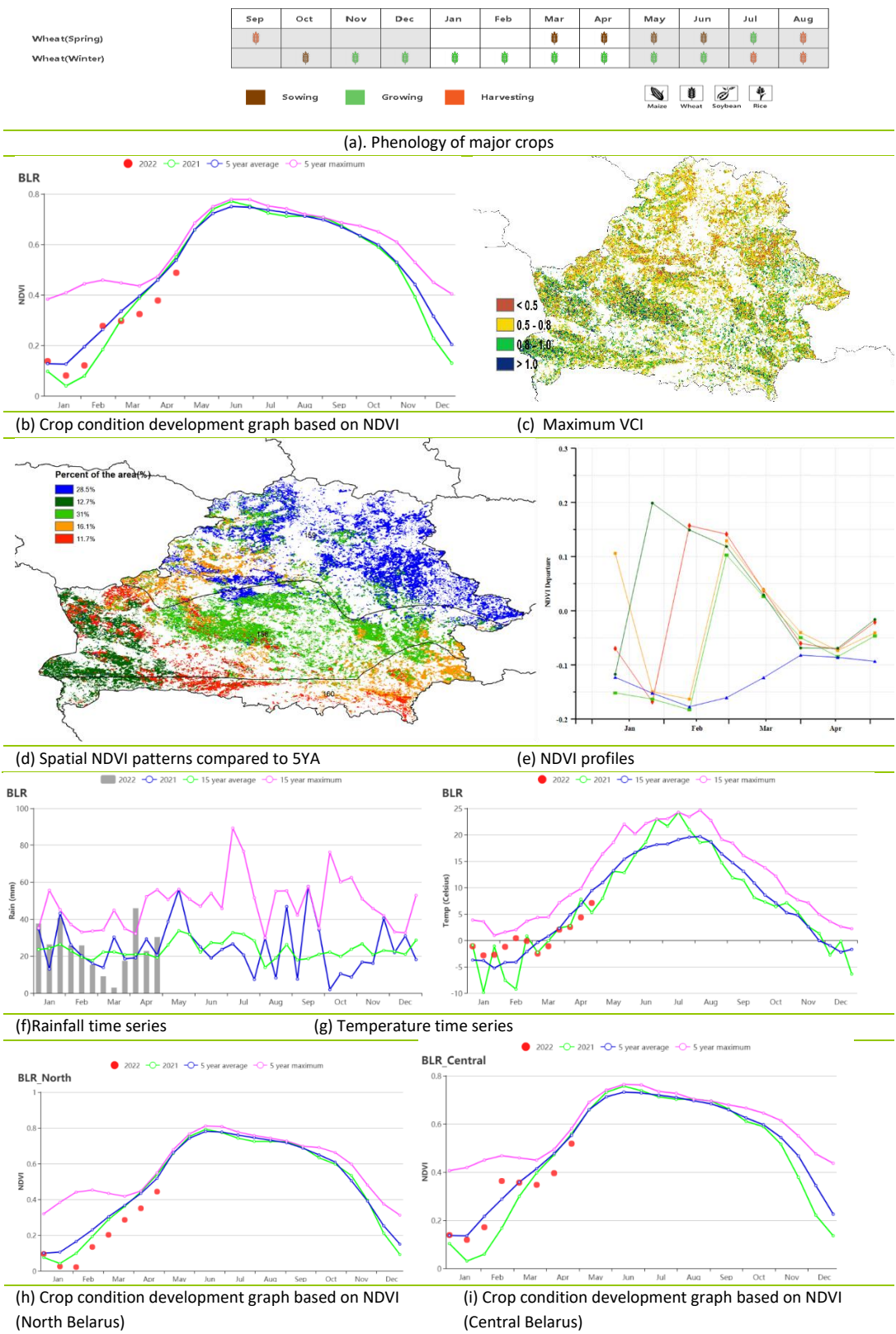
Northern Belarus suffered deficit in radiation (-11%), while temperature and rainfall were above average (TEMP +0.4°C, RAIN +18%). This condition resulted in a potential biomass decrease by 4%. Agronomic indicators showed that CALF dropped a lot compared to the 5YA level (-43%), with a not very high VCIx value (0.67). Starting from January, the regional NDVI development curve was close to but below the long-term average.

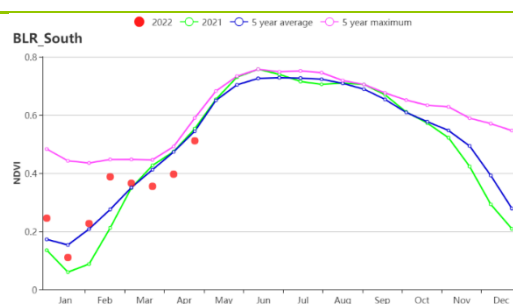
Central Belarus was also affected by low photosynthetically active radiation (11% lower), while temperature and rainfall were above the 15YA (TEMP +0.3°C, RAIN +16%). The VCIx had a value of 0.76, and CALF was 76%. The potential biomass was also expected to decrease (-4%). Similar to Southern Belarus, the NDVI growth curve started to improve to close to the average trend from January to March, but dropped below the 5YA level since April.

Radiation in **southern Belarus** was significantly lower by 13%, while temperature and rainfall were higher by 0.2°C and 9%, respectively. Potential biomass was also expected to decrease by 4%. And like Central Belarus, CALF and VCIx were 74% and 0.76 respectively.

Above all, the three AEZ of Belarus had experienced slow recovery from last season and similar agroclimatic conditions in current season, this might have hindered both the sowing and growing progress of crops. Agronomic situation was also not very favorable, therefore crop status in the following season still require further close attention.

Figure 3.10 Belarus's crop condition, January – April 2022.





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

Table 3.12 Belarus's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January – April 2022.

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Center	303	16	0.8	0.3	376	-11	382	-4
North	309	18	-0.4	0.4	355	-11	341	-4
South-west	278	9	1.3	0.2	379	-13	397	-4

Table 3.13 Belarus's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022.

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Center	76	-15	0.76
North	47	-43	0.67
South-west	74	-18	0.76

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[BRA] Brazil

This bulletin covers the main growing period for soybean, rice and main maize in Center-South. The harvest of those crops almost concluded by the end of April. Second season maize, safrinha, mainly cultivated in Centre-South, reached peak growing stage in March and April and the harvest will start in late May. Rice in the North and Northeast reached the peak of its growth in April. The sowing of maize in the Northeast and wheat in Parana and Rio Grande do Sul starts at the end of the monitoring period.

The proportion of irrigated cropland in Brazil is only 12% and agro-meteorological conditions play a decisive role in the growth of most crops. Since the beginning of the rainy season in September 2021, Brazil experienced prolonged drier and warmer-than-usual weather. From January to April, Brazil received 628 mm rainfall on average, 38% below the 15YA. CropWatch Agro-Climatic Indicators (CWAIs) present 1.1°C higher temperatures and 4% above average radiation compared with the 15YA. Above average temperature and radiation further accelerated the soil moisture loss and further exacerbated the drought conditions. Altogether, the adverse weather resulted in a 19% reduction of potential biomass. Most major agricultural states in central and southern Brazil suffered from severe water shortage while few states in the North received well above average rainfall. Among the top eight major agricultural producing states, only Rio Grande Do Sul received average rainfall (+2%) compared with the 15YA. All other major states experienced significantly below average rainfall with warmer temperature and higher radiation. Low rainfall, high temperature and radiation resulted in below average BIOMSS in all major agricultural producing states except for Rio Grande Do Sul (-2%) and Santa Catarina (+2%). It is also noteworthy that although the weather conditions in the Brazilian main producing states are significantly below the 15YA, the situation is still much better than in the same period of 2021, when the drought conditions were more severe. Only two major states, Mato Grosso, and Santa Catarina experienced drier conditions compared to JFMA 2021 according to the RAIN indicator.

Tracing back to the start of the summer season in September-October 2021, the prolonged dry conditions reduced the overall crop vigor as shown by the continuously below-average vegetation greenness in the crop condition development graph based on NDVI. Nevertheless, the amplitude of the negative NDVI anomalies were narrowed since March 2022 and the NDVI recovered to the 5YA in early-May. Similarly, spatial distribution of NDVI departure from the 5YA and the corresponding profiles also presented significantly below-average NDVI in central Mato Grosso, southern Mato Grosso Do Sul, western Parana, and northwestern Rio Grande Do Sul before March, but recovered to average or above-average level at the end of the monitoring period (dark green region). The below average vegetation greenness before March indicates a reduced production of soybean and first season maize. While no evidence shows the weather conditions were getting better after March, satellite images revealed that the overall recovered crop vigor after March was mainly due to the expanded second maize planted area compared with 2021 and the 5YA. It might be driven by the high maize price after Russia's special military operation in Ukraine. March is still a good sowing window for the second maize in Center and South Brazil. Accordingly, the VCIx map also presents scattered high values (> 1.0) in Central Brazil (figure b). Favorable rainfall in East Coast benefitted crop development which also presented above 1.0 values of VCIx while Northwestern Rio Grande Do Sul presented poor crop conditions with VCIx values below 0.5 due to the drought at peak season in February to March. At the national level, VCIx was 0.91 and almost all cropland was cultivated, indicating overall

limited effects from the dry weather on the sowing of the crops especially for the second maize producing regions.

In general, while crop conditions in Brazil were slightly below average due to the dry and warm weather, the agroclimatic conditions were still relatively more favorable for second maize compared with the same period in 2021. Also, the expanded second maize planted area compared with 2021 compensated the drought affects, resulting in large increase of second maize production.

Regional analysis

Considering the differences in cropping systems, climatic zones and topographic conditions, eight agro-ecological zones (AEZ) are identified for Brazil. These include the Amazon zone (30), Central Savanna (31), the East coast (32), Northeastern mixed forest and farmland (33), Mato Grosso zone (34), the Nordeste (35), Parana River (36), and Southern subtropical rangelands (37). During this monitoring period, dry and hot weather dominated in most AEZs especially in Center South Brazil which was mainly affected by the La Nina effect since the middle of last year.

Central Savanna (31) and Mato Grosso (34) were the two AEZs hit most hard by the exceptional drought, even worse than 2021 during the same period. Rainfall was 72% below average in Central Savanna which resulted in well below average NDVI as presented in the crop development profiles. The impacts were more complicate in Mato Grosso as the monitoring period covered the growth and harvest of first maize and soybean as well as the sowing and growth of second maize. Drought lowered the outputs for first maize and soybean in the region. For the second maize, the significantly below average rainfall in April hampered the second crops development when crops were in high water demand stages, threatening second maize yield. Rainfall was even 20% below 2021 levels. Fortunately, planted area for second maize increased significantly from 2021 which somehow compensated the lower yield impacts.

Parana Basin (36), another major agricultural producing zone, received less than half of the 15YA rainfall during the monitoring period. Adverse weather resulted in poor crop conditions and lower yield for soybean and first maize. Although rainfall was still less than the 15YA since March, it was much higher than the same period in 2021, bringing a relatively better crops development progress for second crops. NDVI based crop development profiles also confirmed the above 2021 crop condition in the second crops growing season. Second maize yield is projected to be above 2021 for the region.

Southern subtropical rangelands (37) experienced 9% above average rainfall but with an irregular distribution. In January and February when first season crops were at peak growing stage, low rainfall and high temperature resulted in poor soil moisture and crop conditions. Crop vigor is below average as reflected by NDVI profiles. When crops reached maturity, above-average rainfall was observed but it was too late for soybean and first maize. Also, the wet weather was unfavorable for the harvest.

Nordeste (35) is dominated by dry and hot weather. As most crops are irrigated in the zone, the abnormal weather had limited effects on the maize. The irrigation mitigated the drought effect, leading to the above-average condition and the highest VCIx values for this zone, as compared with others. Vegetation greenness became lower than average since March which might be attributed to lower planted area for second crops.

Weather conditions in Coast zone (32) was generally normal resulting in close to average crop conditions. Almost all cropland was cultivated with average VCIx at 0.93. However, as recorded by rainfall profiles, the well below average rainfall since late February slowed down the crop development with slightly below average NDVI after February, indicating less favorable conditions for the second crops.

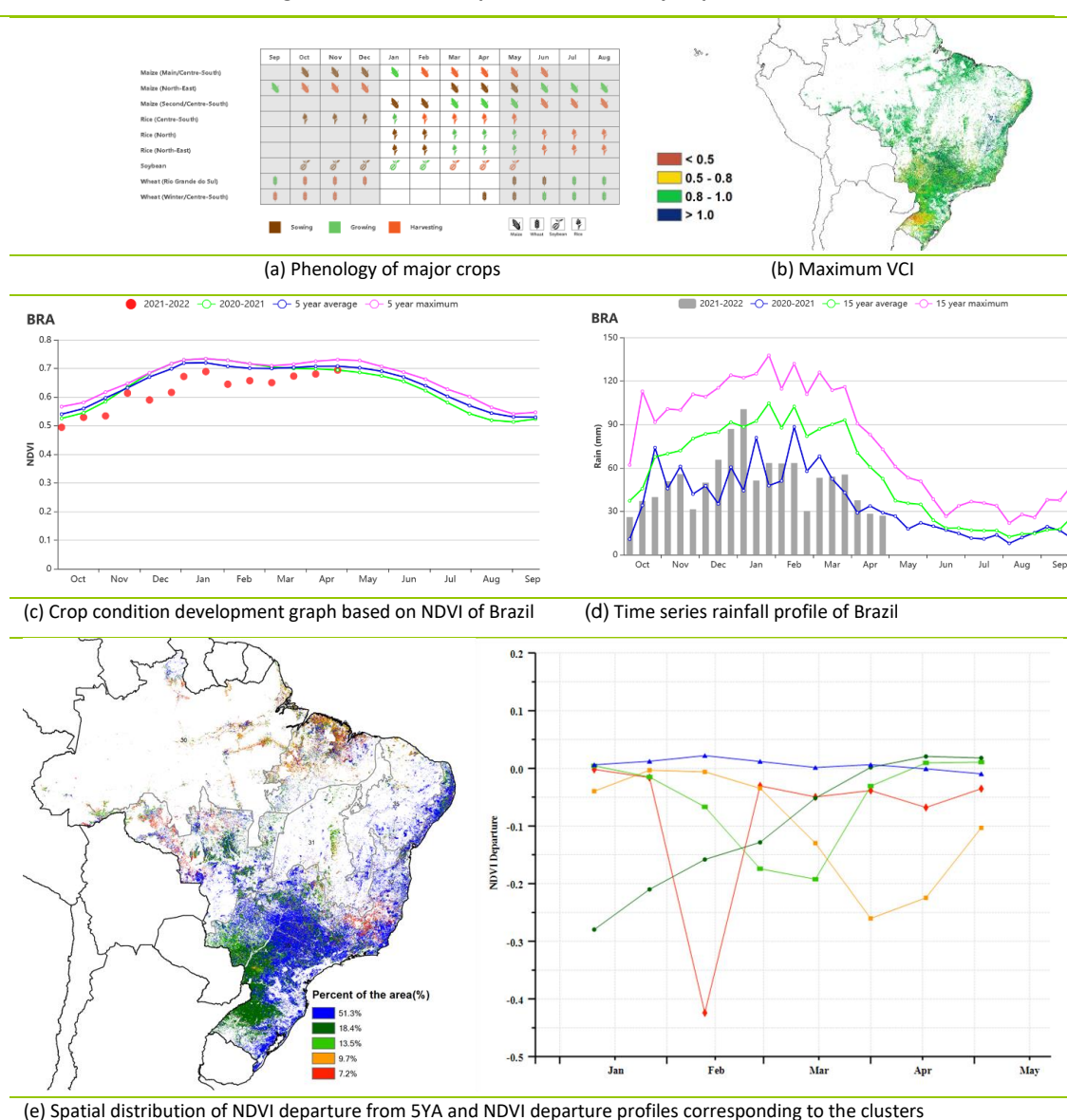
Production outlook

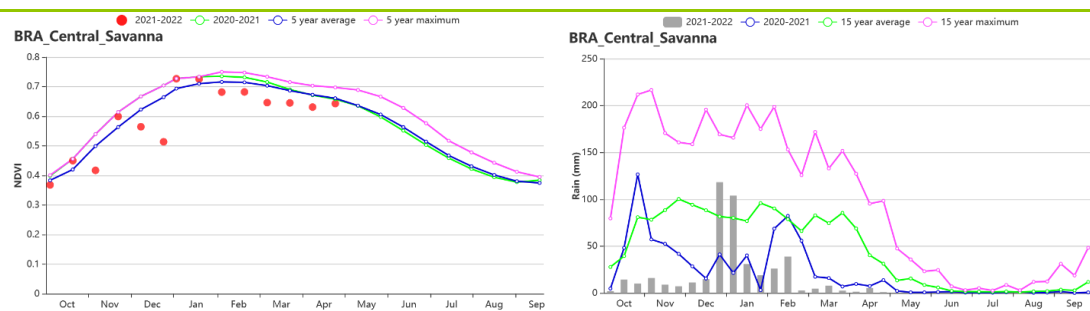
According to CropWatch estimates, the planted area and yield of Brazil's first maize both decreased in 2022, resulted in a decrease of 8.7% in production at 22,589 thousand tonnes. Driven by the increasing maize price, the planted area of second maize expanded by 9.2% from

last year; Although dry and warm weather dominated whole Brazil, the agroclimatic conditions were still less adverse compared with 2021 for second maize, resulting in 6.7% increase of yield for second maize. The production of the second maize is projected at 68,298 thousand tonnes, up by 16.5% from 2021. The total maize production reached 90,887 thousand tonnes, 9.0% increase from the last year. Although rice growing area slightly shrank 0.1%, the yield decreased by 9% and production decreased 9.1%. Since soybean yield and growing area both decreased, it's estimated that soybean production will decrease to 89,205 thousand tonnes with 7.4%.

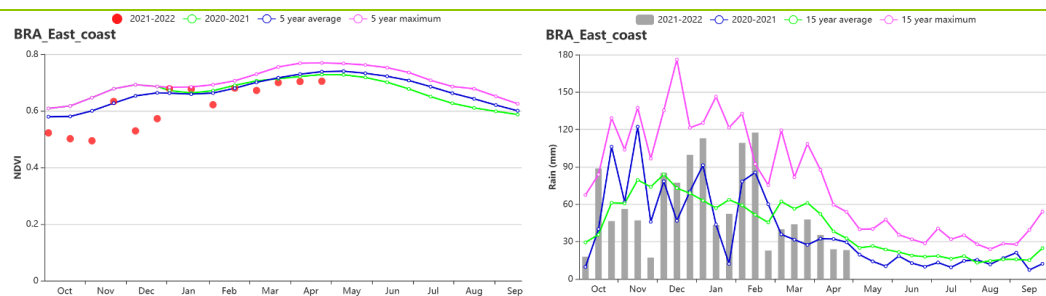
For more indicators and detailed information, it is recommended to visit CropWatch Explore (<http://cropwatch.cn/newcropwatch/main.htm>).

Figure 3.11 Brazil's crop condition, January - April 2022

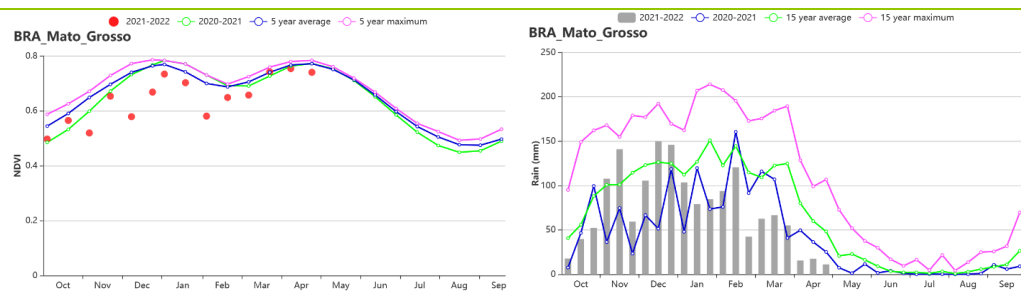




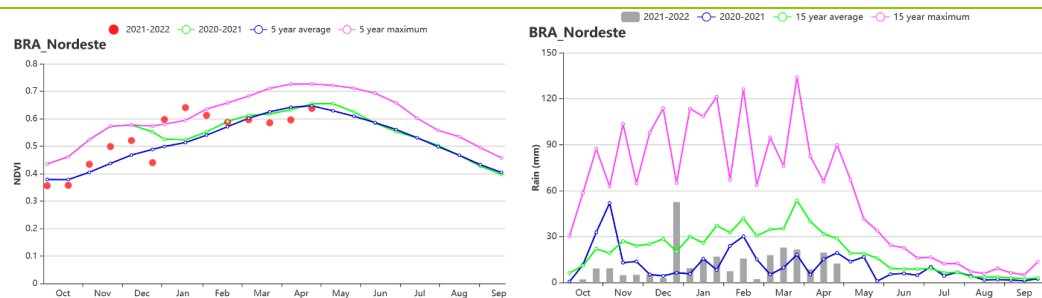
(f) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Central Savanna



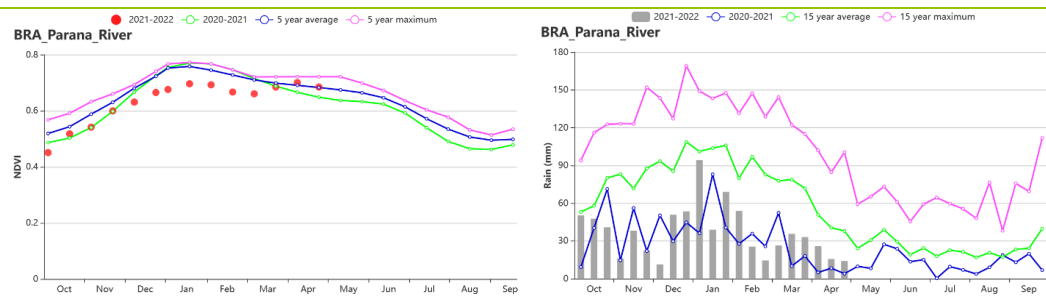
(g) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Coast zone



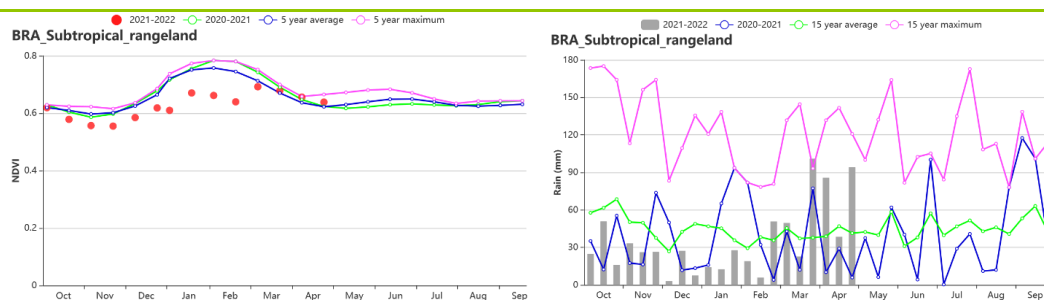
(h) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Mato Grosso



(i) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Nordeste



(j) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Parana basin



(k) Crop condition development graph based on NDVI (left) and rainfall profile (right) of Southern subtropical rangelands

Table 3.14 Brazil's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Amazonas	1222	-8	25.0	0.0	1122	5	1507	1
Central Savanna	244	-72	25.9	2.5	1284	4	753	-43
Coast	672	4	23.5	0.3	1310	6	1154	0
Northeastern mixed forest and farmland	872	-34	25.6	0.7	1230	8	1421	-11
Mato Grosso	752	-43	25.0	0.9	1198	9	1235	-18
Nordeste	170	-60	26.8	1.2	1299	4	751	-25
Parana basin	448	-52	23.7	1.6	1192	1	984	-27
Southern subtropical rangelands	522	9	23.1	0.6	1153	-2	1054	0

Table 3.15 Brazil's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current
Amazonas	100	0	0.94
Central Savanna	100	0	0.92
Coast	100	1	0.93
Northeastern mixed forest and farmland	100	0	0.95
Mato Grosso	100	0	0.94
Nordeste	99	7	0.95
Parana basin	100	0	0.88
Southern subtropical rangelands	100	0	0.83

Table 3.16 Brazil's production outlook in 2022

2020-2021	2021-2022
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	Production	Area change	Yield change	Production	Production change
	(thousand tonnes)	(%)	(%)	(thousand tonnes)	(%)
First season maize	24739	-4.1	-4.8	22589	-8.7
Second season maize	58606	9.2	6.7	68298	16.5
Rice	11851	-0.1	-9	10774	-9.1
Soybean	96300	-2.6	-4.9	89205	-7.4

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[CAN] Canada

From January to April, winter cereals are the only crops that were grown in Canada. Winter wheat is usually planted in the period of September to November and reaches maturity in July and August. It is mainly grown in Ontario and Quebec. Some winter wheat is grown in the Saskatchewan, Alberta and Manitoba provinces as well. The winter wheat conditions were below the 5-year average according to the NDVI development graph.

The proportion of irrigated cropland in Canada is only 5% and agro-meteorological conditions play a decisive role in the growth of most crops. Below-average temperature and above-average precipitation occurred in Ontario, Quebec, Manitoba and Saskatchewan. According to CropWatch Agroclimatic indicators, the precipitation was above the 15-year average by 15% while temperatures were below average by 0.5 °C, and radiation was below average by 7%. Above average precipitation created favorable conditions for winter wheat. The sowing of spring wheat crop will start in May. Its success will depend on the soil moisture conditions. Excessive soil moisture will delay timely sowing, whereas dry conditions will cause poor germination.

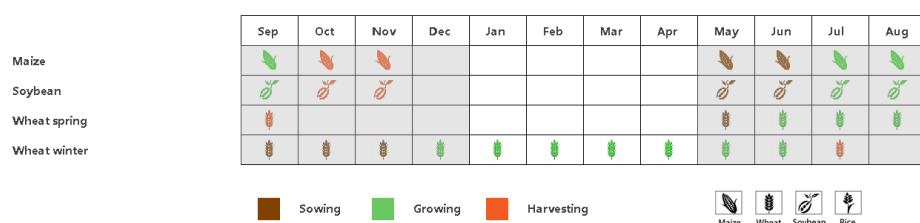
Regional analysis

The **Prairies** (area identified as 30 in the NDVI clustering map) and Saint Lawrence basin (26, covering Ontario and Quebec) are the major agricultural regions.

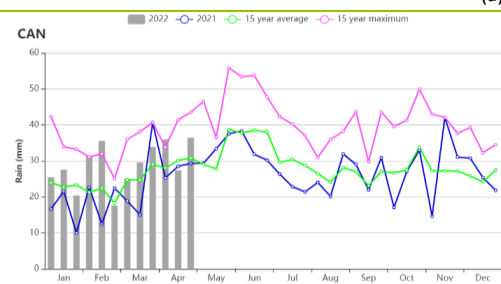
In the **Prairies**, precipitation was above average (RAIN +12%), while the temperature and radiation were lower than the 15-year average (TEMP -0.2°C; RADPAR -7%, respectively). By the end of April, hardly any crops had been sown.

The **Saint Lawrence basin** is the main winter wheat production area in Canada. Most winter wheat is grown in southeastern Ontario, near Toronto and Ottawa. The temperatures and radiation were below the 15-year average (TEMP -0.8°C; RADPAR -7%), and the precipitation was significantly above average (RAIN +29%). Despite the below average trend of NDVI, prospects for winter wheat production are favorable, due to sufficient soil moisture levels.

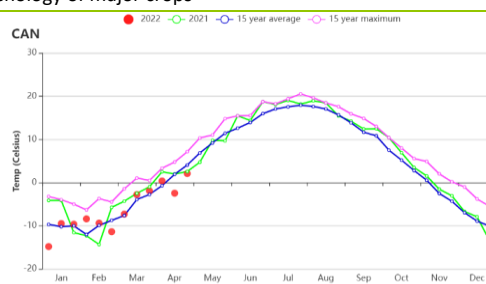
Figure 3.12 Canada's crop condition, January - April 2022



(a). Phenology of major crops



(b) Rainfall profiles



(c) Temperature profiles

Table 3.17 Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Saint Lawrence basin	473	12	-4.7	-0.2	539	-7	253	-3
Prairies	235	29	-6.5	-0.8	538	-7	227	-12

Table 3.18 Canada's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Saint Lawrence basin	51	-6	0.77
Prairies	1	-71	0.69

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[DEU] Germany

This reporting period covers the overwintering and spring green-up phases of the winter cereals. In late April, winter wheat and barley were at the late vegetative stages, and spring wheat and maize were being planted. Generally, the crop conditions in Germany were near average in most regions based on the agroclimatic and agronomic indicators.

The proportion of irrigated cropland in Germany is only 7% and agro-meteorological conditions play a decisive role in the growth of most crops. At the national level, temperatures and solar radiation were above average (TEMP +0.2°C; RADPAR +1%), whereas total precipitation was below average (RAIN -2%). As can be seen from the time series of the rainfall profile, precipitation was significantly below average during the monitoring period, with the exception of early January, early and mid-February, and early April when precipitation was significantly above average. Most of northern Germany experienced significant above-average temperatures throughout the monitoring period, except for early March and April, while most of southern Germany experienced warmer-than-usual conditions, except for the period in mid-January, late February, mid-early March and April (see Figure 2.5(c) and 2.5(d)). Due to warmer-than-normal temperatures and clear skies, the biomass production potential (BIOMSS) is estimated to increase by 1% nationwide as compared to the average of the past 15 years.

CropWatch agronomic indicators based on NDVI development graph at the national scale show that NDVI values were close to average or below average due to snow cover in January, consistent with the previous monitoring period, and then back up to the average in February. They subsequently dropped to below average due to the precipitation deficit. These observations are confirmed by the clustered NDVI profiles: 28.5% of regional NDVI values were below average in late January. Subsequently, NDVI values were at average levels in almost 100% of the region in February, but then dropped to below average levels from mid-March to late-March. Overall VCIx for Germany was 0.91. CALF during the reporting period was the same as the recent five-year average.

Generally, crop conditions were close to the 5-year average in most parts of Germany. High rainfall in early April helped increase soil moisture, but it is starting to get depleted, because of below-average rainfall in the last 2 decades of April. More rainfall will be needed in May and June to ensure high cereal yields.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, six sub-national agro-ecological regions are adopted for Germany. They include: the Wheat Zone of Schleswig-Holstein and the Baltic coast, Mixed Wheat and Sugar beet Zone of the Northwest, Central Wheat Zone of Saxony and Thuringia, Sparse Crop Area of the East-German Lake and Heathland area, Western Sparse Crop Area of the Rhenish Massif and the Bavarian Plateau.

Schleswig-Holstein and the Baltic Coast are among the major winter wheat zones of Germany. The region experienced warmer weather (TEMP +0.8°C), above-average radiation (RADPAR +1%) and rainfall (RAIN +11%). As a result, BIOMSS is expected to increase by 5% as compared to the average. As shown in the crop condition development graph (NDVI), the values were significantly above average in the first part of this monitoring period, and then below average from early February to late April. The area has a high CALF (99%) as well as a favorable VCIx (0.97), indicating a large cropping area.

Wheat and sugarbeets are the major crops in **the Mixed Wheat and Sugarbeet Zone of the Northwest**. According to the CropWatch agroclimatic indicators, temperature was higher than average (TEMP +0.6°C), while rainfall and radiation were both above average (RAIN +7%; RADPAR +1%), which led to an increase in BIOMSS by 5%. As shown in the crop condition development graph based on NDVI, the values were below average during the monitoring period, except for near

average in early January and mid-February. The area has a high CALF (100%) and crop conditions for the region are favorable according to the high VCIx (0.89).

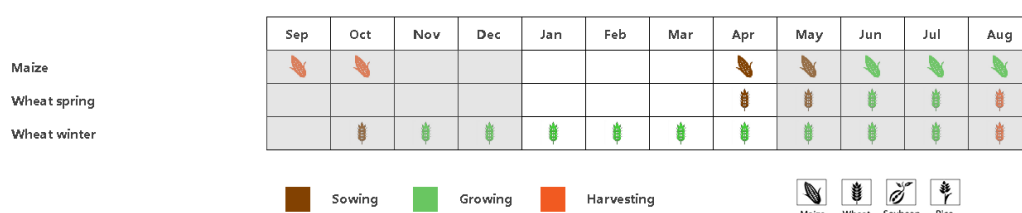
Central Wheat Zone of Saxony and Thuringia is another major winter wheat zone. RAIN was near average, and TEMP was above average (+0.2°C) but RADPAR was below average (-4%). The biomass potential (BIOMSS) was the same as the 15YA. As shown in the crop condition development graph based on NDVI, the values were significantly below average in the first part of this monitoring period and remained below average from mid-March to late April. The area has a high CALF (99%) and the VCIx was 0.85 for this region.

Average to below-average precipitation was recorded in **the East-German Lake and Heathland Sparse Crop Area** (RAIN -4%). TEMP was above average (+0.3°C) but RADPAR was below average (-1%). The biomass potential (BIOMSS) was the same as the 15YA. As shown in the crop condition development graph based on NDVI, the values were close to average in the first part of this monitoring period and were below average from early March to late April. The area has a high CALF (99%) and the VCIx was 0.88 for this region.

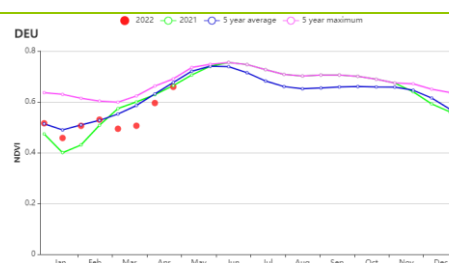
Crop conditions were favorable in **the Western Sparse Crop Area of the Rhenish Massif**. Average to above-average precipitation was recorded in this region (RAIN +4%), with above-average temperature and solar radiation (TEMP +0.3°C; RADPAR +1%). The biomass potential (BIOMSS) increased by 3% compared to the 15YA. As shown in the crop condition development graph based on NDVI, the values were significantly below average in late January, and stayed below average from early March to mid-April. The VCIx value was 0.94 for the western areas. The CALF was 100% for the regions.

On average, a significant reduction in rainfall was recorded for **the Bavarian Plateau** (RAIN -11%), with below-average temperature (-0.3°C) and above-average radiation (RADPAR +3%). Compared to the five-year average, BIOMSS decreased by 3%. As shown in the crop condition development graph based on NDVI, the values were significantly below average in late January, and stayed below average from early March to mid-April. The area had a high CALF (99%) as well as a favorable VCIx (0.93).

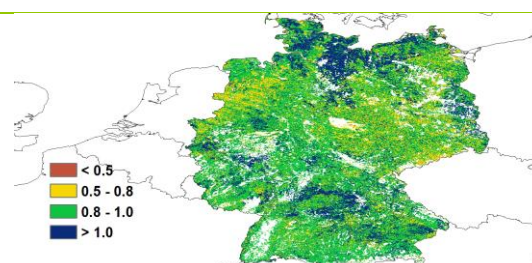
Figure 3.13 Germany's crop condition, January-April 2022



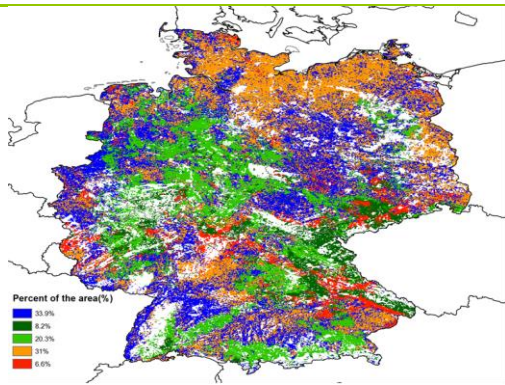
(a). Phenology of major crops



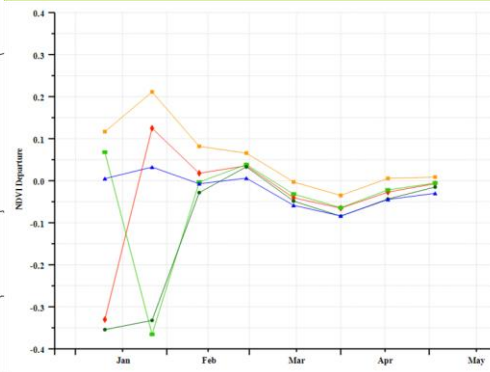
(b) Crop condition development graph based on NDVI



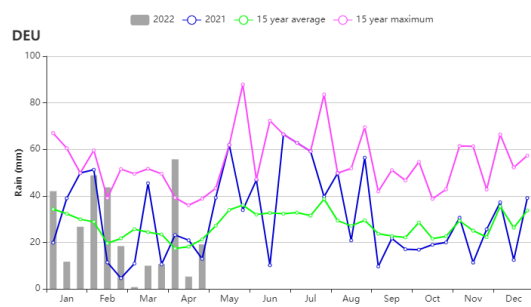
(c) Maximum VCI



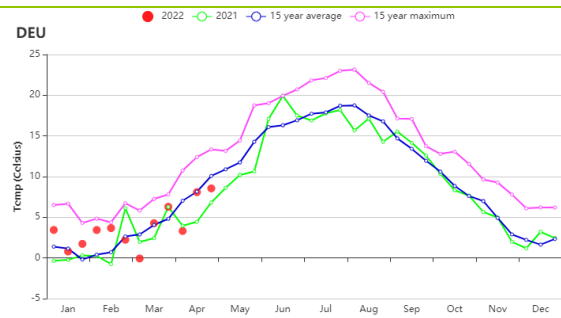
(d) Spatial NDVI patterns compared to 5YA



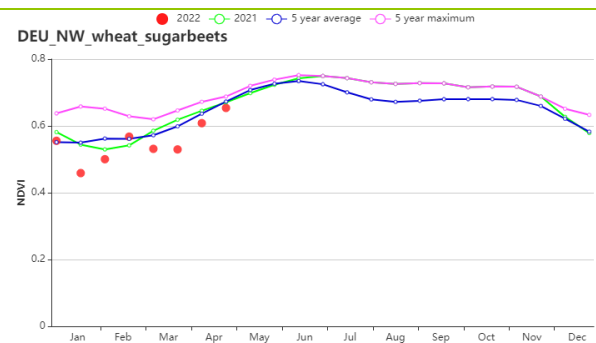
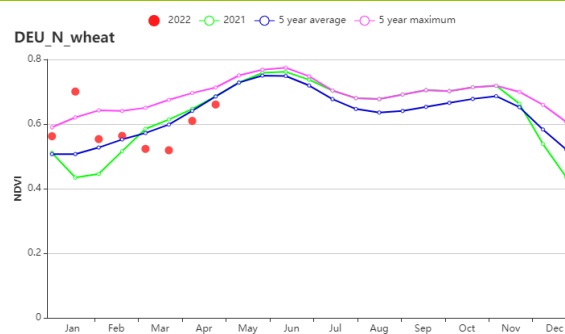
(e) NDVI profiles



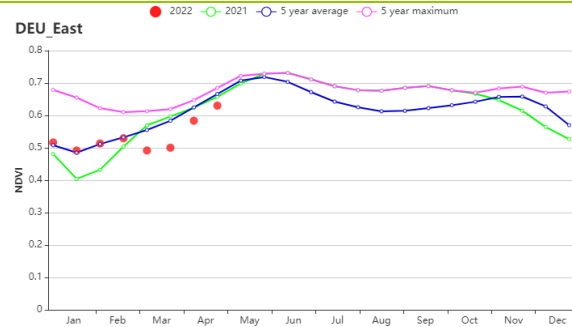
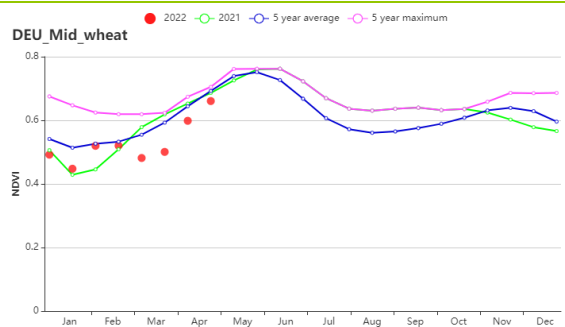
(f) Rainfall profiles



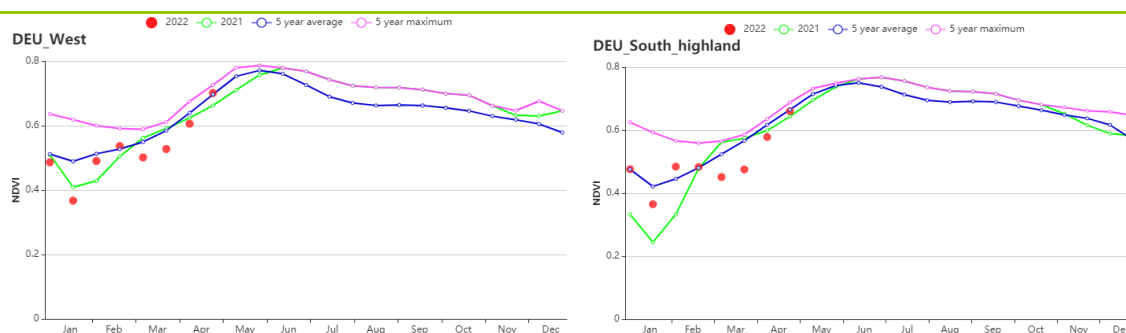
(g) Temperature profiles



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



(i) 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))



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

Table 3.19 Germany's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Wheat zone of Schleswig-Holstein and the Baltic coast	298	11	4.9	0.8	474	1	533	5
Mixed wheat and sugarbeets zone of the north-west	306	7	5.0	0.6	492	1	545	5
Central wheat zone of Saxony and Thuringia	244	0	3.5	0.2	488	-4	469	0
East-German lake and Heathland sparse crop area	238	-4	3.7	0.3	494	-1	485	0
Western sparse crop area of the Rhenish massif	291	4	4.0	0.3	524	1	510	3
Bavarian Plateau	318	-11	2.5	-0.3	596	3	457	-3

Table 3.20 Germany's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Wheat zone of Schleswig-Holstein and the Baltic coast	99	0	0.97
Mixed wheat and sugarbeets zone of the north-west	100	0	0.89
Central wheat zone of Saxony and Thuringia	99	0	0.85
East-German lake and Heathland sparse crop area	99	0	0.88
Western sparse crop area of the Rhenish massif	100	0	0.94
Bavarian Plateau	99	0	0.93

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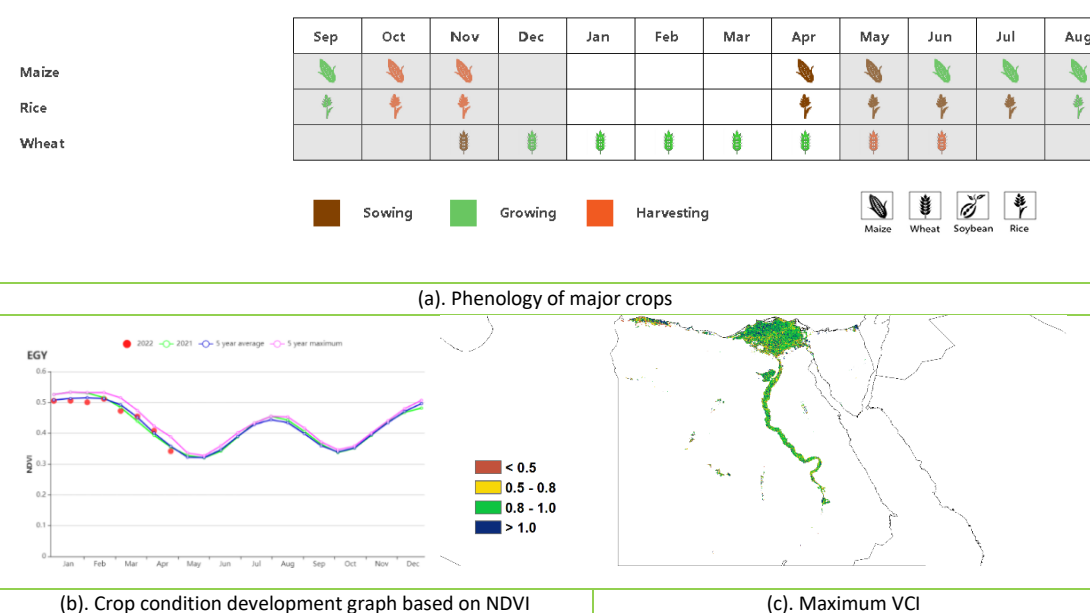
[EGY] Egypt

This report covers the primary growing season of winter wheat and the sowing of maize and rice. Irrigated agriculture is highly developed in Egypt and almost all arable land is irrigated, so rainfall is not the major influential factor. The CropWatch agro-climatic indicators show that the recorded rainfall was 49 mm, 3% less than the average of the last 15-years (15YA). The rainfall index graph shows that most rainfall fell during January and February. The average temperature was 14.6°C, 1.0°C lower than the 15YA. The temperature index graph shows that it was cooler than usual except for late March. Both RADPAR and BIOMSS were lower than the 15YA, respectively, by 2.5% and 8%. The reduction in estimated BIOMSS was presumably due to a decrease in rainfall. The nationwide NDVI development graph shows that the crop conditions fluctuated around the 5-year average (5YA). The NDVI profile map indicates that 33.9% of the cultivated area was above the 5YA, 43% fluctuated around the 5YA, and 23.1% was below the 5YA. The VCIx map indicates that the crop conditions were generally favorable. This finding agrees with the country's VCIx value of 0.82, and the CALF exceeded the 5YA by 2%. Crop conditions for Egypt were average.

Regional Analysis

Based on the cropping systems, climatic zones, and topographic conditions, Egypt is subdivided into three agro-ecological zones (AEZ). Only two are relevant for crop production: (1) the Nile Delta and the Mediterranean coastal strip, as well as (2) the Nile Valley. In the Nile Delta and Mediterranean coastal strip, the average rainfall was 53 mm, only 1% above the 15YA while in the Nile Valley zone, it was 13 mm, 25% below the 15YA. The temperature for both zones was above the 15YA by 1.0°C and 1.2°C, respectively. In Egypt, most crops are irrigated, so rainfall has little impact on crop production. RADPAR and BIOMSS both deviated below the 15YA by about 3% and 4% for the first zone and by 0.9% and 17% for the second, respectively. The NDVI-based crop condition development graphs show similar conditions for both zones following the national crop development NDVI graph. The VCIx was 0.86 and 0.82 for the first and second zone, respectively, while the CALF exceeded the 5YA by 2% for both zones, indicating average crop conditions.

Figure 3.14 Egypt's crop condition, January-April 2022



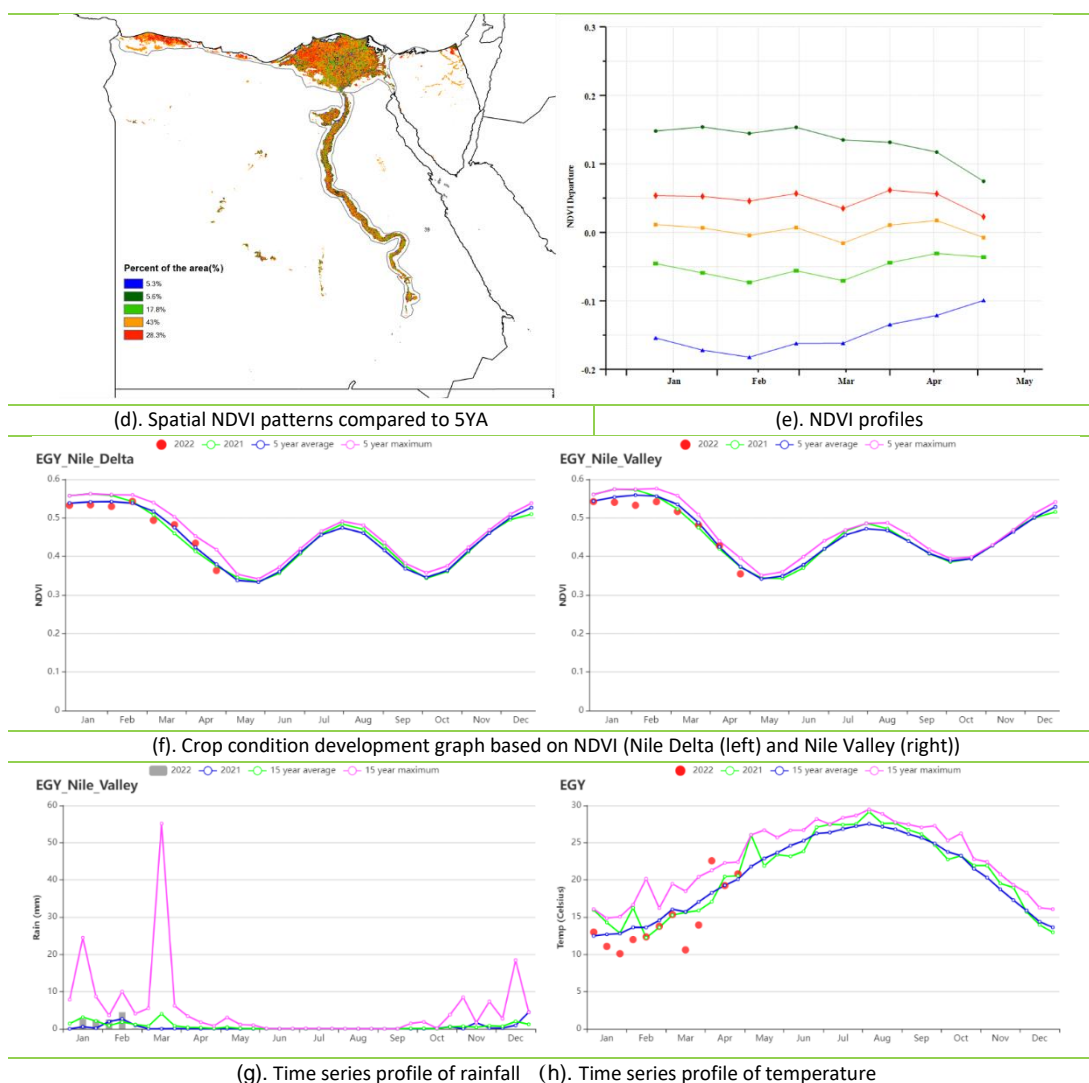


Table 3.21 Egypt's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Nile Delta and Mediterranean coastal strip	53	1	14.5	-1.0	976	-3.0	312	-4
Nile Valley	13	-25	15.1	-1.2	1099	-0.9	212	-17

Table 3.22 Egypt's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January-April 2022

Region	CALF		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current
Nile Delta and Mediterranean coastal strip	71	2	0.86

Region	CALF		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current
Nile Valley	81	2	0.82

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NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[ETH] Ethiopia

The monitoring period for this report covers January to April. Harvest of last year's main crops (barely, teff and wheat) was completed in December, amidst drier than usual conditions. In March and April, the planting of maize started. The proportion of irrigated cropland in Ethiopia is only 5% and agro-meteorological conditions play a decisive role in the growth of crops. However, significant rainfall started in mid-April only. Rainfall had dropped by 48% from the 15YA, temperature (+0.3°C) and solar radiation (+2%) were slightly higher than the 15YA. Below-average rainfall resulted in a 17% reduction of potential biomass compared with the 15YA. The drought was most severe in the southern regions of the country. In the South-eastern mixed maize zone rainfall was 22% below average. The crop condition development graph based on NDVI for Ethiopia presents below-average values in March and April mainly due to late planting of maize caused by dry weather in southeastern Ethiopia. The NDVI departure clustering maps show a negative departure in the south. The average Maximum VCI for Ethiopia was 0.69. The Maximum VCI graph shows the same pattern as the NDVI departure clustering map. The cropped arable land fraction decreased by 11% compared to the 5YA. This was due to poor soil moisture conditions. In short, land preparation and maize planting were negatively affected by below-average rainfall in the southern and eastern parts of the country. Crop cultivation in the war-torn northern semi-arid region has been severely impacted.

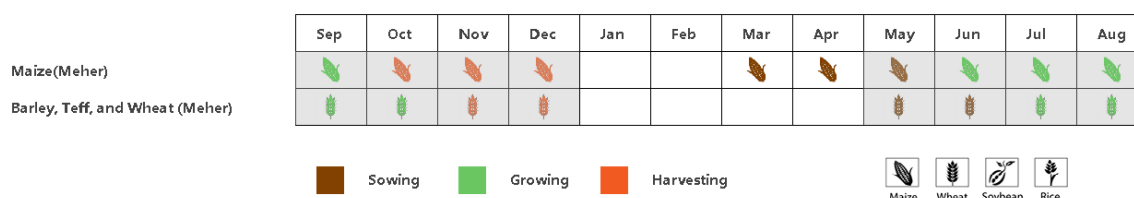
Regional analysis

The agroclimatic conditions in **Semi-arid pastoral areas, Southeastern Mendebo highlands zone** and **South-eastern mixed maize zone** as well as the Semi-arid pastoral areas were similar: Low precipitation but average temperature and adequate photosynthetically active radiation. As a result, the estimated cumulative biomass was reduced by 12%, 29% and 22% in the three regions compared to 15YA. The NDVI was also below the average level in March and April, which means that the forage growth and maize sowing were affected by the drought, which also caused a drop in the cropped arable and fraction and the maximum VCI was less than 0.65. In conclusion, the drought impacted forage production and a delay in maize planting in the southeast zone.

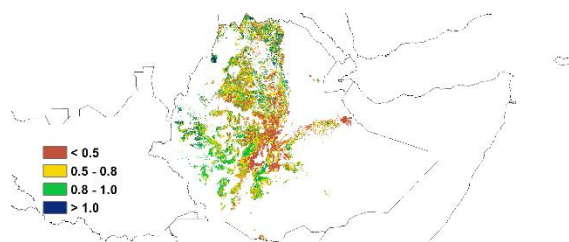
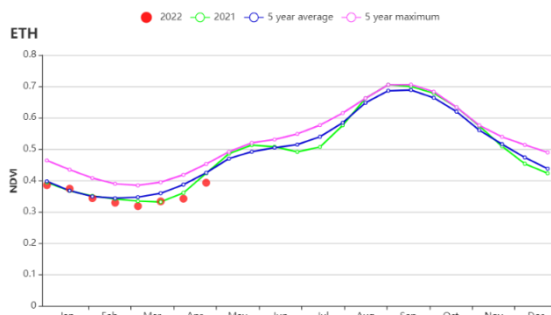
The agroclimatic conditions in **western mixed maize zone** were different. There was a slight decrease in rainfall (-16%), but the effect on cumulative biomass (-4%) was minimal. The cropped arable and fraction did not change much either. The NDVI was near the 15YA and the maximum VCI at 0.85. Conditions for maize cultivation in this region can be assessed as close to normal.

The **northern arid area** is an agricultural area in northern Ethiopia. Due to the war, the cropped arable land fraction was almost zero and the severe food shortage is continuing.

Figure 3.15 Ethiopia's crop condition, January 2022-April 2022

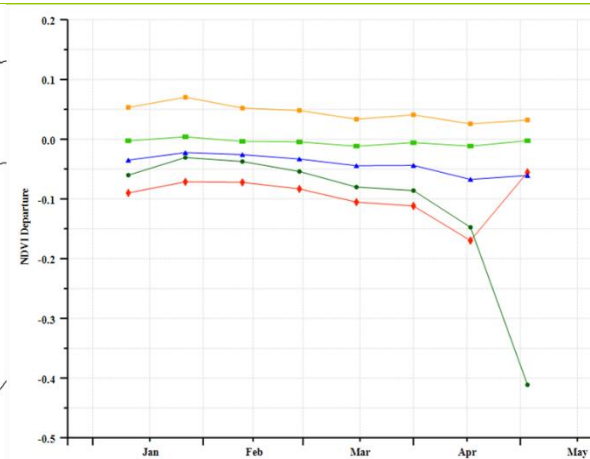
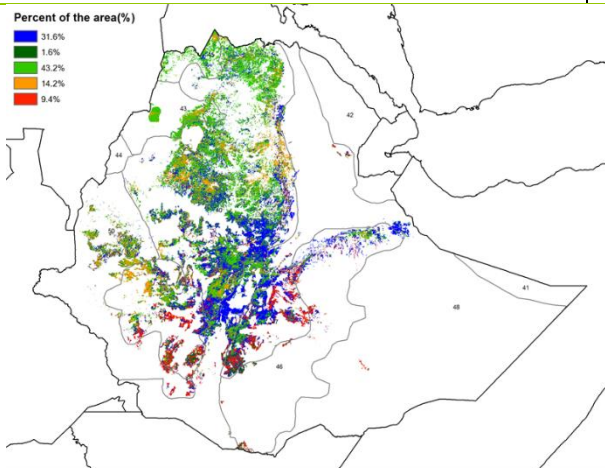


(a) Phenology of major crops



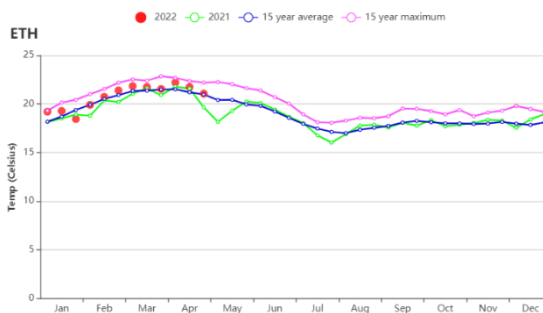
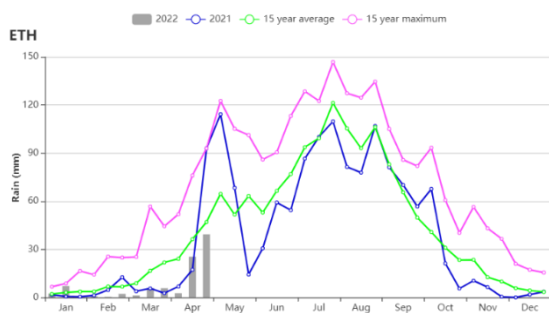
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



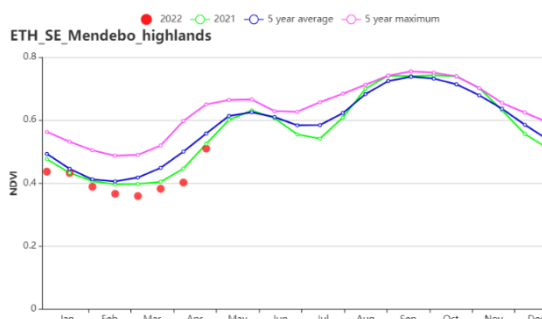
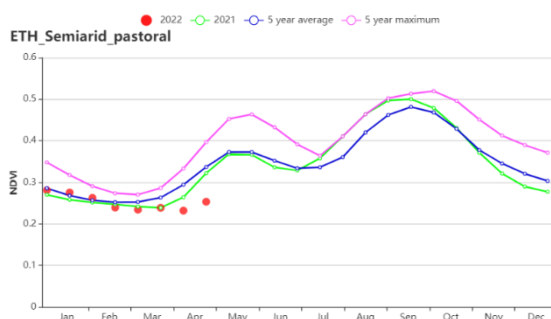
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

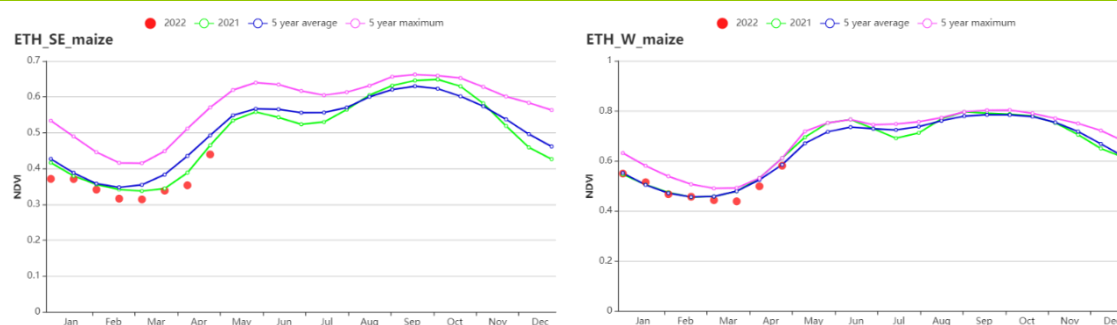


(f) Rainfall profiles

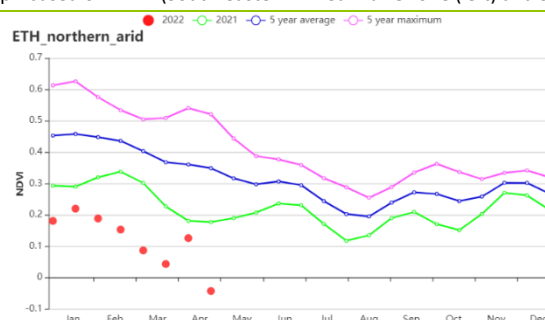
(g) Temperature profiles



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



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



(j) Crop condition development graph based on NDVI (Northern arid area)

Table 3.23 Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January 2022-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Semi-arid pastoral areas	74	-52	22.8	1.5	1427	3	551	-12
South-eastern Mendebo highlands	70	-68	16.6	0.3	1417	5	402	-29
South-eastern mixed maize zone	78	-68	20.3	1.0	1389	6	495	-22
Western mixed maize zone	168	-16	24.5	0.0	1297	0	650	-4
Northern arid area	64	11	26.1	0.6	1404	3	577	3

Table 3.24 Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January 2022-April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Semi-arid pastoral areas	14	-32	0.47
South-eastern Mendebo highlands	64	-12	0.65
South-eastern mixed maize zone	50	-24	0.58
Western mixed maize zone	94	-1	0.85
Northern arid area	0	-100	0.32

[FRA] France

This report covers the growing period of winter wheat, as well as the sowing of spring wheat and maize in France. The proportion of irrigated cropland in France is only 9% and agro-meteorological conditions play a decisive role in the growth of most crops. CropWatch agro-climatic indicators, when compared to the 15YA, show that RAIN was 30% lower than average and sunshine was above average (RADPAR +6%). The temperature was at the average level. Due to extremely unfavorable precipitation conditions, the biomass production potential (BIOMSS) is estimated to have decreased by 7% nationwide compared to the 15-year average. The national-scale NDVI development graph shows that the NDVI values were generally lower than in the 2021 season and the 5YA. The crop conditions were close to the 5-year average in January and February. This is also partly reflected by the spatial distribution of maximum VCI (VCIx) across the country, which reached an average of 0.86. Overall, below-average rainfall starting in mid-January caused unfavorable growth conditions for most of France.

Regional analysis

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

In the Northern barley region, RADPAR and TEMP were both above average (+6% and +0.6°C respectively), while RAIN was below average (-19%). The BIOMSS also decreased by 5% when compared to the past 15 YA. The CALF was at the average level, and VCIx was 0.88. Crop condition development based on NDVI for this region was at the 5-year average level during most monitoring period, but it was below average in March.

In the Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean, slightly warmer (TEMP 0.5°C) and sunnier (RADPAR 3%) weather was observed, but precipitation was below average (RAIN -30%). Estimated BIOMSS was 11% lower than average, CALF was at the average level and VCIx was at 0.91. The regional NDVI profile presented a slightly lower but close-to-average trend.

In the Maize-barley and livestock zone along the English Channel, RADPAR and TEMP were above average by 3% and 0.8°C. RAIN was lower than the average (-26%). BIOMSS decreased by 7%. CALF was average and VCIx was relatively high at 0.94. The regional NDVI profile also presented an overall close-to-average trend, except for mid-January, when it exceeded the 5 years maximum.

In the Rapeseed zone of eastern France, the NDVI profile also indicated general below-average conditions, although it was slightly above the average in early and mid-January. Overall, RAIN in this period dropped by 22% from the average levels, while TEMP increased by 0.1°C. RADPAR increased by 9%. BIOMSS was about 1% lower than average while CALF was at the average level, and VCIx was 0.9.

In the Massif Central dry zone, TEMP and RADPAR were 0.1°C and 7% higher than the average, respectively, while RAIN decreased by 31%. The VCIx was 0.9 and BIOMSS decreased by 3% which indicated a below-average cropping season in the region. Crop conditions based on the NDVI profile were also below the average levels.

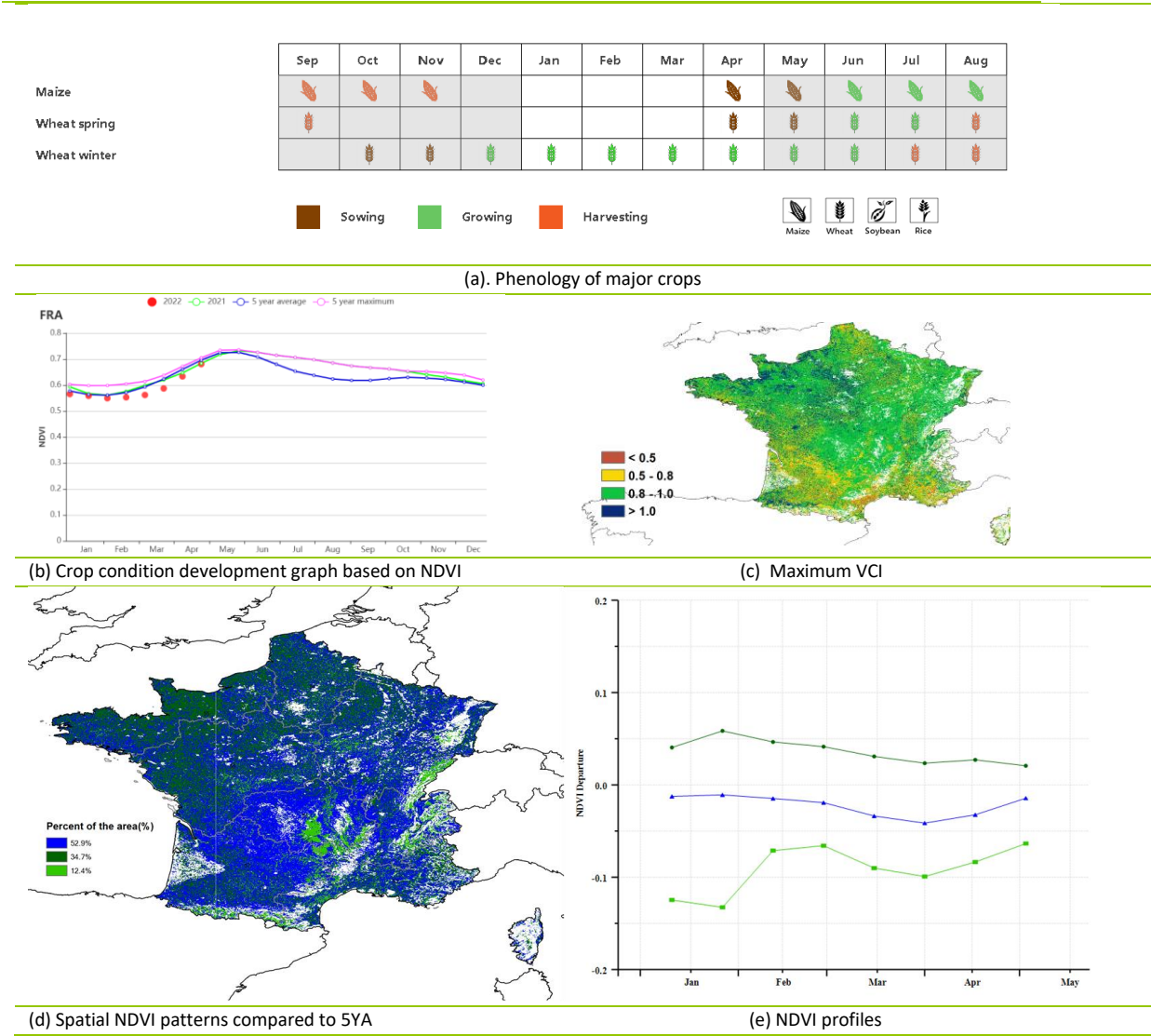
The Southwestern maize zone is one of the major irrigated regions in France. The regional NDVI profile also presented a below-average trend. RAIN in the period was 29% lower than average, while TEMP was near average. RADPAR slightly increased by 3%. BIOMSS was also 5% lower than

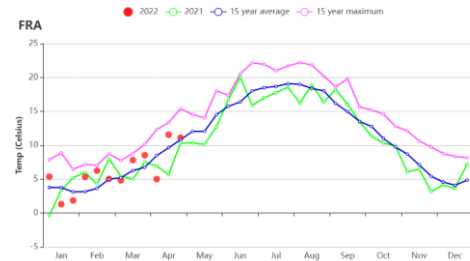
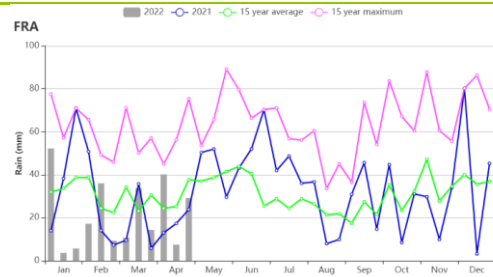
average, while CALF was 1% below average. The VCIx was recorded at 0.79, indicating below-average crop conditions.

In the Eastern Alps region, the NDVI profile also presented an overall below average trend, but it was close to average in late April. RAIN in the region was 36% lower than average, while TEMP was slightly higher than average level (+0.1 °C) and RADPAR was 10% higher than the 15YA. BIOMSS was 8% lower than the fifteen-year average. VCIx for the region was recorded at 0.8 and CALF was at the average level, indicating overall below-average crop conditions.

The Mediterranean zone also presented an overall lower NDVI profile. The region recorded a low VCIx (0.74). TEMP and RADPAR were above average by 1.1 °C and 6%, respectively, while RAIN was lower than average by 45%. BIOMSS and CALF decreased by 19% and 2%. This region is showing below-average crop conditions due to the low precipitation throughout the monitoring period.

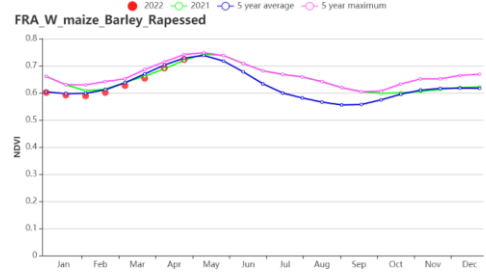
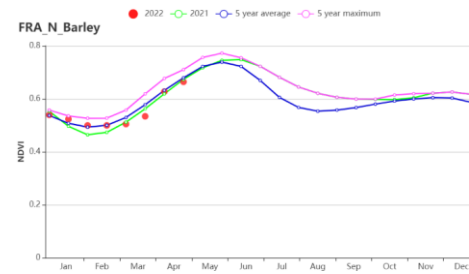
Figure 3.16 France’s crop condition, January - April 2022



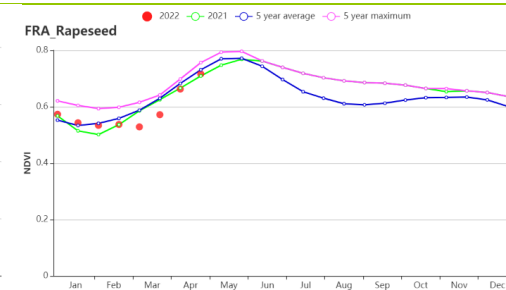


(f) Rainfall profiles

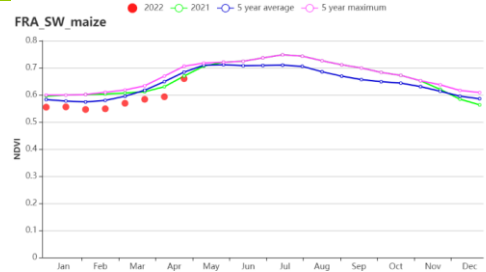
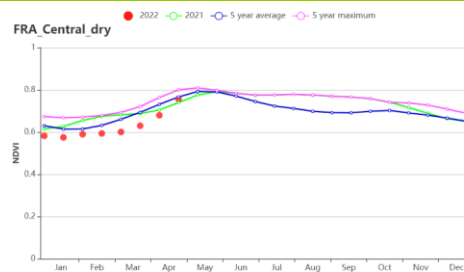
(g) Temperature profiles



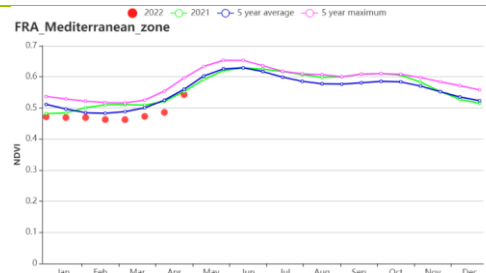
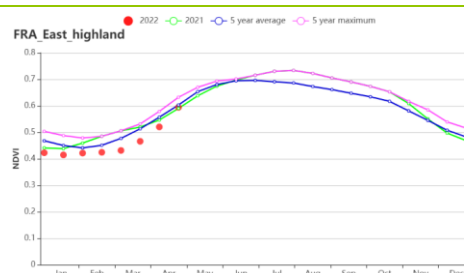
(h) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))



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



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



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

Table 3.25 France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Northern Barley zone	234	-19	6.5	0.6	568	6	545	-5
Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean	223	-30	7.6	0.5	609	3	548	-11
Maize barley and livestock zone along the English Channel	242	-26	7.8	0.8	575	3	567	-7
Rapeseed zone of eastern France	282	-22	4.9	0.1	621	9	540	-1
Massif Central Dry zone	254	-31	4.9	0.1	659	7	535	-3
Southwest maize zone	318	-29	6.5	0.0	671	3	577	-5
Alpes region	282	-36	3.5	0.1	735	10	444	-8
Mediterranean zone	197	-45	6.5	1.1	770	6	423	-19

Table 3.26 France's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Northern Barley zone	100	0	0.88
Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean	100	0	0.91
Maize barley and livestock zone along the English Channel	100	0	0.94
Rapeseed zone of eastern France	99	0	0.90
Massif Central Dry zone	100	0	0.90
Southwest maize zone	97	-1	0.79
Alpes region	87	0	0.80
Mediterranean zone	87	-2	0.74

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[GBR] Kingdom

This report covers the vegetative growth period of winter wheat, winter barley and rapeseed. The proportion of irrigated cropland in Kingdom is only 2% and agro-meteorological conditions play a decisive role in the growth of most crops. According to the crop condition development graph, NDVI values were close to average from January to April. Rainfall (RAIN -21%) was significantly below average, temperatures and radiation were above average (TEMP +0.8°C; RADPAR +7%). The combined impact of these agroclimatic factors resulted in decreased biomass (BIOMSS -2%). The seasonal RAIN profile shows that rainfall was fluctuating in the monitoring period. The temperature was above or close to average for most parts of the period.

The national average VCIx was 0.94. CALF (99%) was unchanged compared to its five-year average. The NDVI departure cluster profiles indicate that: (1) most of arable land in the United Kingdom experienced average crop conditions. (2) 6.2% of arable land experienced a marked drop of crop conditions in early-February, mainly in Wales. Most likely, the large drop in NDVI can be attributed to cloud cover in the satellite images or snow. Altogether, the conditions for wheat in the UK are assessed to be slightly below average, mainly due to a rainfall deficit.

Regional analysis

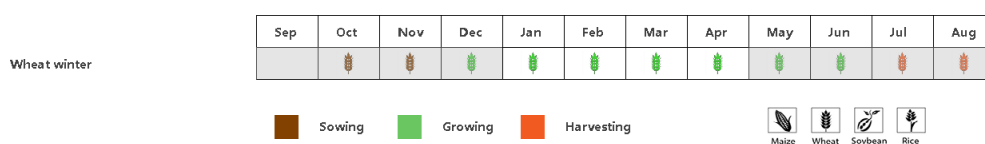
Based on cropping systems, climatic zones and topographic conditions, three sub-national regions can be distinguished: 1) **Central sparse crop region**, 2) **Northern barley region**, and 3) **Southern mixed wheat and barley region**. The fractions of cropped arable land (CALF) in all subregions are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

The **Northern barley region** experienced below-average rainfall (RAIN -15%), while temperature and radiation were significantly above average (TEMP +0.8°C; RADPAR +6%). Biomass was above average (BIOMSS +5%). NDVI was close to average according to the crop condition graph. The VCIx was 0.94. Altogether, the output of wheat is expected to be near average.

The **Central sparse crop region** is one of the major agricultural regions in terms of crop production. The rainfall was below average (RAIN -22%), while temperature and radiation were significantly above average (TEMP +0.8 ° C, RADPAR, +8%). This resulted in an average estimate for biomass (BIOMSS +1%). NDVI values were close to average, except for January. The VCIx was at 0.95. Altogether, the conditions for wheat are expected to be near average.

Southern mixed wheat and barley zone experienced a severe rainfall deficit (RAIN -27%). Temperature and radiation (TEMP +0.8°C; RADPAR +7%) were similar to the Central sparse crop region. The rainfall deficit resulted in biomass estimates that were below average (BIOMSS -8%). NDVI was near average according to the crop condition graph in this reporting period. The VCIx was 0.94. Altogether, the output of wheat is expected to be near average.

Figure 3.17 United Kingdom's crop condition, January - April 2022



(a). Phenology of major crops

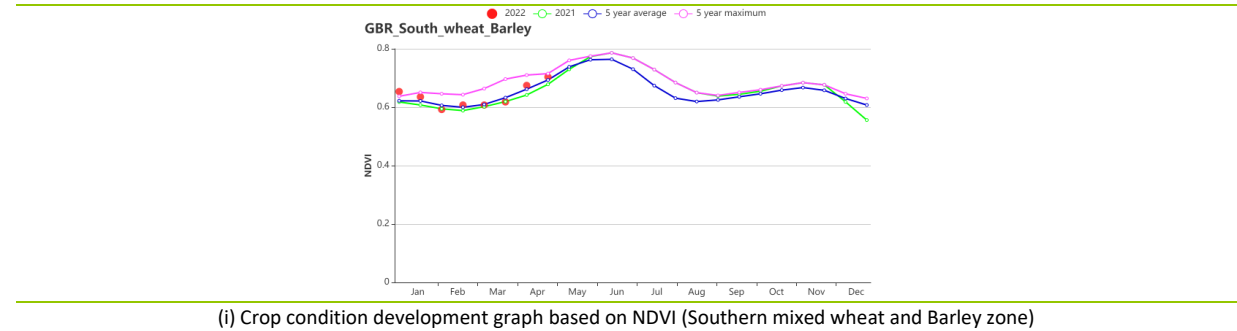
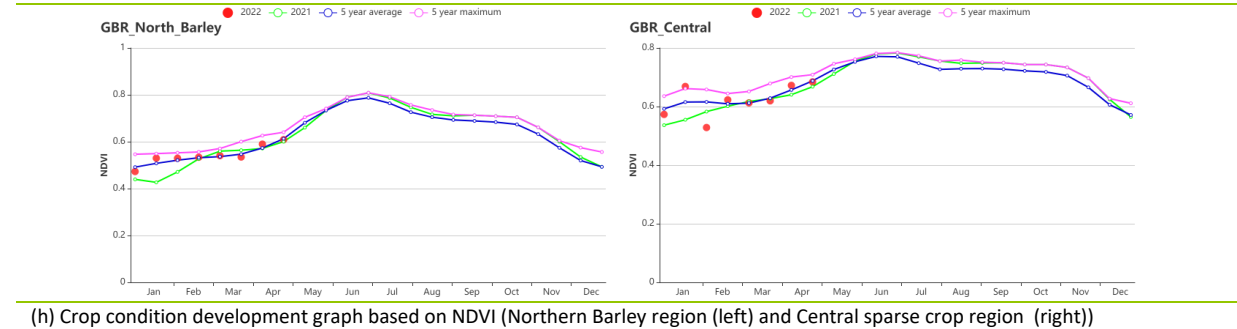
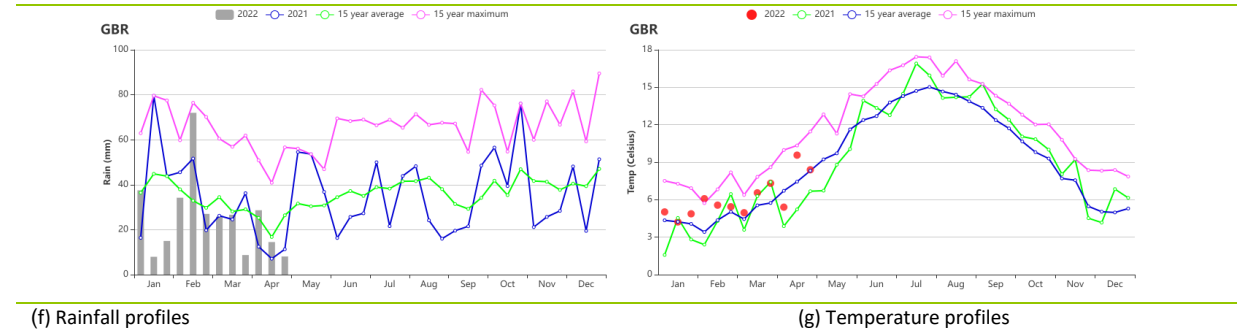
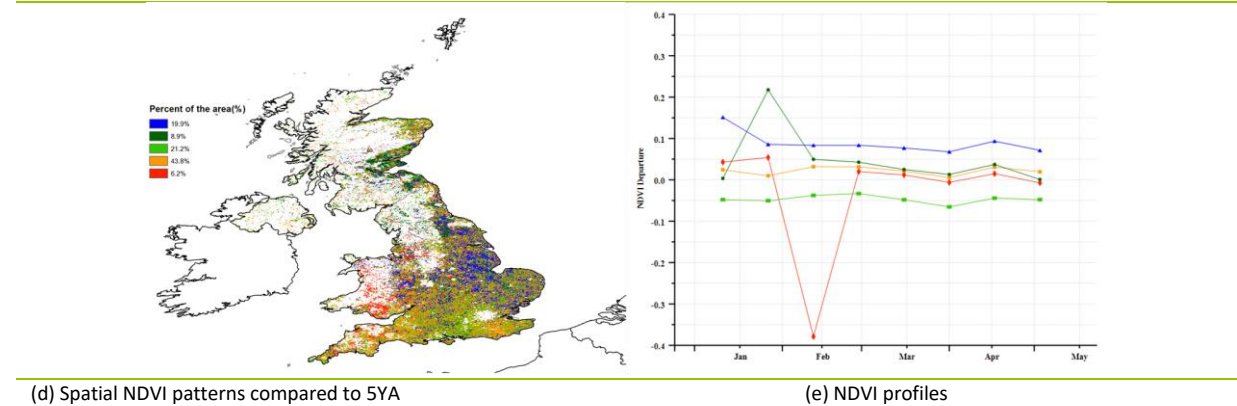
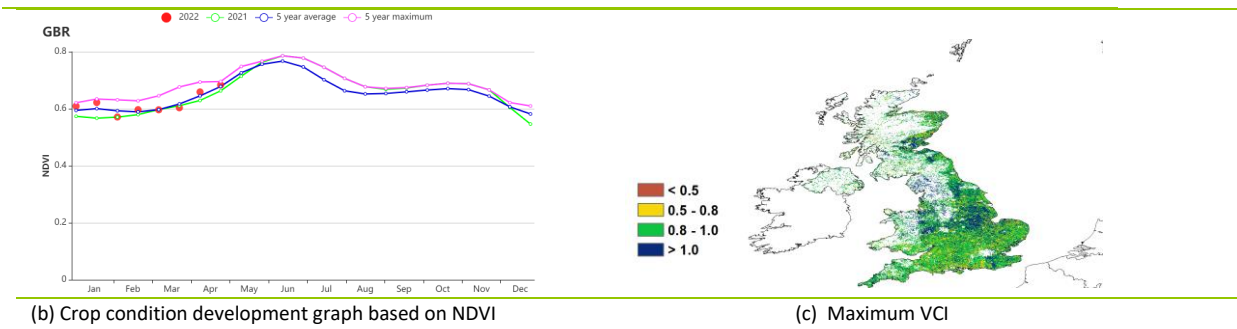


Table 3.27 United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Northern Barley region(UK)	407	-15	5.2	0.8	404	6	536	5
Central sparse crop region (UK)	311	-22	6.0	0.8	458	8	554	1
Southern mixed wheat and Barley zone (UK)	222	-27	6.7	0.8	508	7	519	-8
Northern Barley region(UK)	407	-15	5.2	0.8	404	6	536	5

Table 3.28 United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Northern Barley region(UK)	96	0	0.94
Central sparse crop region (UK)	99	0	0.95
Southern mixed wheat and Barley zone (UK)	100	0	0.94
Northern Barley region(UK)	96	0	0.94

[HUN] Hungary

This reporting period covers the main growing season of winter wheat, sown in September and October. According to the crop condition development graph, NDVI values were below average over the entire period. The proportion of irrigated cropland in Kingdom is only 4% and agro-meteorological conditions play a decisive role in the growth of most crops. The overall rainfall (RAIN -38%) and temperatures (TEMP -0.4°C) in this period were below average. The solar radiation (RADPAR +6%) was above average as compared to the 15YA. The low rainfall was mainly due to below-average rainfall in January, February, March and mid-April, which delayed the growth of winter wheat, resulting in a 21% decrease of estimated biomass. The national CALF was 90%, which was 6% below the 5YA. Rainfall had recovered to average levels in April. This helped the crops recover to average levels by the end of this monitoring period. Below-average to average winter wheat production can be expected, if rainfall remains sufficient in the coming monitoring period.

The national average VCIx was 0.83. The NDVI departure cluster profiles indicate that: 16.6% of arable land experienced above-average crop conditions from January to mid-March, below average in late-March, and above average in April, mainly distributed in west Hungary, middle Hungary and east Hungary. 20.8% of arable land experienced below-average crop conditions from January to mid-April, above average in late-April, mainly distributed in east Hungary. 62.5% of arable land experienced below-average crop conditions, scattered over the whole Hungary.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, four sub-national regions are described below: **Central Hungary, the Great Plain (Puszta), Northern Hungary** and **Transdanubia**. During this reporting period, CALF was below average for all the four subregions (-3%, -7%, -5% and -5%, respectively).

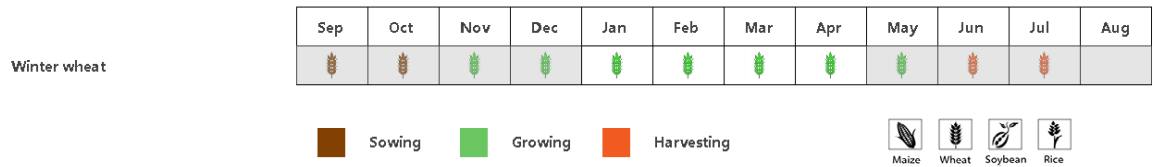
Central Hungary is one of the major agricultural regions in terms of crop production. A sizable share of winter wheat is planted in this region. According to the NDVI development graphs, the values were below average in the whole period. Agro-climatic conditions presented below-average rainfall (RAIN -49%) and temperature (TEMP -0.3°C), and above-average radiation (RADPAR +7%). Biomass (BIOMSS -30%) was below average mainly due to below-average rainfall in January, February, March and mid-April, which slowed the growth of winter wheat. The VCIx was 0.83. The crop conditions in this region are slightly below average.

The Puszta region mainly grows winter wheat, maize and sunflower, especially in the counties of Jaz-Nagykum-Szolnok and Bekes. According to the NDVI development graphs, the values were below average in the whole period. Agro-climatic conditions presented below-average rainfall (RAIN -35%) and temperature (TEMP -0.6°C), and above-average radiation (RADPAR +5%). Biomass (BIOMSS -21%) was below average mainly due to below-average rainfall in January, February, March and mid-April, which delayed the growth of winter wheat. The VCIx was 0.84. The crop conditions in this region are expected to be below average.

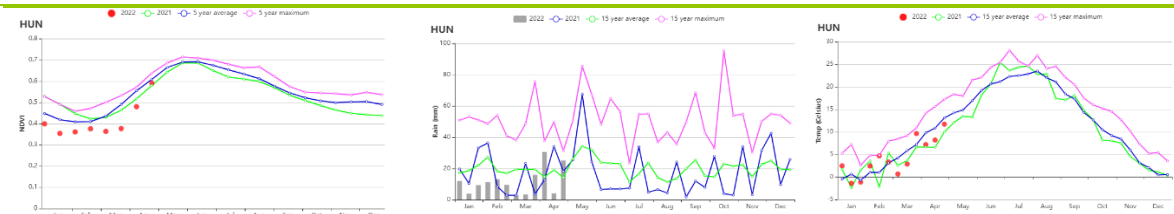
Northern Hungary is another important winter wheat region. According to the NDVI development graphs, the values were below average in the whole period. Agro-climatic conditions presented below-average rainfall (RAIN -44%) and temperature (TEMP -0.2°C), and above-average radiation (RADPAR +5%). Biomass (BIOMSS -24%) was below average mainly due to below-average rainfall in January, February, March and mid-April, which delayed the growth of winter wheat. The VCIx was 0.80. The crop conditions in this region are expected to be below average.

Southern Transdanubia cultivates winter wheat, maize, and sunflower, mostly in Somogy and Tolna counties. According to the NDVI development graphs, the values were below average in the whole period. Agro-climatic conditions presented below-average rainfall (RAIN -39%) and temperature (TEMP -0.3°C), which resulted in a below-average biomass (BIOMSS -20%). The maximum VCI was favorable at 0.82. The crop conditions in this region are expected to be below average.

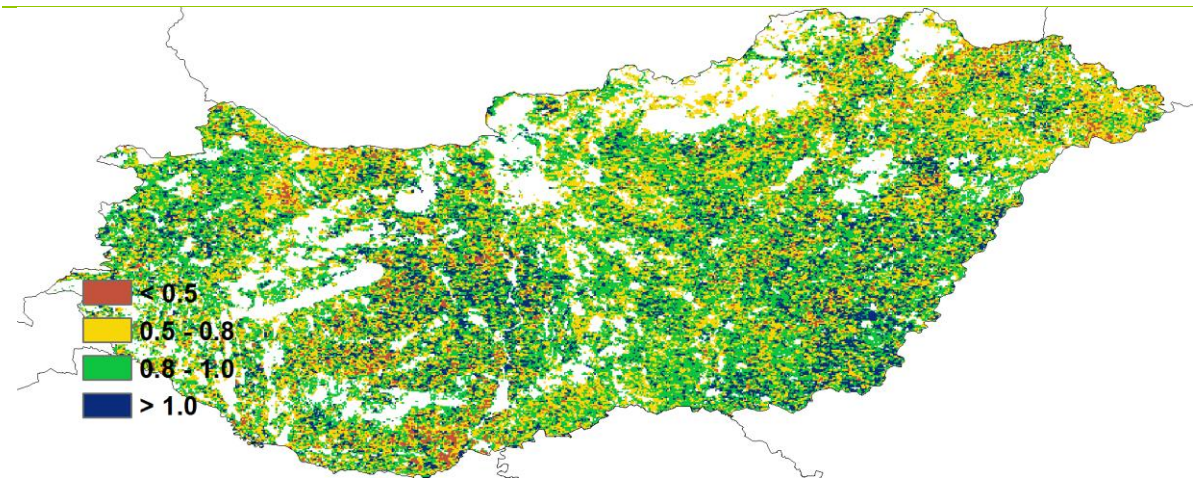
Figure 3.18 Hungary's crop condition, January-April 2022



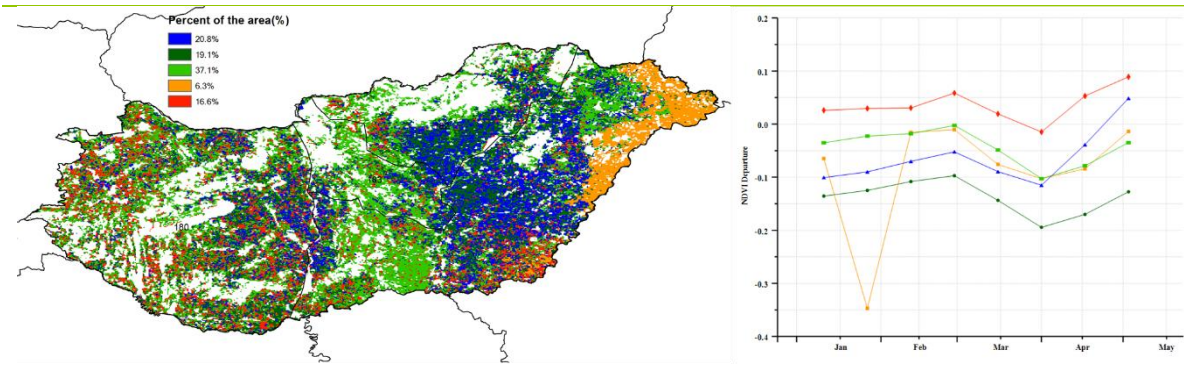
(a). Phenology of major crops



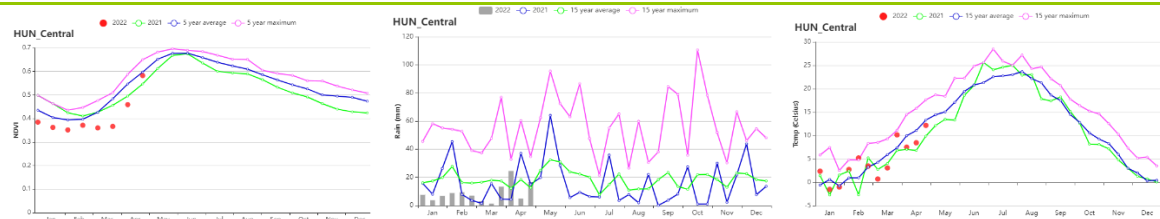
(b) Crop condition development graph based on NDVI, RAIN and TEMP



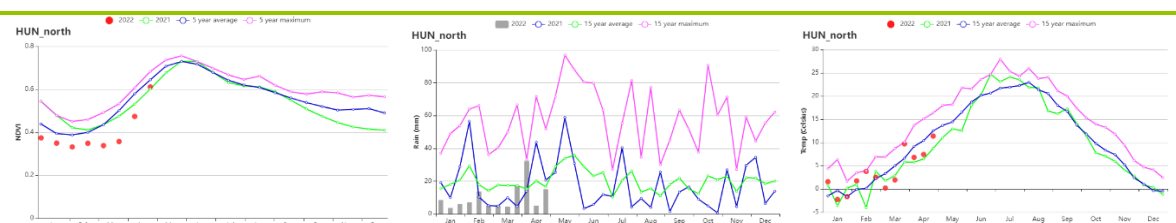
(c) Maximum VCI



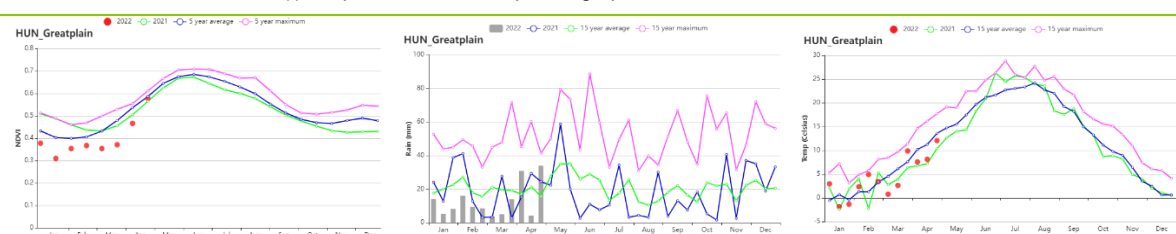
(d) Spatial distribution of NDVI profiles.



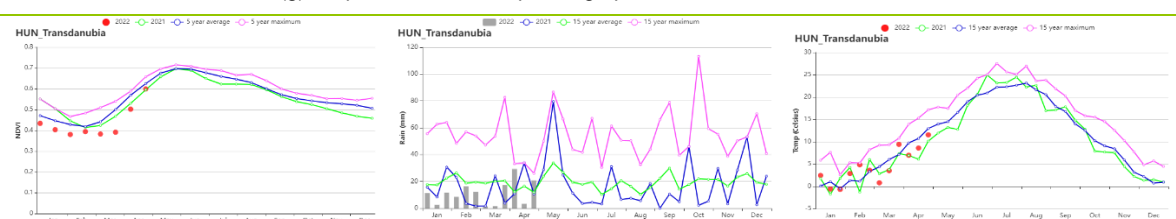
(e) Crop condition development graph based on NDVI, RAIN and TEMP



(f) Crop condition development graph based on NDVI, RAIN and TEMP



(g) Crop condition development graph based on NDVI, RAIN and TEMP



(h) Crop condition development graph based on NDVI, RAIN and TEMP

Table 3.29 Hungary's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central Hungary	107	-49	4.5	-0.3	675	7	340	-30
North Hungary	123	-44	3.6	-0.2	634	5	360	-24
The Puszta	152	-35	4.3	-0.6	658	5	401	-21
Transdanubia	136	-39	4.5	-0.3	701	8	397	-20

Table 3.30 Hungary's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current (%)
Central Hungary	94	-3	0.83
North Hungary	94	-5	0.80
The Puszta	87	-7	0.84
Transdanubia	91	-5	0.82

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[IDN] Indonesia

From January to April, the harvest of the main rice was completed, while the rainy season maize in Java and Sumatra was still growing between January and February, and the harvest started in March.

The proportion of irrigated cropland in Indonesia is only 14% and agro-meteorological conditions play a decisive role in the growth of most crops. CropWatch agroclimatic indicators show that precipitation (RAIN -6%) was below the 15YA, while radiation (RADPAR +5%) and temperature (TEMP +0.2°C) were slightly above average, which led to a slight increase of the potential biomass production (BIOMSS +1%).

NDVI clusters and profiles show that 56.7% of the cropland was significantly below the 5YA at the beginning of the monitoring period, but returned to normal in mid-February. The crop conditions on 43.4% of arable land were close to the 5YA, mainly in Medan, Bandung, Java, Kupang, Timor, and Ambon. Considering that the area of cropped arable land in Indonesia was close to the 5YA (CALF 100%) and the VCIx value reached 0.95, the crop conditions are anticipated to be average or slightly above.

Regional analysis

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

According to the agroclimatic conditions of **Java**, temperature (TEMP +0.1°C) and radiation (RADPAR +7%) were above average, whereas precipitation (RAIN -6%) was below the 15YA, which may have resulted in average potential biomass production (BIOMSS +0%). The NDVI development graphs indicate that crop conditions were close to average in January, mid-March and April, but below the 5YA at other times. Crop conditions on Java Island can be expected to be close to average.

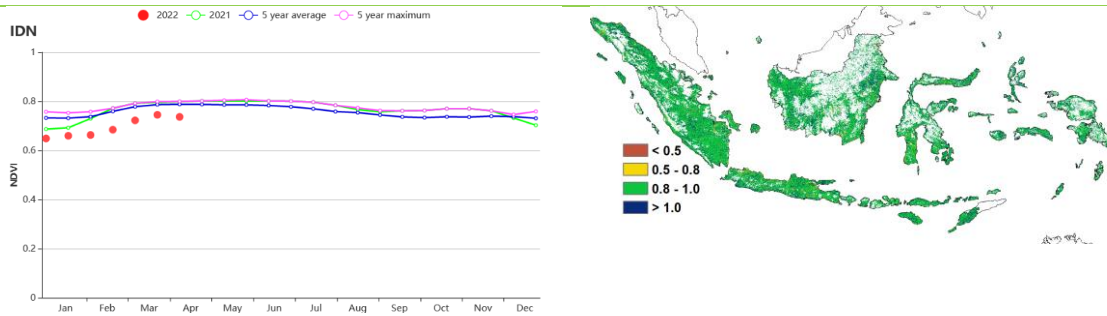
In the **Kalimantan and Sulawesi** region, precipitation (RAIN -10%) was below average, but temperature (TEMP +0.2°C) and radiation (RADPAR +6%) were above the 15YA. They resulted in an increase in the potential biomass production (BIOMSS +1%). The NDVI development graphs show that crop conditions were below the 5YA. Overall, crop conditions in **Kalimantan and Sulawesi** are assessed as close to or slightly above average.

In **Sumatra**, precipitation (RAIN -3%) was below the 15YA, whereas temperature (TEMP +0.2°C) and radiation (RADPAR +5%) were above average, which led to an increase in the potential biomass production (BIOMSS +1%). According to the NDVI development graphs, crop conditions were close to average in mid-March, but below average at other times. Crop conditions in this region are anticipated to be above average.

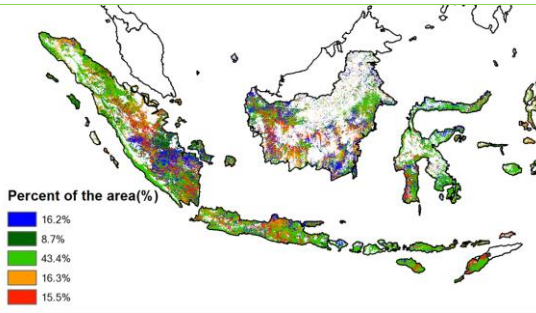
Figure 3.19 Indonesia's crop condition, January – April 2022



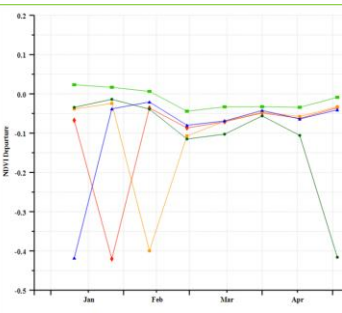
(a). Phenology of major crops



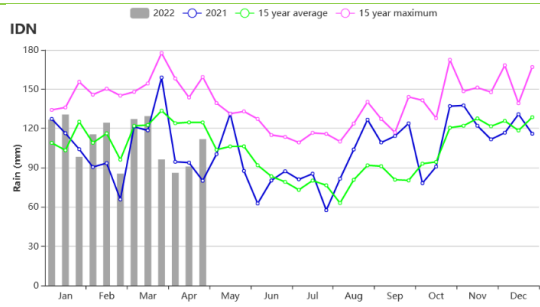
(b) Crop condition development graph based on NDVI



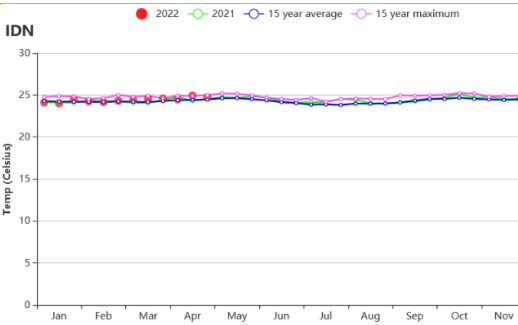
(c) Maximum VCI



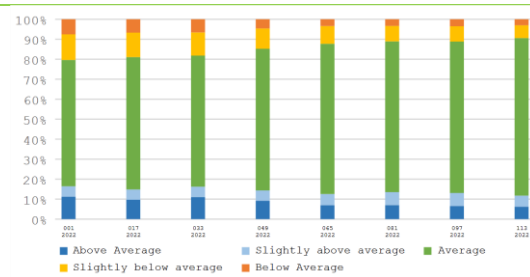
(d) Spatial NDVI patterns compared to 5YA



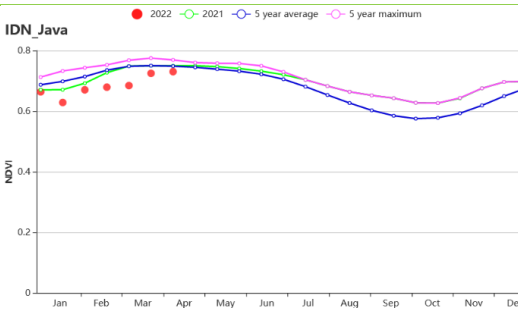
(e) NDVI profiles



(f) Rainfall profiles



(g) Temperature profiles



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

(i) Crop condition development graph based on NDVI (Java)

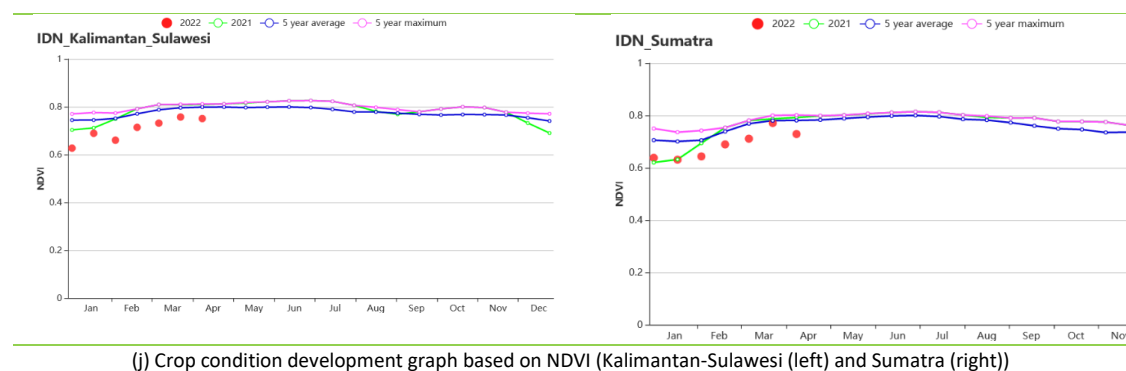


Table 3.31 Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Java	1249	-6	25.1	0.1	1281	7	1470	0
Kalimantan and Sulawesi	1196	-10	24.7	0.2	1197	6	1495	1
Sumatra	1285	-3	24.5	0.2	1181	5	1482	1
West Papua	1637	-4	23.6	0.1	1051	5	1443	2

Table 3.32 Indonesia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January – April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Java	99	0	0.95
Kalimantan and Sulawesi	100	0	0.96
Sumatra	100	0	0.95
West Papua	100	0	0.96

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[IND] India

The current monitoring period covers most of the wheat and winter (Rabi) rice growing periods. Harvest for both crops was mostly completed by the end of April, while maize and summer (Kharif) rice were harvested by January. The graph of NDVI development shows that the crop conditions were close to or above the 5-year average in general.

The proportion of irrigated cropland in India is 50% and agro-meteorological conditions play an important role in the growth of almost half of the crops. Rainfall is not the major influential factor. The CropWatch agroclimatic indicators show that nationwide, TEMP and RADPAR were close to average, whereas RAIN was below the 15YA (-26%). The BIOMSS decreased by 1% compared with the 15YA due to the lower rainfall. The overall VCIx was high, with a value of 0.93. As can be seen from the spatial distribution, only the northwestern region recorded values below 0.80. Most of India had high VCIx values. These spatial patterns of VCIx were thus generally consistent with those of NDVI. The southern and northeastern region showed above-average crop conditions while the conditions were slightly below average in the northwestern regions. The spatial distribution of NDVI profiles shows that before March, 81.7% of the areas showed above-average crop conditions in the central and southern regions. Punjab and Haryana, which are important wheat producing states, experienced daily maximum temperatures that were above 35°C starting from mid-March, when wheat was still in the grainfilling period. This caused a high percentage of shrivelled grains and yield loss for these two states. Wheat had already been mostly harvested in the other wheat producing states by the time the heat wave started. CALF increased by 18% compared to the 5YA. At the country level, conditions for crop production were close to average.

Regional analysis

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

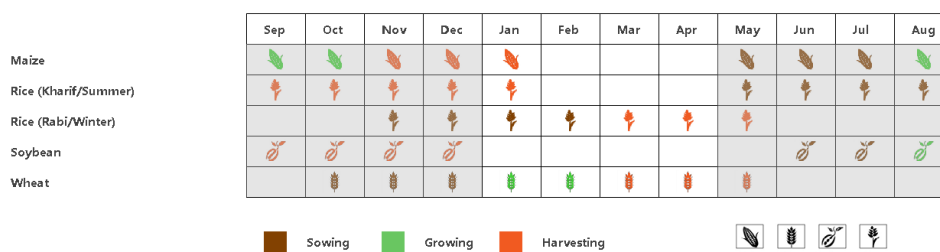
The four agro-ecological zones of the Deccan Plateau, Eastern coastal region, Gangetic plain and Western Himalayan region showed similar trends in agricultural indices. Compared to the same period of previous years, RAIN had decreased significantly, especially in the Deccan Plateau (-69%). The TEMP and RADPAR were slightly above average, and BIOMSS was below the 15-year average. CALF showed the same trends for the four regions. They were all above average. The graph of NDVI development shows that the crop growth of the four states was close to or above the 5-year average until mid-March, when it started to decline sharply. Generally, the crop production is expected to be near average.

The agriculture areas in Rajasthan and North-western dry region recorded similar trends of agricultural indices in this monitoring period. Compared to the same period of the previous years, RAIN increased significantly by 57% in the agriculture areas in Rajasthan and Gujarat and by 88% for the North-western dry region. TEMP was slightly above average. The RADPAR was close to average for both regions. BIOMSS was increased significantly because it benefitted from sufficient rainfall. Both regions recorded increases of CALF. VCIx was above 0.85. The graph of NDVI development shows that the crop growth for both regions was generally close to and above the 5-year average. The crop production is expected to be average.

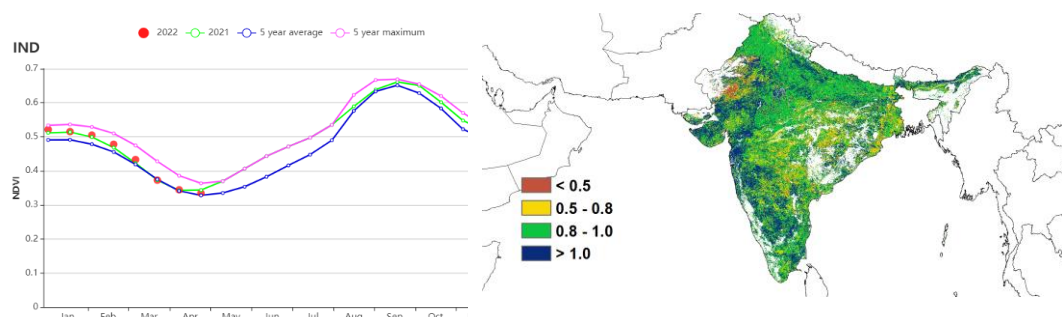
The Assam and north-eastern regions and Western coastal region recorded similar trends of agricultural indices in this monitoring period. Compared to the same period of the previous years, RAIN decreased by 21% in the Assam and north-eastern regions and by 42% for the Western coastal region. TEMP and RADPAR were both close to average. The BIOMSS had decreased due to the insufficient rainfall. Both regions recorded increases of CALF. VCIx was

above 0.94. The graph of NDVI development shows that crop growth for both regions was generally close to and above the 5-year average. The crop production is expected to be close to average.

Figure 3.20 India's crop condition, January - April 2022

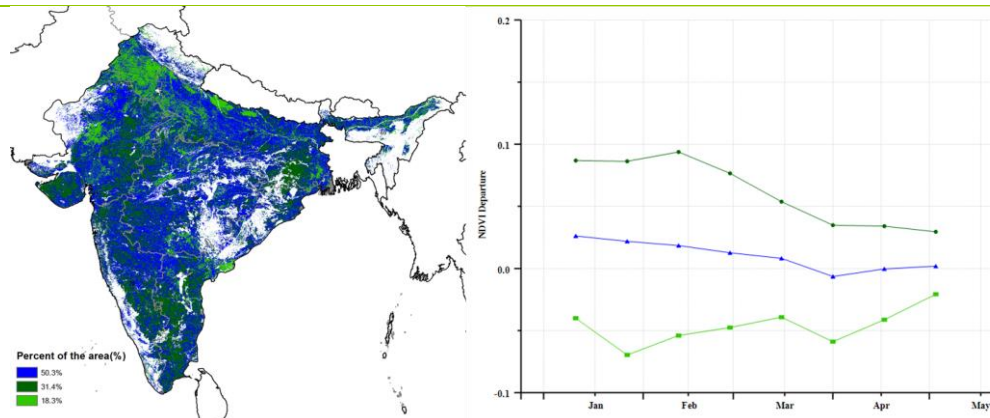


(a) Phenology of major crops



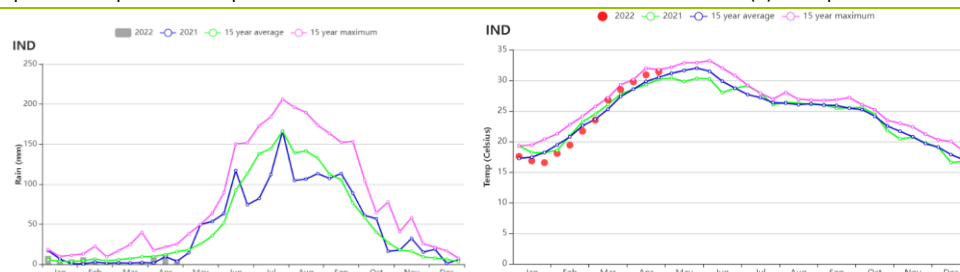
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



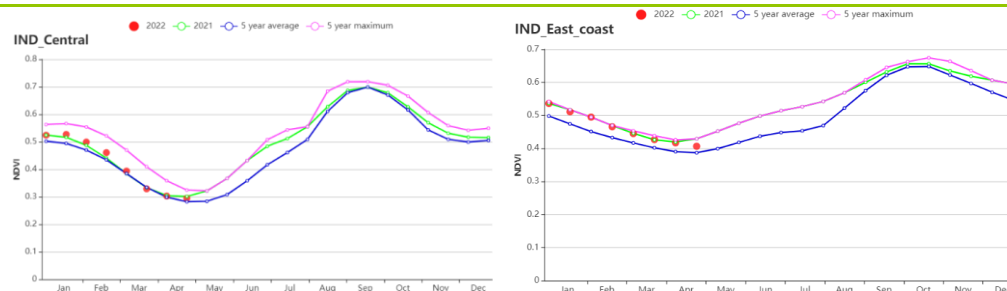
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

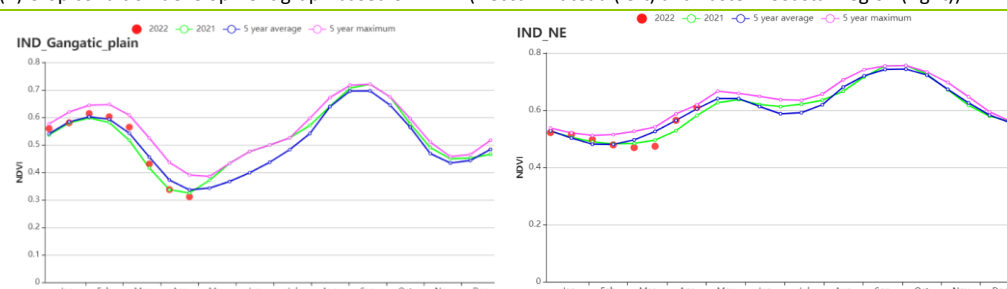


(f) Rainfall profiles

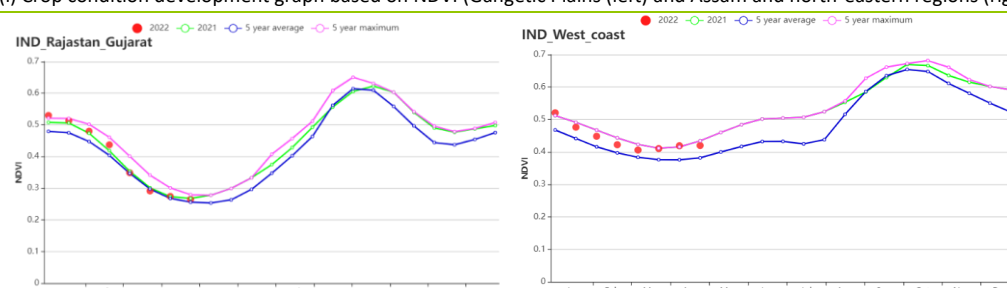
(g) Temperature profiles



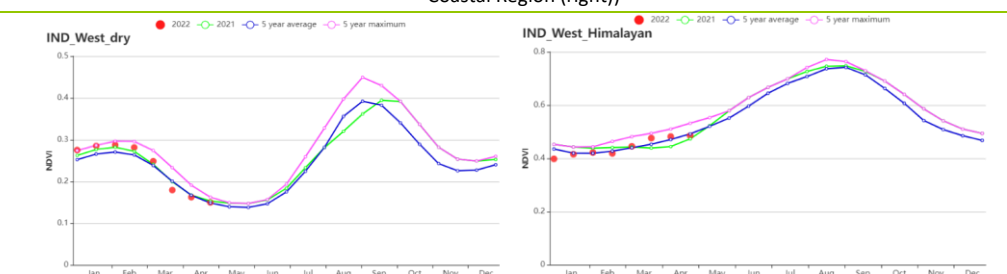
(h) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))



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



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



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

Table 3.33 India's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Deccan Plateau	7	-69	25.0	0.0	1307	3	443	-4
Eastern coastal region	49	-40	25.6	-0.1	1321	2	539	-4
Gangetic plain	53	-11	22.1	0.0	1195	2	453	-3
Assam and north-	259	-21	17.7	-0.5	1090	-1	609	-6

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
eastern regions								
Agriculture areas in Rajasthan and Gujarat	17	57	25.1	0.4	1271	0	459	11
Western coastal region	49	-42	26.1	0.0	1340	0	525	-5
North-western dry region	28	88	24.4	1.1	1223	0	457	14
Western Himalayan region	236	-33	10.8	1.3	1099	5	444	-1

Table 3.34 India's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Deccan Plateau	82	19	0.88
Eastern coastal region	88	23	0.92
Gangatic plain	93	6	0.93
Assam and north-eastern regions	93	1	0.94
Agriculture areas in Rajasthan and Gujarat	76	27	0.97
Western coastal region	80	44	0.99
North-western dry region	21	39	0.85
Western Himalayan region	89	3	0.92

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[IRN] Iran

This monitoring period covers the vegetative and early reproductive phases of winter wheat. Rice planting started in April. The proportion of irrigated cropland in Iran is 70% and rainfall is not major influential factor. Nationwide, the accumulated rainfall was below average (RAIN -25%), while temperature and radiation were above average (TEMP +1.0°C, RADPAR +2%). The BIOMSS index was 13% below average. The national average of maximum VCI index was 0.60, and the Cropped Arable Land Fraction (CALF) decreased by 24% as compared to the recent five-year average.

According to the national NDVI development graphs, crop conditions were above average throughout the monitoring period on about 12.7% of the cropland (marked in dark green), mainly in the provinces of Khuzestan, Qazvin, Alborz, Golestan, Mazandaran and Hamadan in the western and northern regions, while crop conditions were below average throughout the monitoring period on about 12.6% of the cropland (marked in light green), mainly located in some parts of Aredbil, Ilam and Lorestan in the west and north-western regions. 38.0% of the cropland showed close-to-average crop conditions (marked in red). The remaining croplands experienced below-average crop conditions in late January and then recovered to average or above average levels (marked in blue and orange). The below-average NDVI values in late January are most likely due to the snow or cloud cover as indicated by the rainfall profile.

In general, the conditions for the winter crops were not favorable due to below-average rainfall.

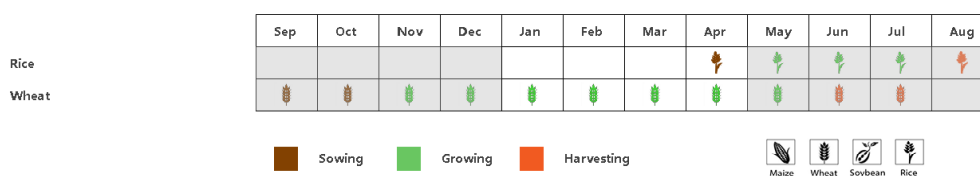
Regional analysis

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

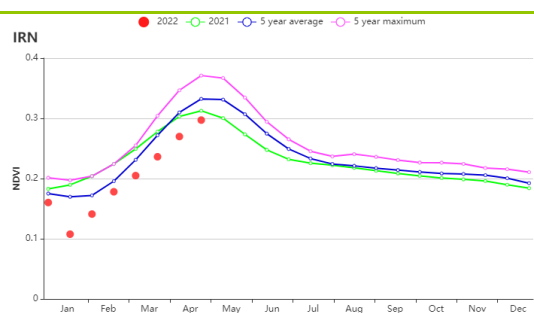
In the **Semi-arid to sub-tropical hills of the west and north** region, NDVI profiles show a similar change of patterns as for the whole country. The accumulated rainfall was 183 mm (24% below average), while temperature and radiation were above average (TEMP +0.9°C, RADPAR +2%). The influence of rainfall exceeded that of radiation and temperature, which resulted in a decrease of BIOMSS by 13%. CALF declined by 26%. The average VCIx (0.63) indicates unfavourable crop conditions for winter wheat.

Crop conditions in the **Arid Red Sea coastal low hills and plains** region were also below the five-year average throughout the whole monitoring period. This region experienced a deficit of rainfall (RAIN -29%) but received more sunshine (RADPAR +2%). The temperature was above average (TEMP +1.2°C). BIOMSS decreased by 11%. The CALF decreased by 11% compared to the five-year average, and the national VCIx (0.54) was also quite low, indicating the unfavorable outlook for winter crops in this region.

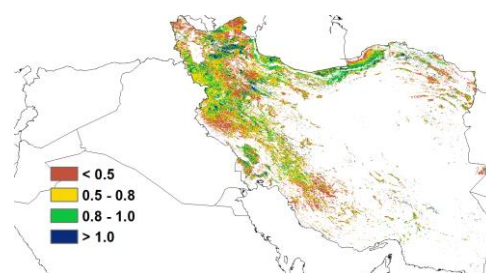
Figure 3.21 Iran's crop condition, January - April 2022



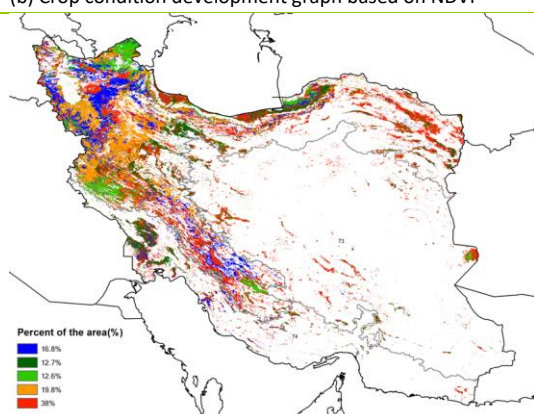
(a). Phenology of major crops



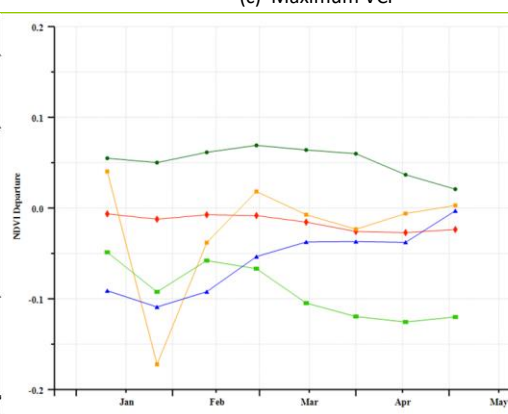
(b) Crop condition development graph based on NDVI



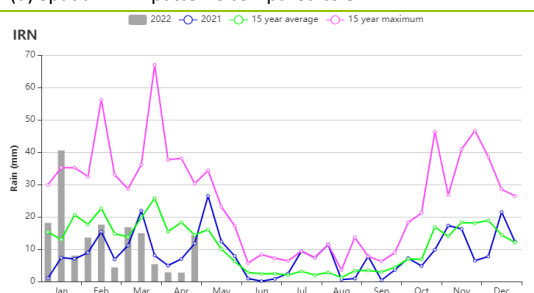
(c) Maximum VCI



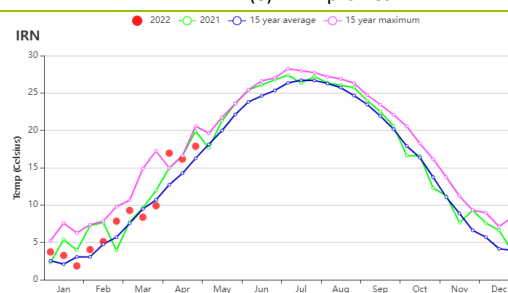
(d) Spatial NDVI patterns compared to 5YA



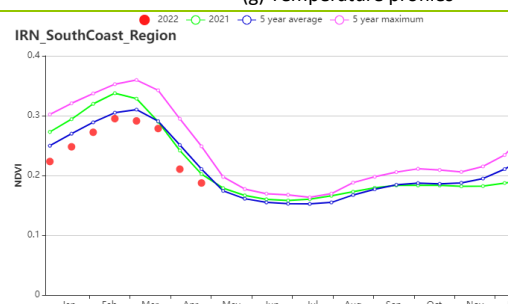
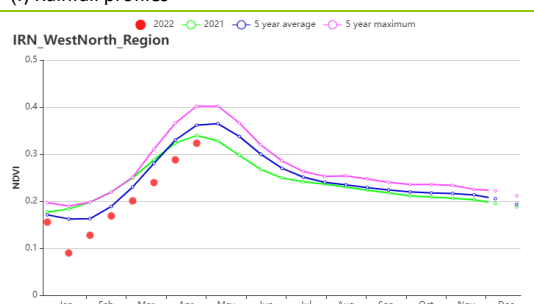
(e) NDVI profiles



(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (semi-arid to the subtropical hilly region in the west and the north (left) and coastal lowland in the arid red sea plain area (right))

Table 3.35 Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Semi-arid to sub-tropical hills of the west	183	-24	6.8	0.9	991	2	407	-13

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
and north								
Arid Red Sea coastal low hills and plains	106	-29	18.5	1.2	1084	2	458	-11

Table 3.36 Iran's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Semi-arid to sub-tropical hills of the west and north	20	-26	0.63
Arid Red Sea coastal low hills and plains	26	-11	0.54

[ITA] Italy

This reporting period covers the main growing season of winter wheat, which was sown between October and December. Based on the agroclimatic and agronomic indicators, the crop conditions in Italy were below the 5-year average from March to April.

The proportion of irrigated cropland in Italy is 40% and agro-meteorological conditions play an important role in the growth of more than half of the crops and rainfall is not the major influential factor. The total rainfall in this period was significantly below the 15YA (RAIN -50%), the temperature was below the 15YA (TEMP -0.2°C) and RADPAR was 8% above the 15YA. The lower rainfall was mainly due to below - average rainfall from mid-January to late-April, which slowed the green-up of winter wheat. The significantly lower rainfall resulted in a 22% decrease of BIOMSS compared to the 15YA. But CALF at the national level was 95%, close to the average (-1%). And the VCIx was close to normal (0.81).

Except for a few areas in the north and south parts of the country (Piemonte, Lombardia, Trentino-Alto Adige, Veneto, and Basilicata), the VCIx was above 0.80 (green and blue) for most of the cultivated land.

The NDVI departure cluster profiles indicate that 42.9% (red and orange) of arable land experienced above-average crop conditions in January and February, mainly located in Abruzzo, Calabria, and Basilicata. 33.9% (Light green and dark green) of arable land experienced slightly below - average crop conditions, scattered in Piemonte, Sicily, Apulia, Campania and Lombardia. This area is the main distribution area of winter wheat in Italy (Po Valley and part of southeast area). The below-average NDVI indicates that conditions for winter wheat were unfavorable. For the remaining 12% (dark green) of arable land, NDVI remained below average throughout the reporting period. As shown in the NDVI cluster map, on about 26.2% (Light green) of arable land, NDVI was near average in January and February, and then below average in March and April. Overall, prospects for winter wheat are unfavorable.

Regional analysis

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

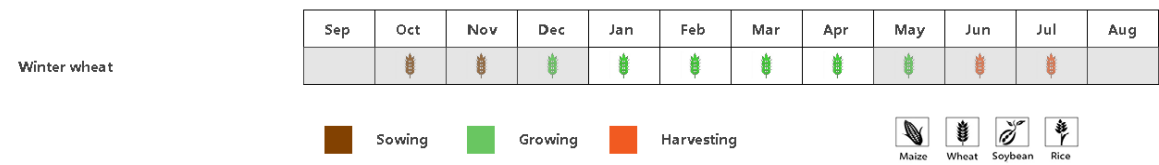
East coast (mainly in Puglia, Marche, and Abruzzi) experienced below-average rainfall (RAIN -46%), while temperature was slightly lower (-1%) and solar radiation was above 15YA (9%). The potential biomass production was below average (BIOMSS -22%). VCIx was 0.83. The crop condition development graph indicates that NDVI was slightly below average over the past five years.

Crop production in **Po Valley** (mainly in Piemonte, Lombardia and Veneto) was affected by low rainfall (RAIN -50%), above -average temperature (TEMP +0.3°C) and solar radiation (RADPAR+10%). BIOMSS was below the 15YA by 12%. VCIx reached 0.78, which was the lowest among the four AEZs in Italy. The crop condition development graph indicates that the crop conditions were below average. The Po Valley is the main wheat producing region in Italy, the significantly low BIOMSS as well as VCIx indicate poor conditions for wheat during this monitoring period.

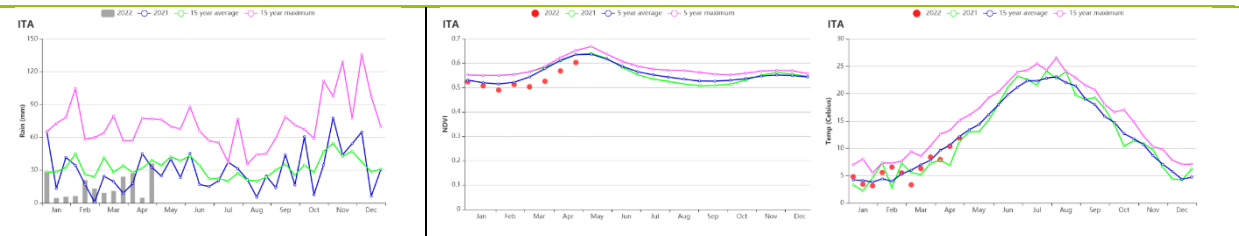
The Islands recorded a below-average precipitation (RAIN -54%) and temperature (TEMP -0.6°C). RADPAR was slightly above average (+2%). BIOMSS decreased by 35% compared with the 15YA. The maximum VCI was only 0.79. The Cropping Intensity was 100%, which is the highest in the four regions. NDVI was very close to average expect for March. The crop production in this region is expected to be close to average.

In **Western Italy**, RAIN (-52%) and TEMP (-0.3°C) were below, while RADPAR (+10%) was above average. The maximum VCI was 0.83. The severe rainfall deficit caused a decrease in the biomass production potential in this region by 21%. The NDVI was slightly below average. CropWatch expects a below -average production.

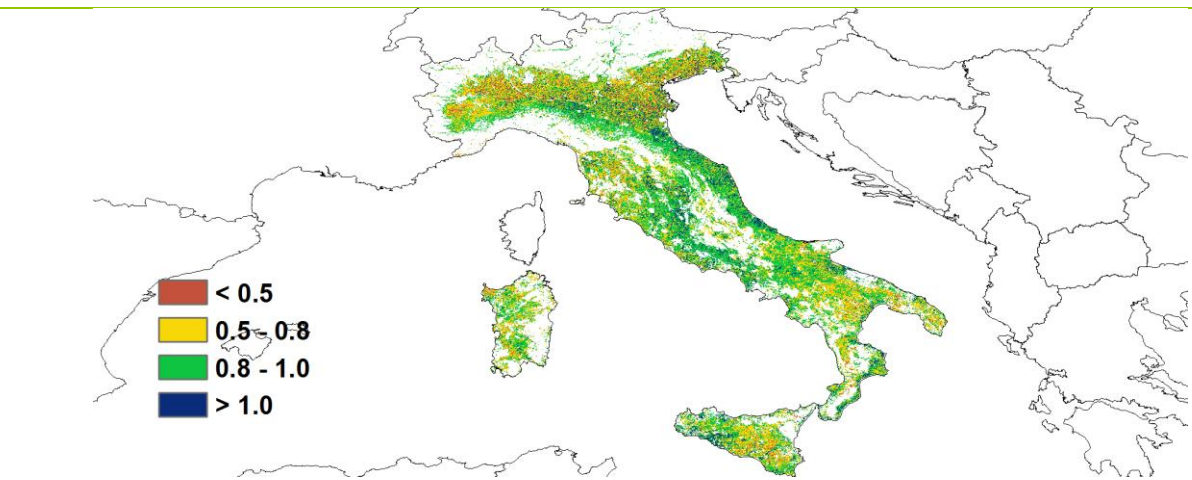
Figure 3.22 Italy’s crop condition, January - April 2022



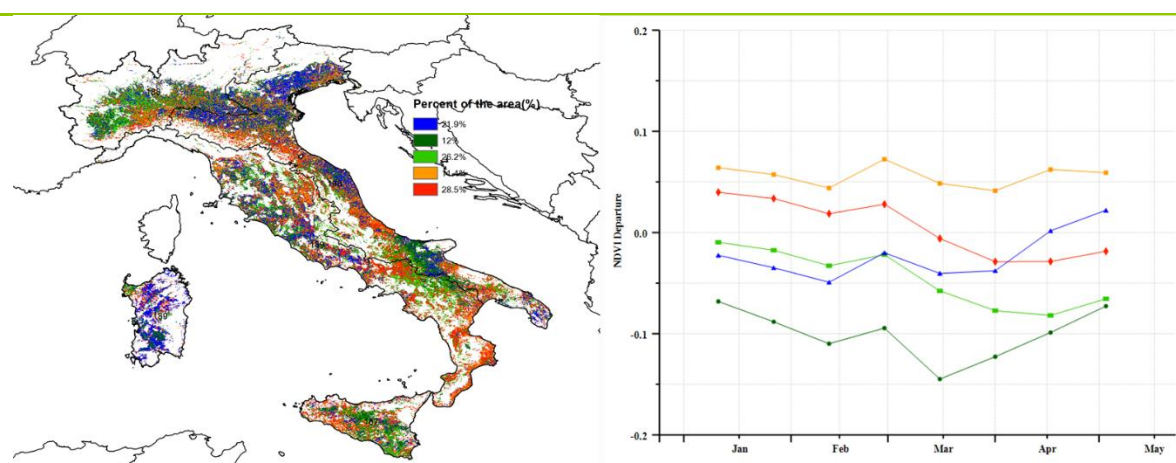
(a) Phenology of major crops



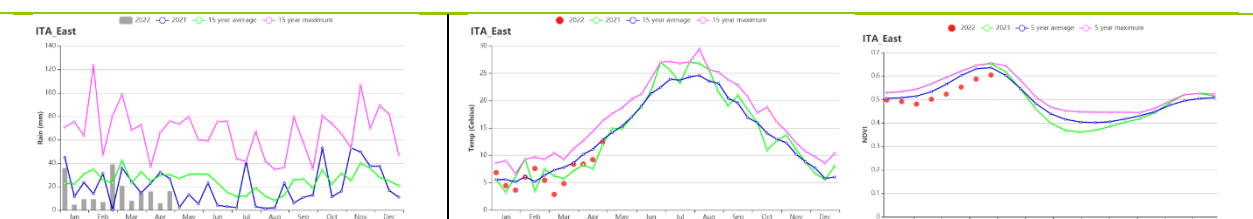
(b) Crop condition development graph based on NDVI, RAIN and TEMP (Italy).



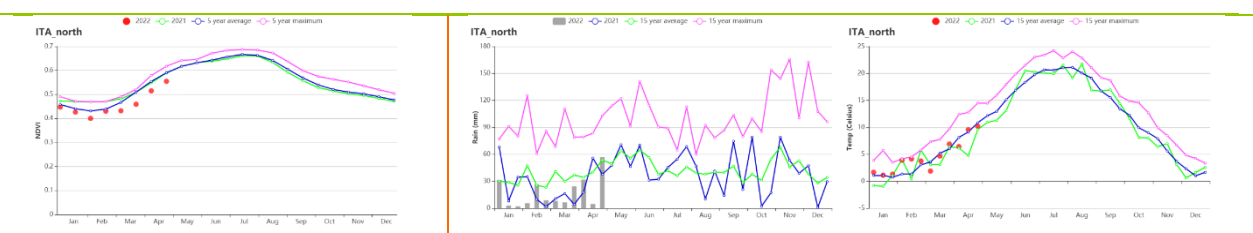
(c) Maximum VCI



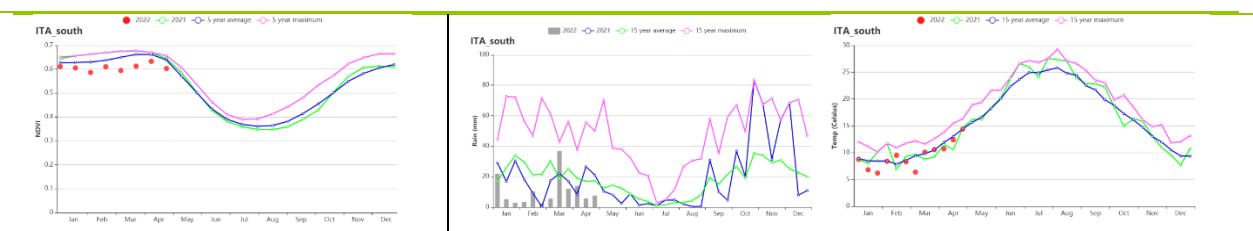
(d) Spatial distribution of NDVI profiles.



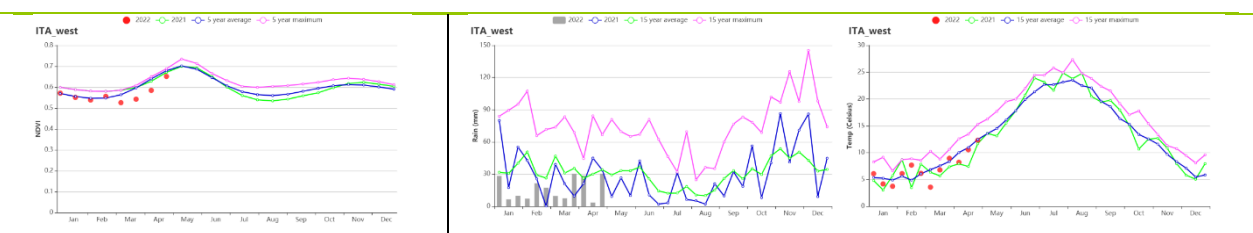
(e) Crop condition development graph based on NDVI, RAIN and TEMP (East Italy).



(f) Crop condition development graph based on NDVI, RAIN and TEMP (Po Valley).



(g) Crop condition development graph based on NDVI, RAIN and TEMP (Islands).



(h) Crop condition development graph based on NDVI, RAIN and TEMP (West Italy).

Table 3.37 Italy's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
East Coast	185	-46	6.7	-1.0	817	9	471	-22

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Po Valley	210	-50	4.6	0.3	741	10	424	-12
Islands	128	-54	9.4	-0.6	868	2	397	-35
Western Italy	200	-52	7	-0.3	801	10	497	-21

Table 3.38 Italy's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
East Coast	99	0	0.83
Po Valley	87	-3	0.78
Islands	100	0	0.79
Western Italy	99	0	0.83

[KAZ] Kazakhstan

No crops were cultivated in most of the country during this monitoring period. Only some minor winter crops were grown in the southern regions. The proportion of irrigated cropland in Kazakhstan is only 3% and agro-meteorological conditions play a decisive role in the growth of crops. Compared to the 15-year average, accumulated rainfall was above average (RAIN +6%), while radiation was below average (RADPAR -6%). Although the temperature was above average (TEMP+2°C), the average temperature value for the reporting period was below 0°C. The dekadal precipitation was below average in late January, early and late February and all of April. The dekadal temperature was generally above average except in mid and late March. It is noticeable that the temperatures warmed up to above 0°C in early April and stayed above average in April. The favorable agro-climatic conditions resulted in an increase of BIOMSS by 14%. According to the NDVI profiles, the national average NDVI values were lower than 0.1 because of freezing conditions from January to March. The average NDVI increased to above 0.2 in April due to the warming temperatures.

Above-average precipitation, a trend which had lasted from November to March, will be favorable for the sowing of spring wheat in May.

Regional analysis

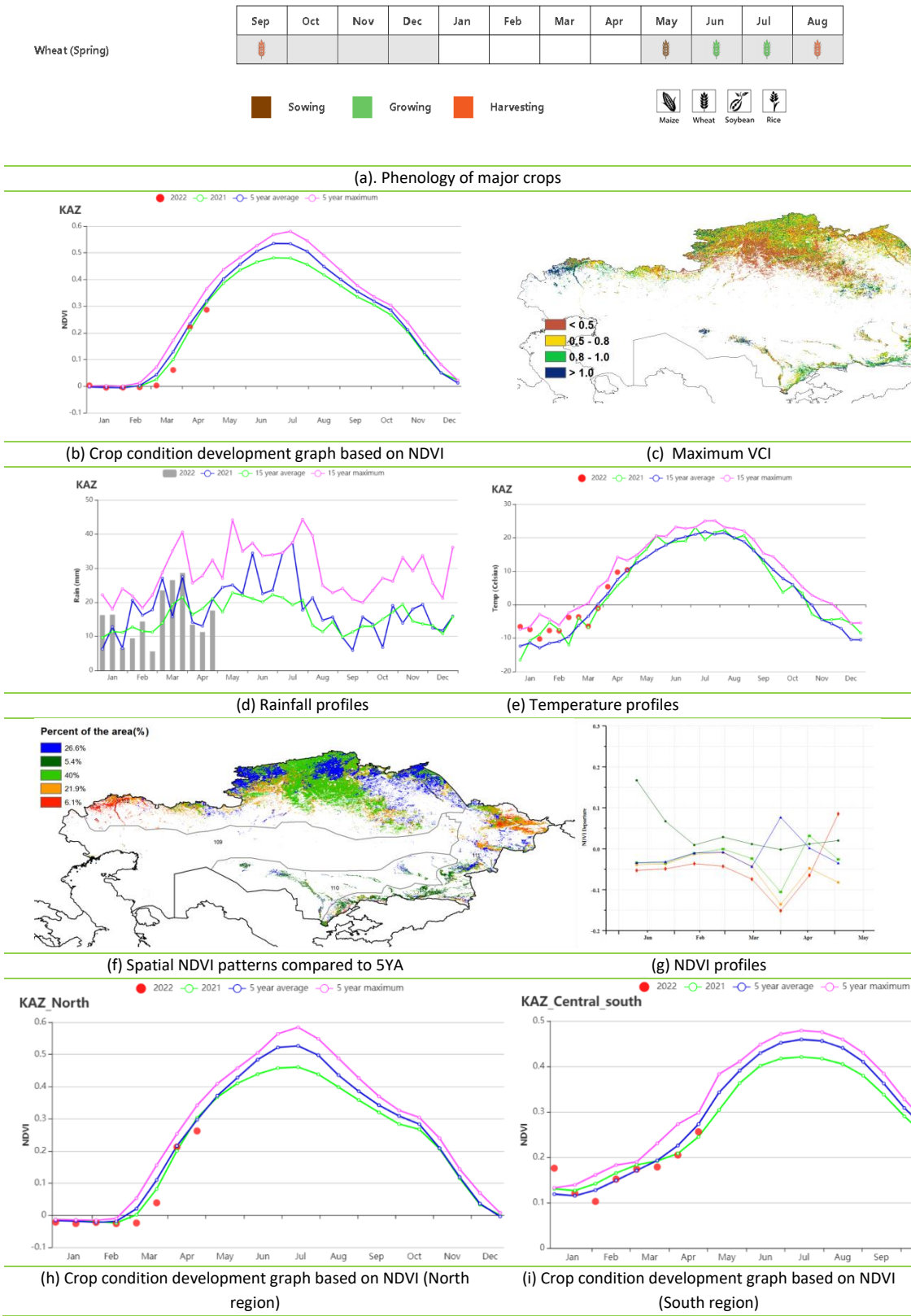
Based on cropping systems, climatic zones and topographic conditions, four sub-national agro-ecological regions can be distinguished for Kazakhstan, among which three are relevant for crop cultivation: the Northern region (112), the Eastern plateau and southeastern region (111) and the South region (110).

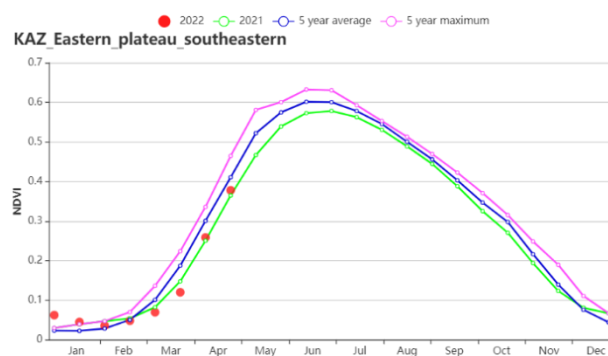
In the **Northern region**, the accumulated precipitation was close to average, and temperature was above average (TEMP +2.8°C), while RADPAR was below average (-8%). The warm and wet weather resulted in an increase of BIOMSS by 16%.

Agro-climatic conditions in the **Eastern plateau and southeastern region** were normal. The average rainfall and temperature were above average (RAIN +10%, TEMP +1.3°C). RADPAR was close to average. The favorable weather conditions led to an increase of potential biomass by 7%. Compared to the other regions, the higher CALF value (30%) indicated some agricultural activities in this region. The NDVI profiles showed that the NDVI was below average in April, but similar to last year.

The **South region** had the largest precipitation departure (RAIN +22%) among the three regions. The temperature was above average (TEMP +2.3°C), while the solar radiation was below average (RADPAR -9%). The combination of agro-climatic indicators resulted in an increase of the BIOMSS index by 17%.

Figure 3.23 Kazakhstan's crop condition, January-April 2022





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

Table 3.39 Kazakhstan agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Northern region	158	1	-3.4	2.8	537	-8	310	16
Eastern plateau and southeastern region	262	10	-1.8	1.3	1453	-1	326	7
South region	205	22	5.0	2.3	694	-9	448	17

Table 3.40 Kazakhstan, agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Northern region	4	-42	0.64
Eastern plateau and southeastern region	30	-22	0.69
South region	8	3	0.93

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[KEN] Kenya

Kenya experiences two rainy seasons: The long rains last from March to September and the short rains from October to December. Maize can be grown during the long and short rains, whereas wheat is grown during the long rains only. In the monitoring period from January to April 2022, the short rain maize had been harvested and the sowing of long rain maize began, while the planting of wheat will start in May only.

The proportion of irrigated cropland in Kazakhstan is 11% and agro-meteorological conditions play an important role in the growth of crops. At the national scale, precipitation was 204 mm, 55% below average. When looking into sub-national level, rainfall was lower in all areas. The weather was slightly warmer (TEMP +0.6°C) and RADPAR was slightly above the 15YA (+5%). BIOMSS was 21% lower than average due to insufficient rainfall. According to the national rainfall profiles, the 10-day accumulations of rainfall presented conditions that were close to the 5YA in January to February and below the average in the following two months.

The NDVI development graph at the national level hovered along the 5YA trends in January to Mid-February but the NDVI values were below average in March and April. It can be noticed that the below-average rainfall in March and April resulted in this situation. At the same time, the lower precipitation in March and April may lead to a delay in long rain maize planting. Therefore, conditions for the short rains maize were more favorable than for the long rains maize (sowing in March and April). Based on the NDVI clusters and the corresponding NDVI departure profiles, the western and central part of Kenya (red area), which accounts for 35.6% of the country's cultivated land, has near-average NDVI values, while other areas show significant deviations in the January to May crop growth. This is consistent with the maximum VCI graph which shows that the green spots representing VCI between 0.8 and 1.0 were equally distributed in the central and western regions. The national average VCI value reached 0.80 and the cropped arable land fraction decreased by 2% as compared to the 5YA. In brief, the national crop condition is below average, due to the planting of long rains maize suffered from drier-than-normal conditions in March and April.

Regional analysis

In the Eastern coastal region, the rainfall was greatly below average (-50%), which resulted in a decreased estimate for biomass (-24%) while the temperatures (+0.8 °C) and RADPAR (+3%) were moderately above average. The low rainfall delayed sowing and establishment of the long rainy season maize. The NDVI values stayed below the 5YA, and the CALF decreased by 10% to 83%. The maximum VCI was 0.64, which is the lowest among the four AEZs in Kenya. Overall, the crop conditions were below average for both livestock and crop production in the coastal areas.

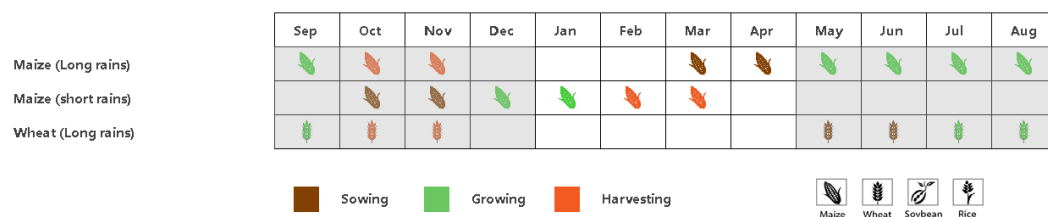
The **Highland agriculture zone** recorded 222 mm of rain, which was below the 15YA (-54%). Temperature was close to the 15YA (+0.7°C), whereas RADPAR was slightly above average (+6%). But BIOMSS was below average (-20%). The NDVI profile was near average between January to February but was below average in March to April. As with the eastern coastal region, the sowing of maize in the long rainy season was also affected by the lack of rainfall. At the same time, the increase in precipitation during April led to an increasing trend of NDVI values. The maximum VCIx value was recorded at 0.81. In this area, cropped arable land fraction almost stayed unchanged. Overall, crop growth has been severely affected by the drought conditions.

In the **Northern region**, precipitation was below average at 142 mm (-56%). The temperature was close to the 15YA (+0.9°C), while RADPAR was above average (+5%). BIOMSS was below average (-21%). The maximum VCIx was normal at 0.70. The below-average trend of its crop condition development graph indicates that the area was affected by drought between March and April. The sowing of long rain maize was delayed. In addition, CALF decreased (-7%) to 72%.

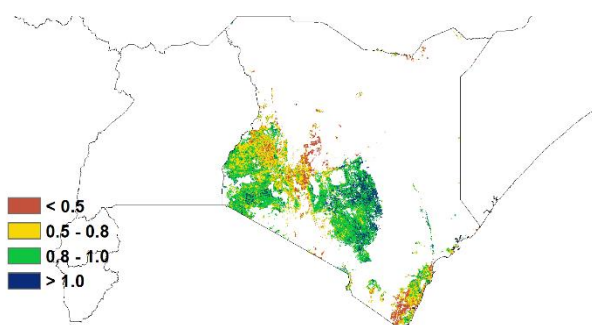
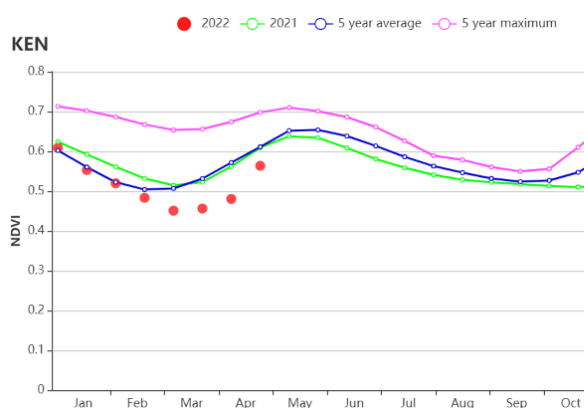
In general, the region has seen a decrease in rainfall, biomass, and CALF. This indicates that the region is severely affected by the drought.

The **Southwest region** includes the areas of Narok, Kajiado, Kisumu, Nakuru and Embu. It had the largest negative deviation in rainfall (-68%). The following values of indicators were observed: TEMP 20.9°C (+0.3°C), RADPAR (+4%) and BIOMSS (-27%). The decrease in precipitation led to a large decrease in biomass. However, NDVI values were close to the 5YA except for mid-March. In addition, CALF was unchanged (100%). VCIX value remained at a high level (0.86). All in all, the parameters indicate close to average conditions for this area.

Figure 3.24 Kenya's crop condition, January-April 2022

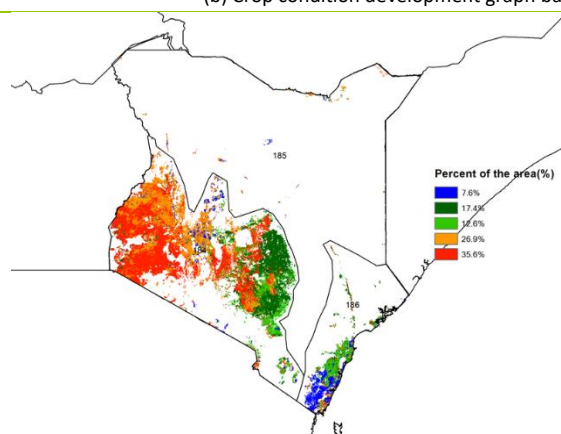


(a). Phenology of major crops

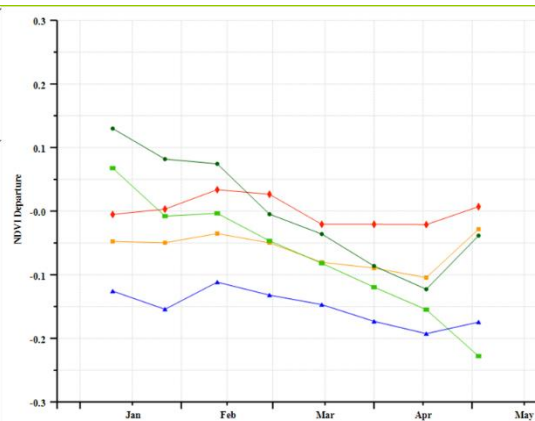


(b) Crop condition development graph based on NDVI

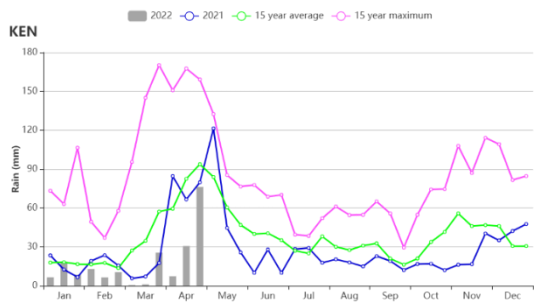
(c) Maximum VCI



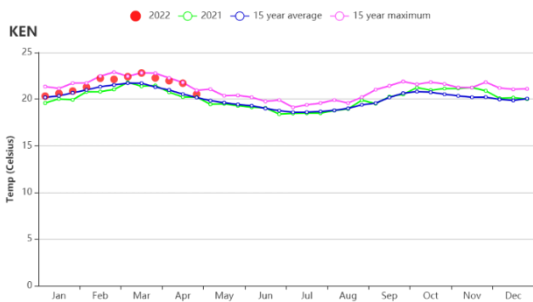
(d) Spatial NDVI patterns compared to 5YA



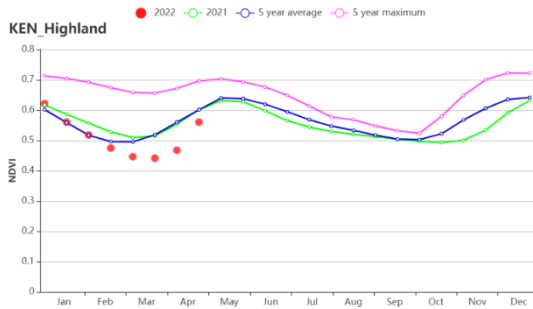
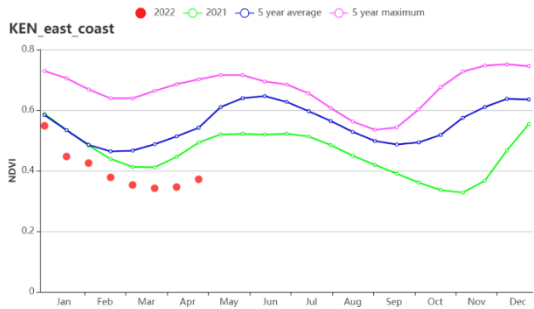
(e) NDVI profiles



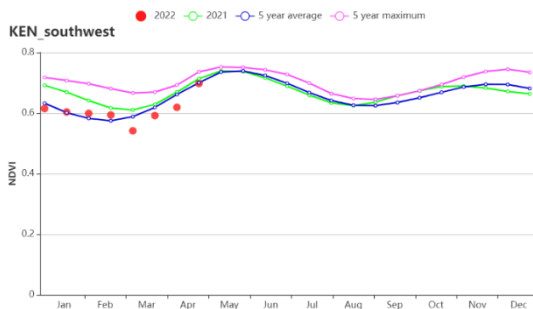
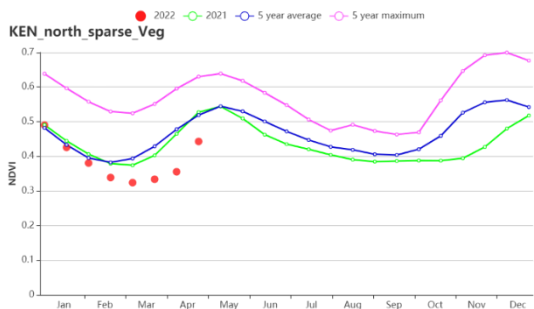
(f) Time series rainfall



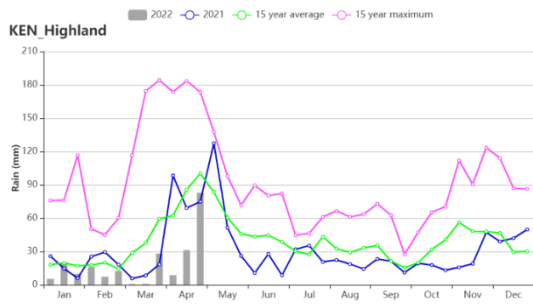
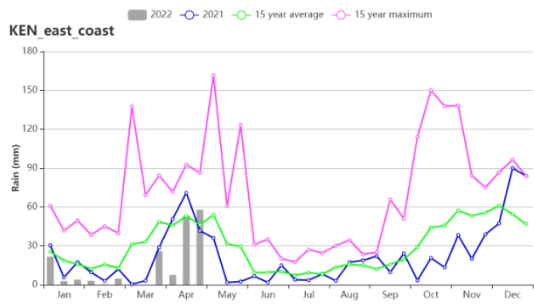
(g) Time series temperature



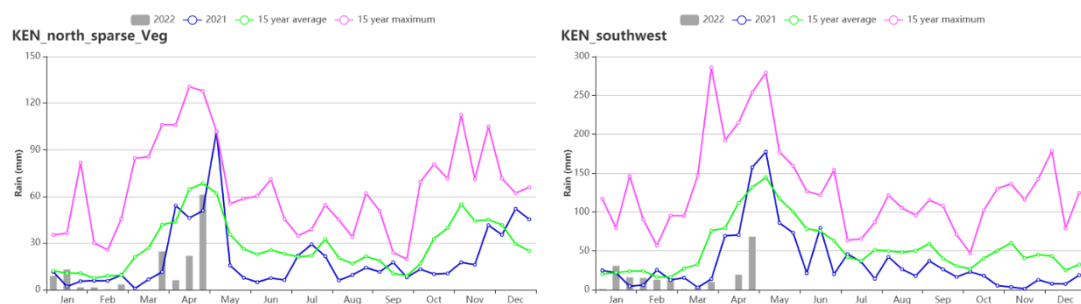
(h) Crop condition development graph based on NDVI, The eastern coastal region(left), The Highland agriculture zone(right)



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



(j) RAIN condition development graph based on NDVI, the eastern coastal region(left), The Highland agriculture zone(right)



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

Table 3.41 Kenya's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA,

January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
Coast	181	-50	27.6	0.8	1396	3	814	-24
Highland agriculture zone	222	-54	20.2	0.7	1396	6	683	-20
northern rangelands	142	-56	24.9	0.9	1414	5	683	-21
South-west	189	-68	20.9	0.3	1372	4	695	-27

Table 3.42 Kenya's agronomic indicators by sub-national regions, current season's values and departure,

January-April 2022

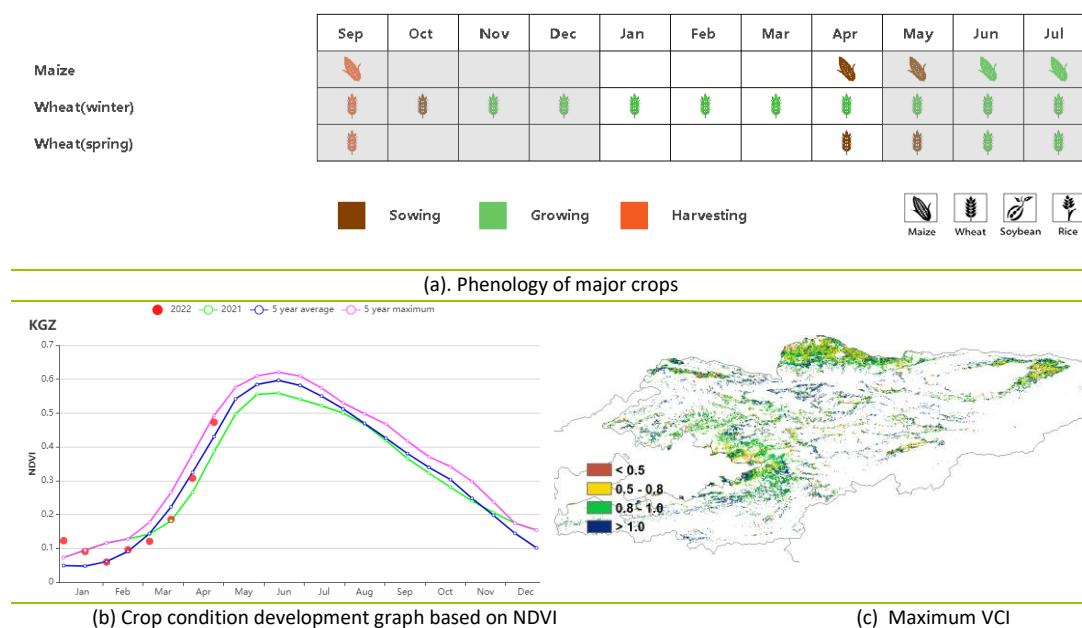
Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Coast	83	-10	0.64
Highland agriculture zone	94	-1	0.81
northern rangelands	72	-7	0.70
South-west	100	0	0.86

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[KGZ] Kyrgyzstan

Only a small area of winter wheat is grown in Kyrgyzstan. Spring crops were planted in April in the southern part. Among the CropWatch agro-climatic indicators, RADPAR was slightly below average (-1%), while TEMP (+0.4°C) and RAIN (+12%) were above average. The combination of these factors resulted in an above-average BIOMSS (+5%) compared to the recent fifteen-year average. As shown by the NDVI development graph, the winter vegetation conditions were generally above average except for March and early April. The spatial NDVI clustering profile shows that most of the cultivated regions had average or above-average crop conditions. It's worth noting that 18.5% of the cultivated regions (marked in light green, mainly distributed in western Osh, central Naryn, and Southern Jalal-Abad) had close-to-average crop conditions before March. Then, the crop conditions dropped to below-average in middle March, most likely due to rainfall that exceeded the recent 15-year maximum, and gradually recovered to average at the end of the monitoring period. This situation is confirmed by the VCIx map which shows relative high values (>0.8) distributed across the whole country. The national average VCIx was 0.95, indicating favorable crop conditions. The cropped arable land fraction increased by 14%, indicating that more land was cultivated. Crop conditions are favorable due to above-average precipitation.

Figure 3.25 Kyrgyzstan's crop condition, January - April 2022



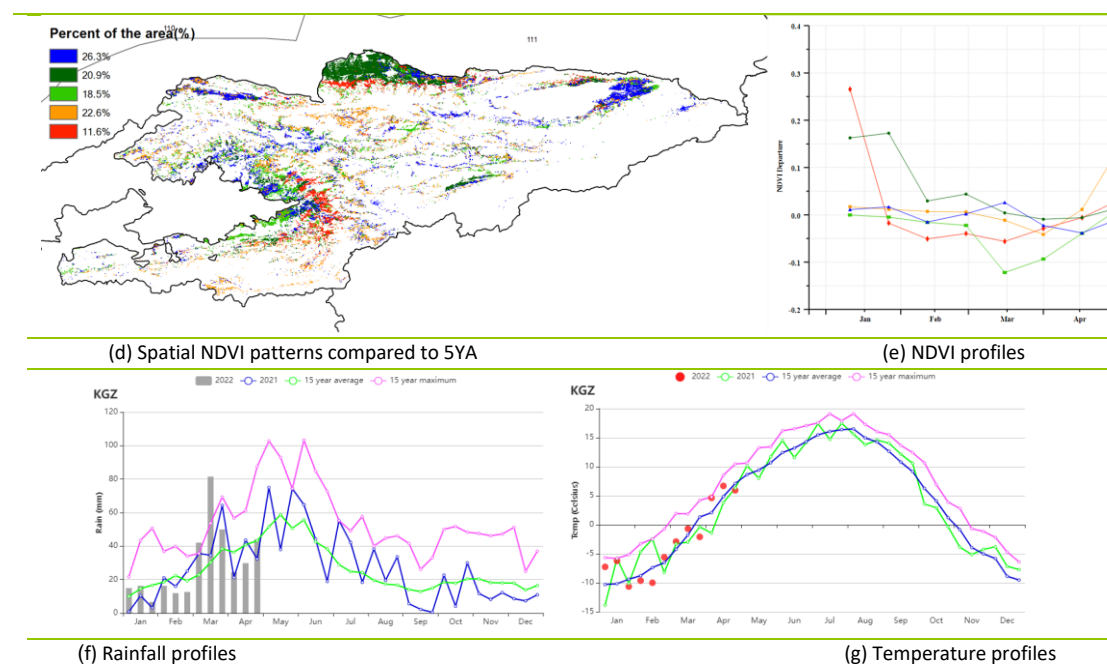


Table 3.43 Kyrgyzstan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Kyrgyzstan	351	12	-3.1	0.4	829	-1	301	5

Table 3.44 Kyrgyzstan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Kyrgyzstan	57	14	0.95

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MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[KHM] Cambodia

This reporting period covers the main harvesting stage of medium rice, late rice, and floating rice, which had a slightly below average production estimate according to the previous monitoring period. The period also covers the main growth stage of dry season early rice, dry season maize, and soybean, which benefitted from favorable growth conditions as monitored by the Cropwatch system.

The proportion of irrigated cropland in Cambodia is 8% and agro-meteorological conditions play an important role in the growth of crops. During this monitoring period, Cambodia experienced wetter and relatively cooler weather conditions. Compared to the same period of the past 15 years, the precipitation in Cambodia was 27% higher (RAIN), while the average temperature was slightly cooler by 0.1°C (TEMP) and the radiation was slightly higher as well (RADPAR +1%). The abundant rainfall resulted in a 14% higher potential biomass (BIOMSS) than average, which shows a favorable climatic condition for crop growth, which is consistent with the NDVI profile. As is shown by the NDVI profile, the national-scale NDVI recovered to average in mid-January, then reached and exceeded the maximum value of the past 5 years in February and March. Since mid-January, NDVI has stayed above average. According to the spatial NDVI patterns, 4 patterns could be identified: 1) about 59.3% of the cropland (in red and light green) in the country experienced a positive NDVI deviation, and these croplands were mainly located in the lower Mekong River basin and around the Tonle Sap Lake. 2) about 21.7% of the cropland (in dark green) maintained a slightly below-average NDVI, and these croplands mainly appeared in the northwestern Banteay Meanchey and were scattered in the lower Mekong River basin. 3) around 12.8% of the croplands (in blue) experienced a steady decline from the peak starting in mid-February. These croplands were mainly located in southern Banteay Meanchey and western Prey Veng. 4) the remaining 6.2% of the croplands (in yellow) had a below-average NDVI throughout the entire period. These croplands were in southeastern Kandal and western Prey Veng. Considering that the VCIx value was as high as 0.93 and the CALF index significantly rose by 12%, both the growth of soybean and the estimated production of dry-season maize and dry-season early rice were favorable.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, four sub-national regions are described below: **The Tonle Sap Lake region**, a seasonally inundated freshwater lake which is influenced by the inflow and outflow from the Mekong River, **the Mekong valley** between Tonle Sap and Vietnam border, **Northern plain and northeast**, and the **Southwest Hilly region** along the Gulf of Thailand coast.

For **Tonle Sap Lake region**, it experienced a 34% higher precipitation (RAIN), 0.3°C lower temperature (TEMP), and about 1% higher radiation (RADPAR), resulting in a 15% higher potential biomass (BIOMSS). The regional NDVI was close to average in January and then remained above average. Noteworthy, the NDVI exceeded the maximum value of the past 5 years in March. In addition, the CALF index in this region increased by 18% and the VCIx value was as high as 0.92, indicating favorable crop conditions.

For the **Mekong Valley region**, the precipitation in this zone was significantly higher by 38% (RAIN), the temperature was near average (TEMP), and radiation was 1% higher (RADPAR). Abundant precipitation resulted in a higher potential biomass (BIOMSS +15%), indicating favorable climatic condition for crop growth. Like the Tonle Sap Lake zone, the NDVI in this zone was close to average in January and then gradually approached the maximum level of the past 5 year in March. Considering that the regional CALF index increased by 9% and the VCIx value reached 0.93, the crop condition in this zone is predicted to be favorable as well.

For the **Northern plains and Northwest**, the zone had an 8% higher precipitation (RAIN), about 0.1°C higher temperature (TEMP), and average radiation (RADPAR), resulting in a potential biomass increase by about 8% (BIOMSS). Crop NDVI in the zone was close to average before early February, and then increased and was higher than average. The CALF index in the zone reached 98% and the VCIx value was at 0.93, so the crop production in the zone is estimated to be favorable as well.

For the **Southwestern hilly region**, precipitation in this region was 43% above average (RAIN), temperature was about 0.6°C lower (TEMP), and radiation was about 3% higher (RADPAR), resulting in a higher potential biomass in this region (BIOMSS +21%). In terms of the NDVI profile, the NDVI was likewise close to average in January and then gradually rose and was close to the maximum level of past 5 years. Meanwhile, the CALF index was as high as 99% and the VCIx index was close to 0.93, so the crop condition in this region was favorable as well.

Figure 3.26 Cambodia's crop condition, January - April 2022

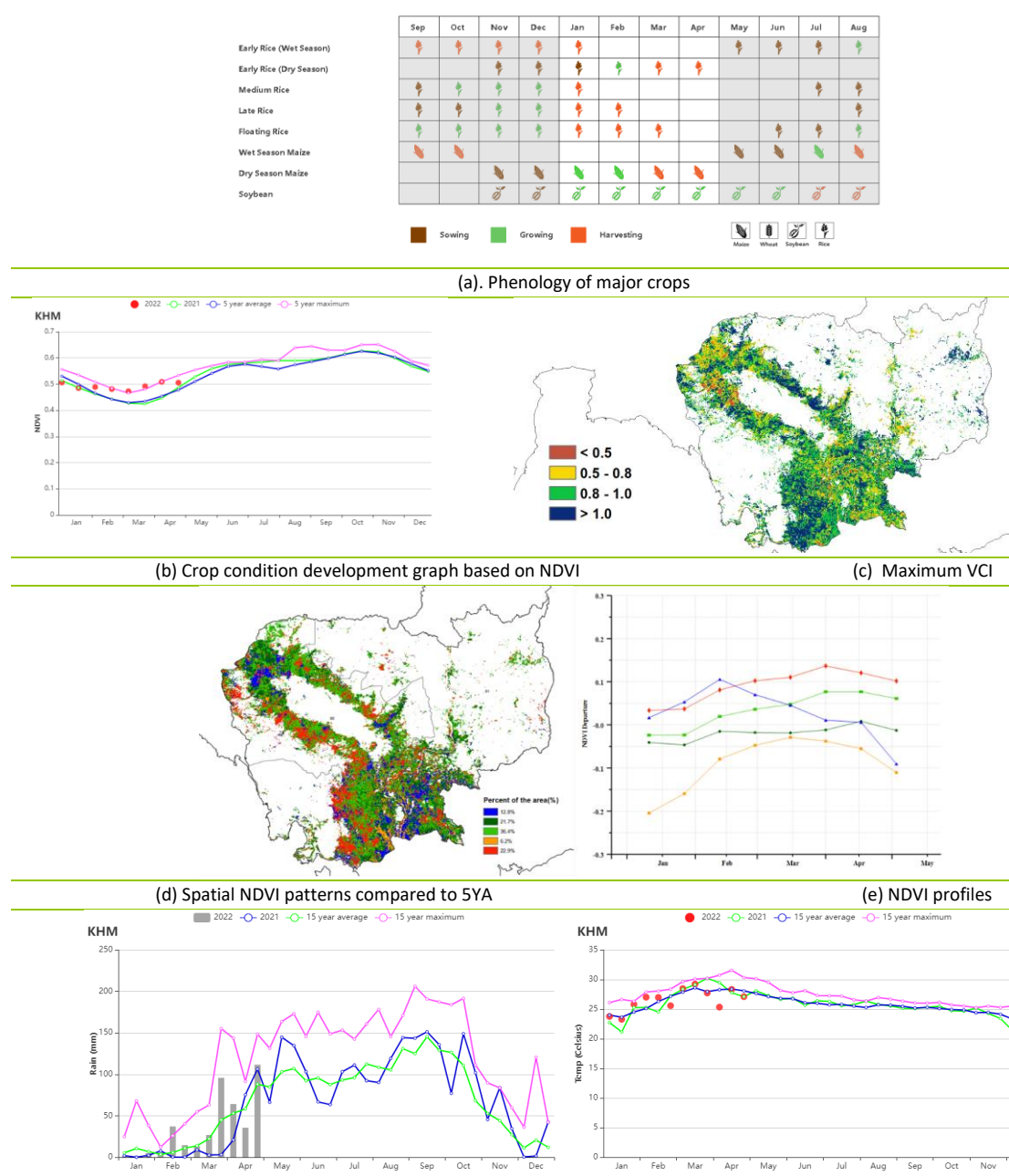




Table 3.45 Cambodia's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Tonle-Sap	430	34	26.5	-0.3	1195	1	998	15
Mekong valley	306	8	26.6	0.1	1186	0	854	8
Northern plain and northeast	306	8	26.6	0.1	1186	0	854	8

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Southwest hilly region	615	43	24.3	-0.6	1222	3	1190	21

Table 3.46 Cambodia's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Tonle-Sap	82	18	0.92
Mekong valley	91	9	0.93
Northern plain and northeast	98	6	0.93
Southwest hilly region	99	2	0.93

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[LKA] Sri Lanka

This report covers both the main (Maha) and second cropping season (Yala) of Sri Lanka. The harvest of main season crops (maize and wheat) took place between January to March. Sowing of the second season crops started in April. According to the CropWatch monitoring results, crop conditions were assessed as close to, but below average for the monitoring period.

The proportion of irrigated cropland in Sri Lanka is 41% and agro-meteorological conditions play an important role in the growth of more than half of the crops, rainfall is not the major influential factor. During this period, the country experienced the Northeast-Monsoon from January to February, followed by the First Inter-Monsoon, during which the island typically experiences cold and dry windy weather. At the national level, precipitation was markedly above the 15YA (RAIN +22%), while temperature and radiation were near the average level. The remarkable increase of rainfall in early April ensured sufficient water supply for the sowing of crops. The fraction of cropped arable land (CALF) was comparable to the 5YA. BIOMSS was up by 14% compared to the 15YA. As shown in the NDVI development graph, NDVI was generally close to average during the period. The maximum VCI for the whole country was 0.92.

As shown by the NDVI clusters map and profiles, more than half of country's cropland showed close to, but below average crop conditions. These croplands were distributed over the whole country. The decline in crop conditions was most likely due to the lack of fertilizer, resulting from a ban on the use of chemical fertilizer in Sri Lanka, which will likely lead to an annual drop of at least 30% in paddy yields nationwide. The abnormal NDVI departure values in January and April were mainly caused by cloud cover. The maximum VCI showed high values all over the country.

Regional analysis

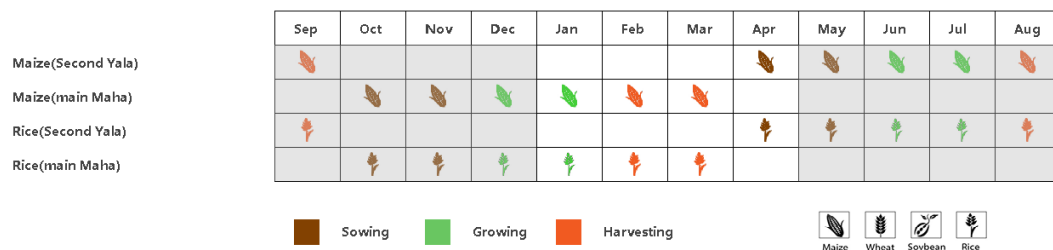
Based on the cropping system, climatic zones and topographic conditions, three sub-national agroecological regions can be distinguished for Sri Lanka. They are the Dry zone, the Wet zone, and the Intermediate zone.

In the Dry zone, the recorded RAIN (533 mm) was 19% above average. TEMP was 0.1°C above average and RADPAR was average. BIOMSS increased by 18% as compared to the 15YA. CALF was the same as the 5YA level with 99% of cropland utilized. NDVI was average in general, with below-average values in early January and above-average values in April. The VCIx for the zone was 0.91. Overall, crop conditions were near average for this zone.

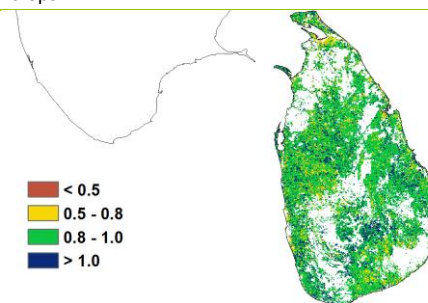
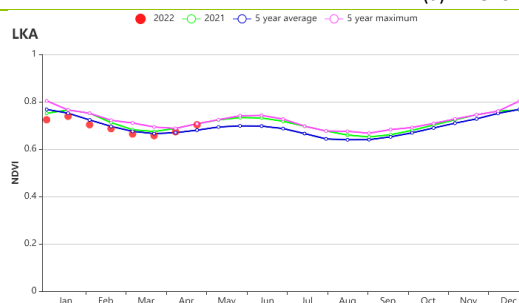
For the Wet zone, RAIN (1007 mm) was 28% above average as compared to the 15YA. TEMP and RADPAR decreased by 0.3°C and 1% respectively. BIOMSS was 7% above the 15YA and cropland was fully utilized. NDVI values showed slight deviation from average during the period. The VCIx value for the zone was 0.94. Crop conditions were near average for this zone.

The Intermediate zone also experienced sufficient rain (729 mm) with a 9% increase from the 15YA. TEMP was 0.2°C above average and RADPAR was average compared to the 15YA. With full use of cropland, BIOMSS was 8% above the average. The NDVI values were similar to the Wet zone and the VCIx value for this zone was 0.93. Conditions of crops were close to average.

Figure 3.27 Sri Lanka's crop condition, January - April 2022

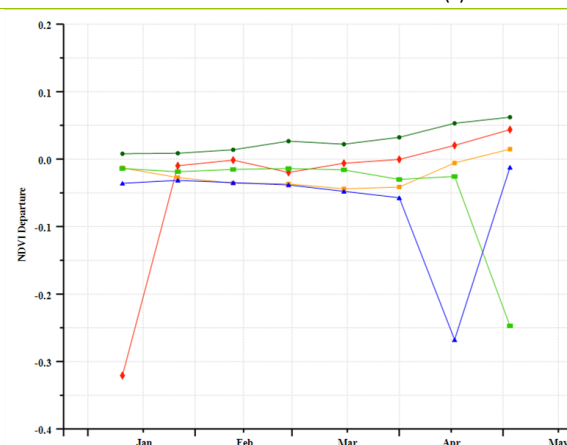
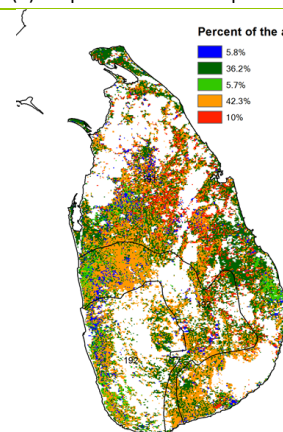


(a). Phenology of major crops



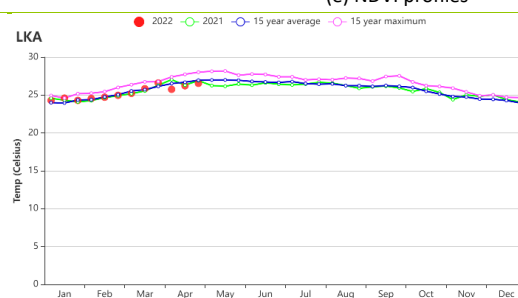
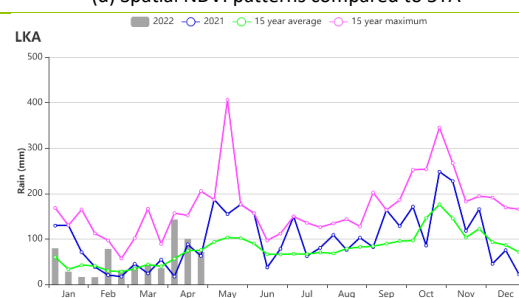
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



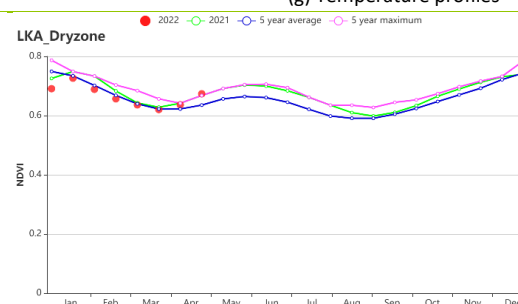
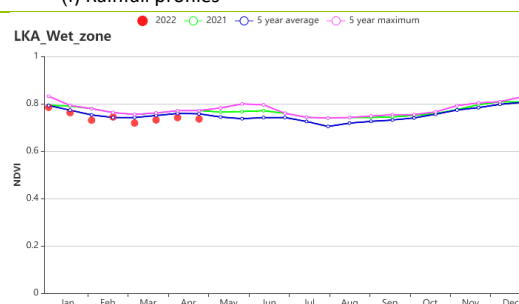
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

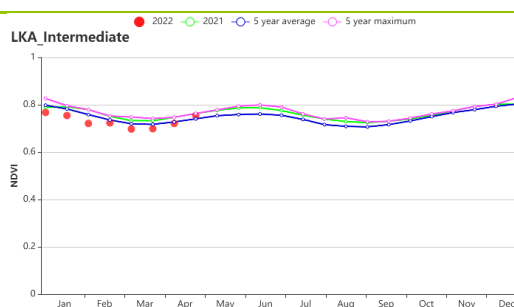


(f) Rainfall profiles

(g) Temperature profiles



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



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

Table 3.47 Sri Lanka's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Dry zone	533	19	25.8	0.1	1286	0	1260	18
Wet zone	1007	28	24.3	-0.3	1178	-1	1330	7
Intermediate zone	729	9	24.2	0.2	1185	0	1239	8

Table 3.48 Sri Lanka's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Dry zone	99	0	0.91
Wet zone	100	0	0.94
Intermediate zone	100	0	0.93

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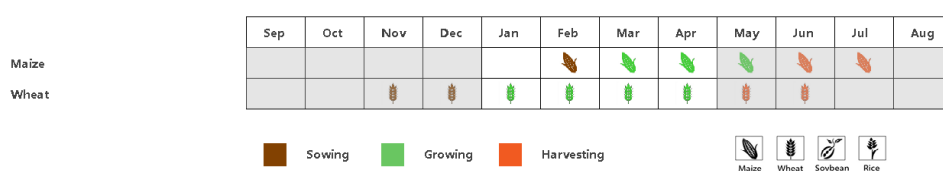
[MAR] Morocco

This reporting period covers the main growing stage of wheat, while maize planting started in February. The proportion of irrigated cropland in Morocco is 15% and agro-meteorological conditions play an important role in the growth of most crops. Precipitation had been 51% below the average during the previous monitoring period. The drought conditions continued during this monitoring period, as the CropWatch agro-climatic indicators show that the recorded rainfall was 184 mm, 15% below the 15-year average (15YA). The rainfall index graph shows that the rainfall was less than the 15YA during the January to mid-February period, with higher rainfall than the 15YA between late February and early April (>20 mm). The average temperature was only 0.2°C below the 15YA. The temperature index graph shows that the temperature fluctuated around the 15YA. RADPAR was slightly lower than the 15YA by 0.1% while BIOMSS was higher than the 15YA by 5%. The nationwide NDVI crop development graph shows that the crop conditions were far below the 5-year average (5YA) due to severe drought conditions, particularly during January and mid-February as confirmed by the rainfall index graph. The NDVI profile map indicates that about 21.1% of cultivated areas were slightly above the 5YA, and 78.9% were below the 5YA with some improvement in April. The VCIx was at 0.51, and the CALF was below the 5YA by 32%. Conditions for wheat production were highly unfavorable.

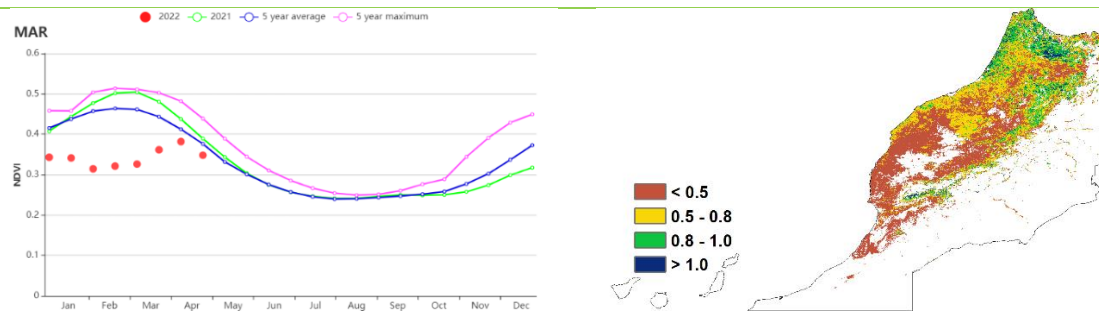
Regional analysis

Based on the cropping system, climatic zones, and topographic conditions, Morocco is subdivided into four agro-ecological zones (AEZ). Only three are relevant for crop production: Sub-humid northern highlands including the central Centre-Nord Region and northern Centre-Sud, Warm semiarid zone covering the regions of North-Oriental and the broad Tensift Region, and Warm sub-humid zone of the Nord-Ouest Region. The agroclimatic indicators for the three AEZs show a decrease in rainfall (-17%, -17%, and -12%, respectively) and the temperature was also below 15YA by 0.2°C. RADPAR was higher than the 15YA by 2% in the first zone while it was at the 15YA in the second and third zones. BIOMSS was below the 15YA by 6%, 4%, and 4% in the three zones, respectively. The NDVI-based crop condition development graphs show similar conditions for the three zones following the national crop development NDVI graph. The VCIx was 0.67, 0.38, and 0.63, and the CALF was below the 5YA by 21%, 56%, and 15%, respectively in the three zones, implying poor prospects for cereal production.

Figure 3.28 Morocco's crop condition, January– April 2022

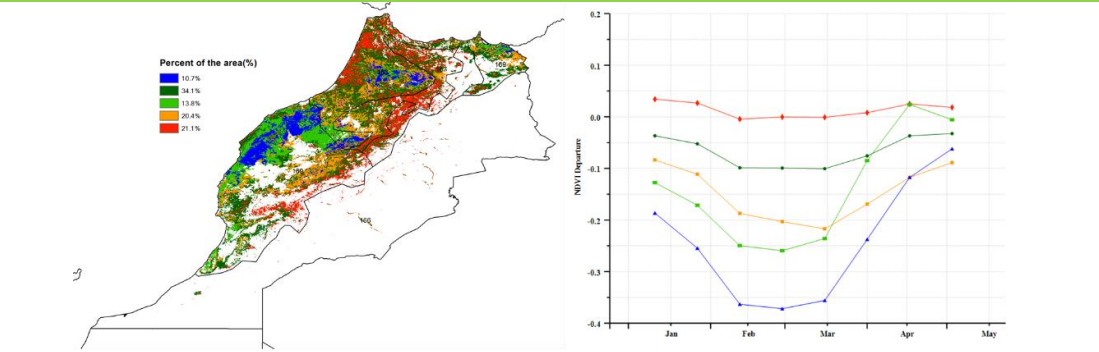


(a). Phenology of major crops



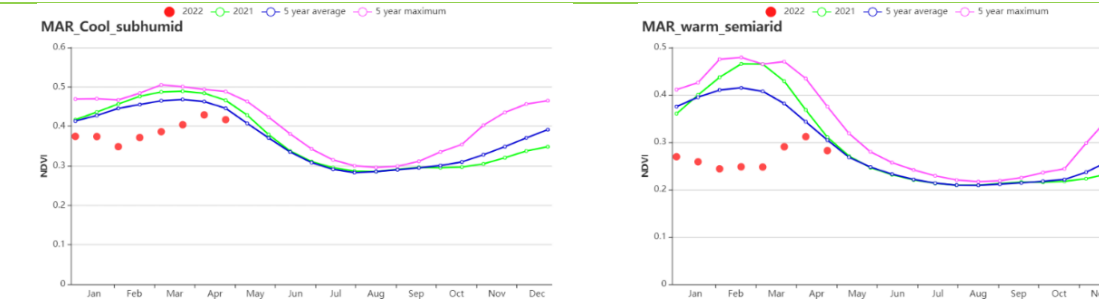
(b) Crop condition development graph based on NDVI

(c) Maximum VCI

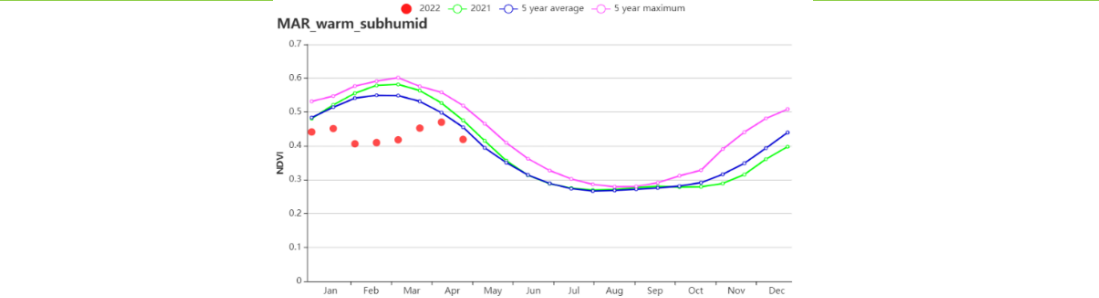


(d) Spatial NDVI patterns compared to 5YA

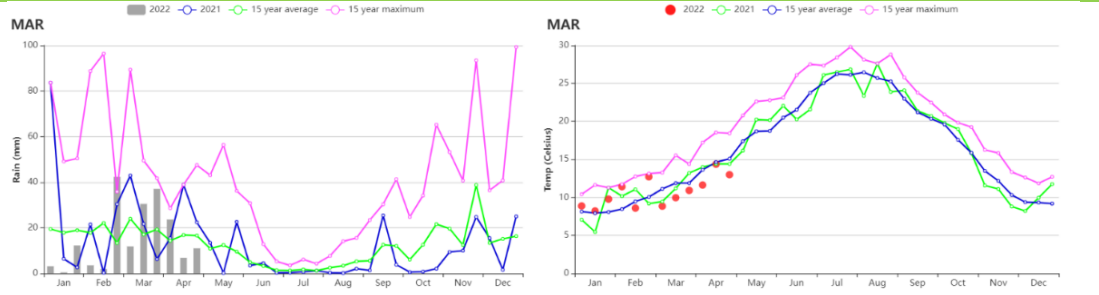
(e) NDVI profiles



(f) crop condition development graph based on NDVI, Sub-humid northern highlands and (g) Warm semi-arid zones



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



(i) Time series profile of rainfall (j) Time series profile of temperature

Table 3.49 Morocco's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Sub-humid northern highlands	255	-17	9.0	-0.2	974	2	559	-6
Warm semi-arid zones	115	-17	12.0	-0.2	1062	0	421	-4
Warm sub-humid zones	248	-12	10.0	-0.2	966	0	564	-4

Table 3.50 Morocco's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January – April 2022

Region	CALF		Maximum VCI
	Current (%)	Departure (%)	Current
Sub-humid northern highlands	57	-1	0.67
Warm semi-arid zones	21	-56	0.38
Warm sub-humid zones	70	-15	0.63

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[MEX] Mexico

This report covers the production of irrigated wheat, typically sown in November and December, as well as of irrigated winter maize, sown roughly one month earlier. Maize and wheat were at the harvesting stage in March and April, respectively. Rice and soybean sowing began in April.

The proportion of irrigated cropland in Morocco is 35% and agro-meteorological conditions play an important role in the growth of most crops, rainfall is not the major influential factor. The CropWatch agroclimatic indicators show that RAIN was near the 15YA, TEMP decreased by 0.1°C and RADPAR was above average (+2%). Accordingly, BIOMSS increased by 2% as compared to the 15YA. CALF was 57%. It had decreased by 5%. The VCIx was 0.73.

In terms of Agro-climatic conditions, precipitation and temperature were at the average level for the country. However, precipitation was not evenly distributed. The rainfall deficit was more pronounced in the north, where the drought conditions persisted. According to VCI spatial patterns, very high values (greater than 1.0) occurred mainly in northern Tamaulipas. Extremely low values (less than 0.5) occurred in the northern border area, mainly in Sonora, Coahuila de Zaragoza and Chihuahua.

As shown in the spatial NDVI profiles and distribution map, 9.1% of the total cropped areas were above average during the entire monitoring period, mainly distributed in Campeche, Yucatán and Tabasco. Half of the total cropped areas were below average. 12.6% of the areas were significantly below average, mainly in Coahuila de Zaragoza, and 36.9% were slightly below average, mainly in Veracruz and Jalisco.

Overall, the crop conditions were similar to last year, but lower than the 5YA average. The prolonged drought still persists, especially in the north. However, the production of irrigated maize and wheat, which predominantly takes place in Sinaloa and Sonora, is close to average.

Regional analysis

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

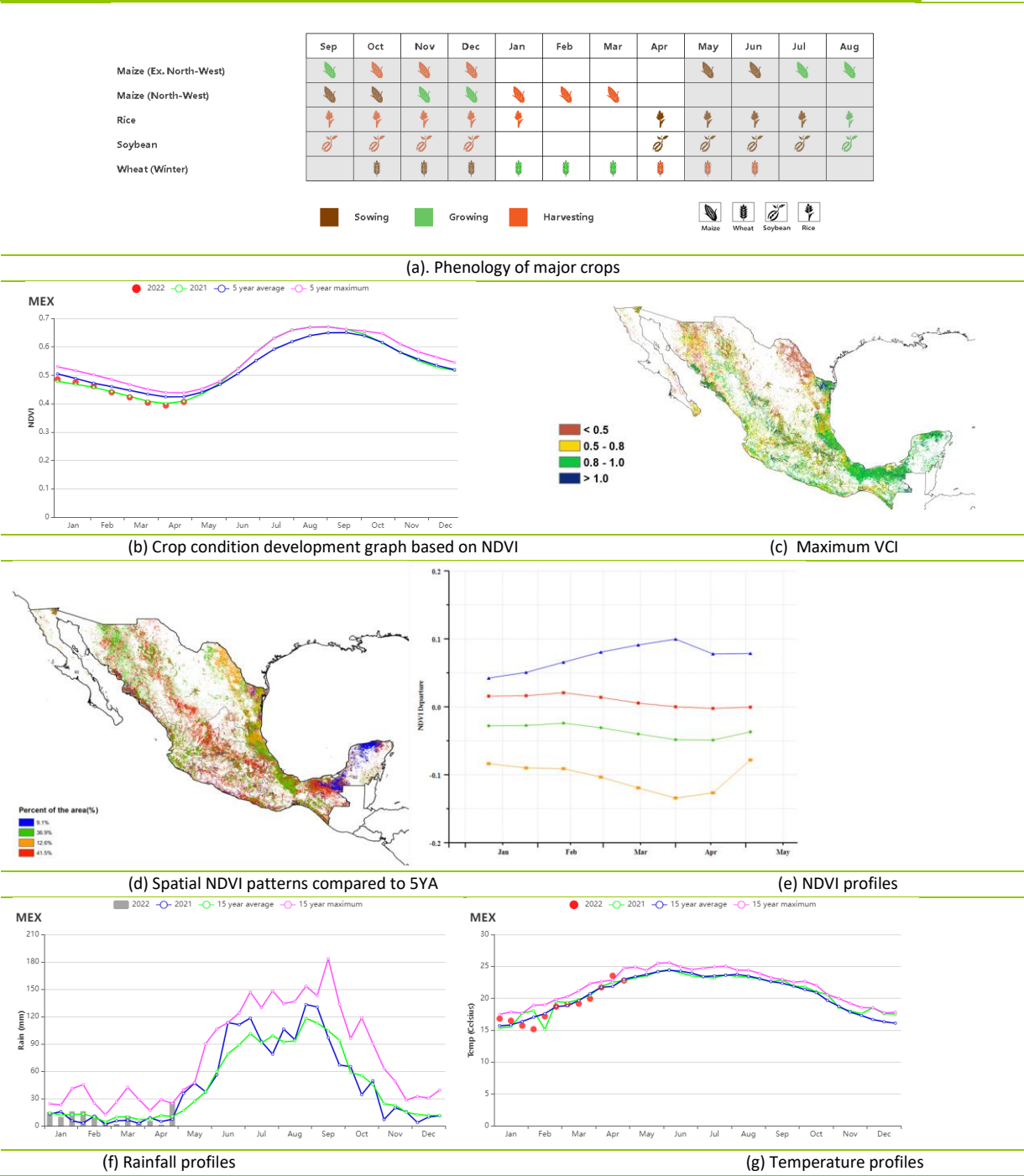
The Arid and semi-arid region, located in northern and central Mexico, accounts for about half of the planted area in the country. The agro-climatic condition showed that RAIN decreased by 40%, TEMP decreased by 0.3°C and RADPAR increased by 3%. According to the NDVI development graph, crop condition in this region was at the same level as last year. CALF decreased by 15% compared with the 5YA. This region was most affected by the below-average rainfall and VCIx was only 0.62.

The region of Humid tropics with summer rainfall is located in southeastern Mexico. RAIN was significantly above average (+59%), TEMP decreased by 0.1°C, RADPAR decreased by 1% and BIOMSS increased by 17%. As shown in the NDVI development graph, crop conditions were close to average from January to April. CALF was 99%. The increased precipitation brought some relief from the drought. The VCIx (0.89) confirms that crops grew better in this region than in other regions, which was due in large part to increased precipitation.

The Sub-humid temperate region with summer rains is situated in central Mexico. According to the NDVI development graph, crop conditions were below but close to average, and later recovered to average levels. The agro-climatic conditions were close to the average level. RAIN decreased by 61%, TEMP increased by 0.2°C, RADPAR increased by 3%, and BIOMSS decreased by 21% compared to the 15YA. CALF was 47%, and VCIx for this zone was 0.80.

The region called Sub-humid hot tropics with summer rains is located in southern Mexico. During the monitoring period, crop conditions were close to average as shown by the NDVI time profiles. Agro-climatic conditions were close to average levels, including RAIN (-21%), RADPAR (+2%) and BIOMSS (-10%). CALF was 79%. The VCIx for the region was 0.79.

Figure 3.29 Mexico’s crop condition, January - April 2022



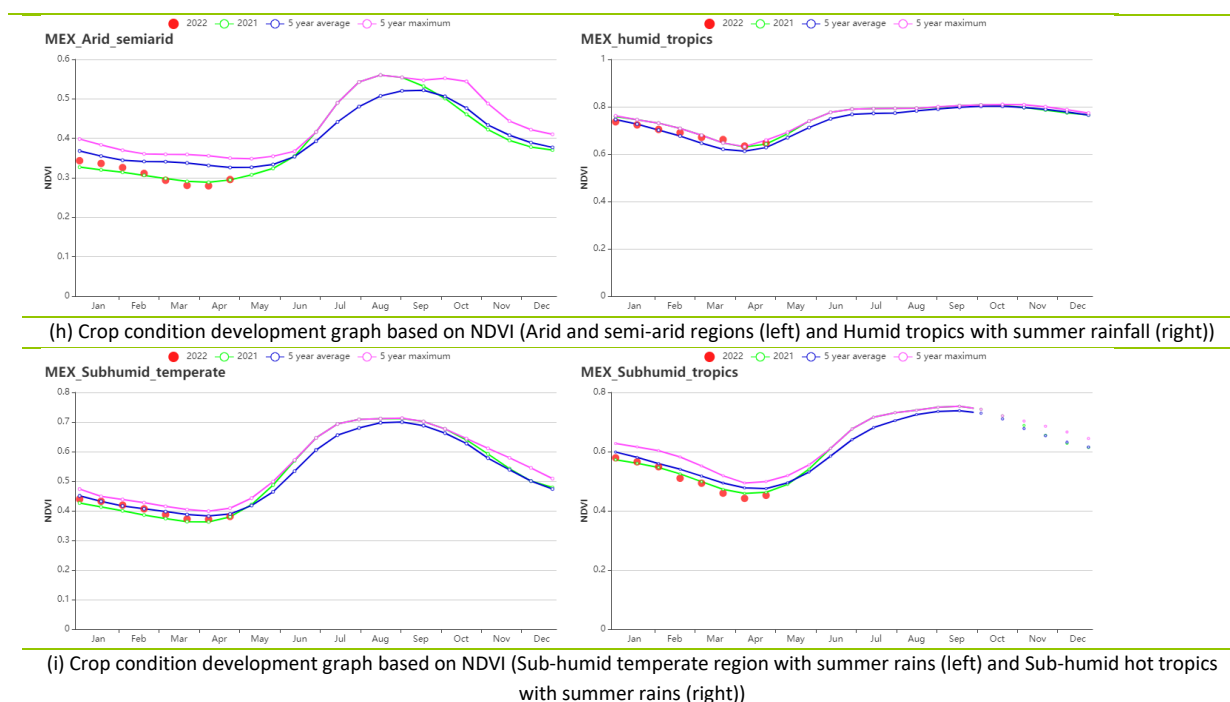


Table 3.51 Mexico's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Arid and semi-arid regions	42	-40	15.6	-0.3	1265	3	333	-15
Humid tropics with summer rainfall	373	59	23.2	-0.1	1157	-1	895	17
Sub-humid temperate region with summer rains	42	-61	18.2	0.2	1347	3	384	-21
Sub-humid hot tropics with summer rains	96	-21	20.3	0.0	1274	2	473	-10

Table 3.52 Mexico's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Arid and semi-arid regions	30	-17	0.62
Humid tropics with summer rainfall	99	0	0.89
Sub-humid temperate region with summer rains	47	1	0.8
Sub-humid hot tropics with summer rains	79	-1	0.79

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[MMR] Myanmar

During this reporting period, the weather was warmer and drier than usual. The harvest of maize started in January, whereas that of the second rice crop started in March. Wheat reached maturity in February. The country is plagued by an internal conflict, which has caused displacement of people, restrictions of movement and trade, as well as a surge of input prices for crop production.

The proportion of irrigated cropland in Myanmar is 26% and agro-meteorological conditions play an important role in the growth of most crops. Compared to the 15YA, RAIN was lower (-5%) while TEMP was higher (+0.3°C) and RADPAR was down by 3%. As a result, BIOMSS was slightly above the average (+1%). Compared to the 5YA, the utilization of cropland dropped by 1%. NDVI values were average during the entire period. The maximum VCI during this period was 0.85.

As shown by the NDVI clusters map and profiles, the crop conditions across the country were quite different. More than half (69.3%) of the country's cropland showed average and above average crop conditions. It was mainly located in the Central Plain. The remaining 30.7% trended below average throughout this monitoring period. The lowest VCI values were observed for parts of the Central Plain. During this monitoring period, the crop conditions for most of the country were fair.

Regional analysis

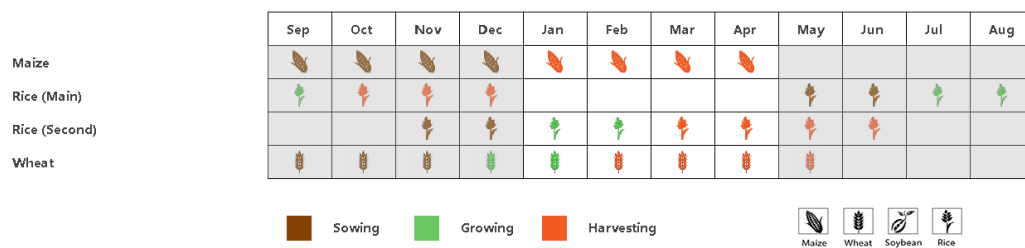
Three sub-national agro-ecological zones (AEZ) can be distinguished for Myanmar based on the cropping system, climatic zones and topographic conditions. They are the Central plain, the Hills and the Delta and Southern Coast regions.

The **Central Plain** had a marked rainfall deficit (RAIN -33%), RADPAR dropped by 3% and TEMP was up by 0.6°C compared to the 15YA. BIOMSS was 4% lower than the 15YA. CALF (-3%) showed that only 69% of the cropland was fully utilized. NDVI was near the level of the 5YA for most of the period and was above-average in early April. The VCIx was 0.81. Crop conditions for this region were slightly below average.

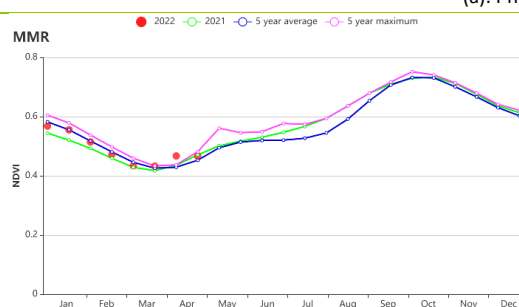
The **Hills region** also had below-average rainfall (RAIN -8%). RADPAR was 3% below average and TEMP increased by 0.1°C. BIOMSS was the same as the 15YA. Most of the cropland was fully utilized (CALF 93%). The NDVI values were close to the 5YA during the whole period. The VCIx was 0.89. Crop conditions are assessed as close to the 5YA level.

The **Delta and Southern Coast region** had the highest RAIN compared with the other two sub-national regions, and it was 18% above the 15YA. TEMP was 0.3°C above average while RADPAR decreased by 4%. BIOMSS was 10% above the 15YA. The cropland was not fully utilized (CALF 88%). VCIx was 0.88. The NDVI values were near the 5YA. Crop conditions in this region were near average.

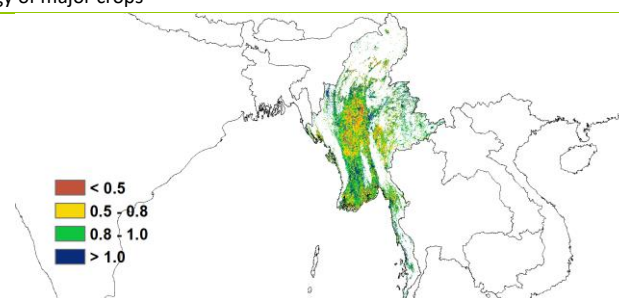
Figure 3.30 Myanmar's crop condition, January - April 2022



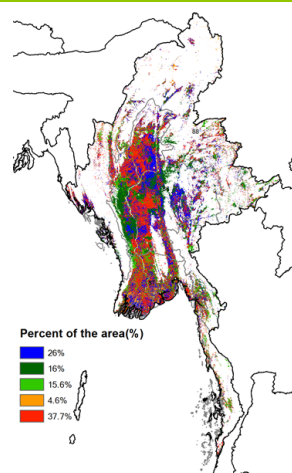
(a). Phenology of major crops



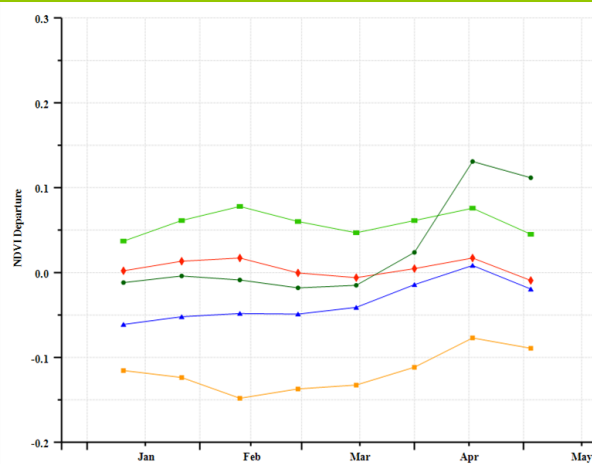
(b) Crop condition development graph based on NDVI



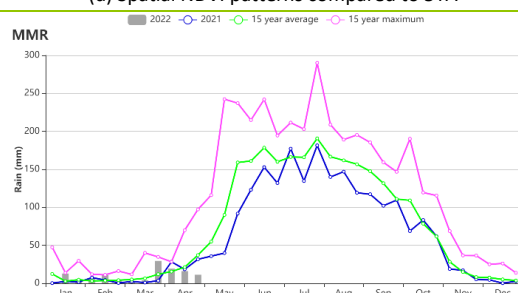
(c) Maximum VCI



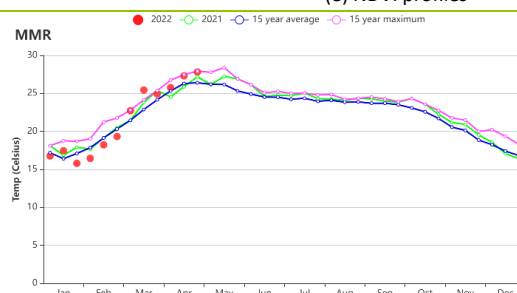
(d) Spatial NDVI patterns compared to 5YA



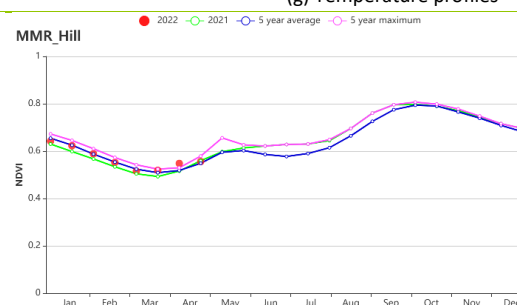
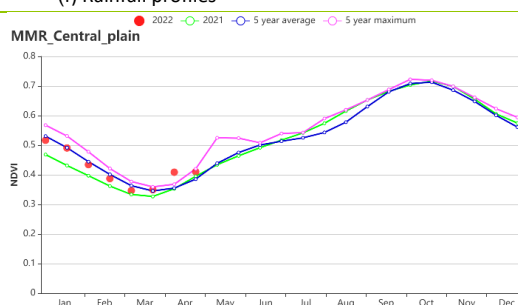
(e) NDVI profiles



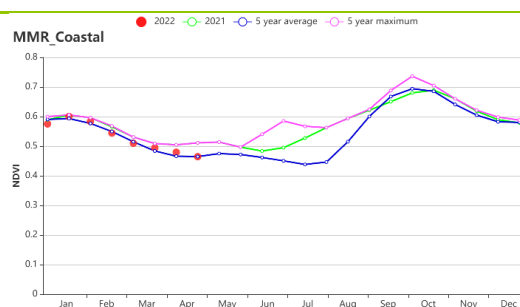
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (central plain (left) and hills region (right))



(i) Crop condition development graph based on NDVI (delta and southern coast region)

Table 3.53 Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central plain	45	-33	22.7	0.6	1227	-3	471	-4
Hills region	139	-8	19.0	0.1	1192	-3	529	0
Delta and southern-coast	158	18	26.4	0.3	1234	-4	711	10

Table 3.54 Myanmar's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central plain	69	-3	0.81
Hills region	93	0	0.89
Delta and southern-coast	88	0	0.88

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[MNG] Mongolia

During the monitoring period from January to April 2022, no crops were grown in Mongolia due to the cold winter weather. Summer crops (mainly spring wheat and potatoes) will be planted in May. The proportion of irrigated cropland in Mongolia is only 3% and agro-meteorological conditions play a decisive role in the growth of almost all crops. According to the CropWatch agroclimatic indicators, rainfall was significantly below the 15YA in the Altai region (-41%) and Gobi Desert region (-52%), while above average in the Central and Eastern Steppe region (+23%). Accordingly, the average rainfall in Mongolia was close to the 15YA (70mm). Similar to the trend reported in the last bulletin, Mongolia was warmer than usual (+0.5°C), while RADPAR was slightly below average (-2%). The potential biomass was slightly above average (BIOMSS +1%) and the maximum VCI was 0.95.

According to the development graph based on NDVI, the vegetation conditions in Mongolia were normal, and the spatial distribution of NDVI profiles also shows that NDVI of most regions was close to average. Overall, the climate and soil conditions at the start of the summer crop season were normal.

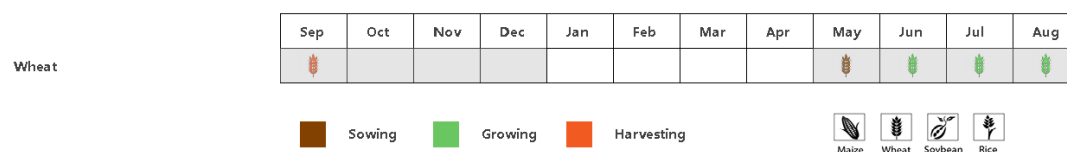
Regional analysis

Hangai Khuvs gul region: The average temperature was slightly above average (+0.2°C), while rainfall and solar radiation were below average (-5% and -2%). Thus, the potential biomass was decreased by 8%. The development graph based on NDVI shows that vegetation conditions were below average throughout this monitoring period.

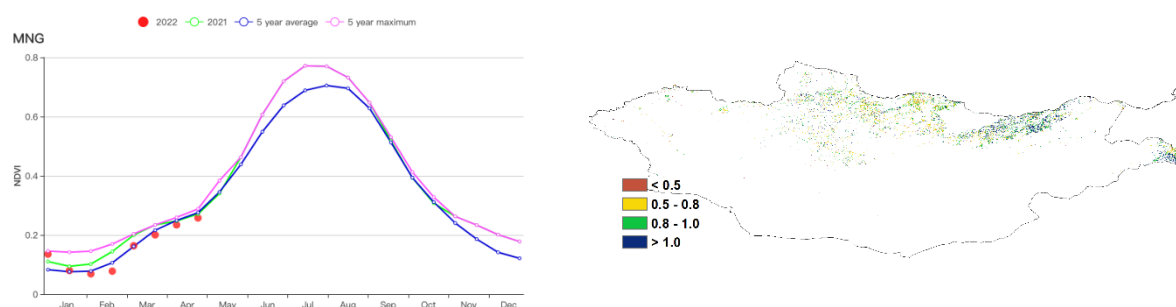
Selenge-Onon region: The agroclimatic conditions for this region were normal (RAIN +3%, TEMP +0.5°C, RADPAR -2%, BIOMSS +5%), the maximum VCI was 0.96, and the development graph based on NDVI also indicates normal vegetation conditions.

Central and Eastern Steppe Region: Rainfall was significantly above average (+23%), the average temperature increased by 0.5°C, and solar radiation decreased by 3%. The combination of the factors resulted in a higher BIOMSS (+14%) compared to the fifteen-year average, and the maximum VCI was 1.13. Overall crop prospects are average.

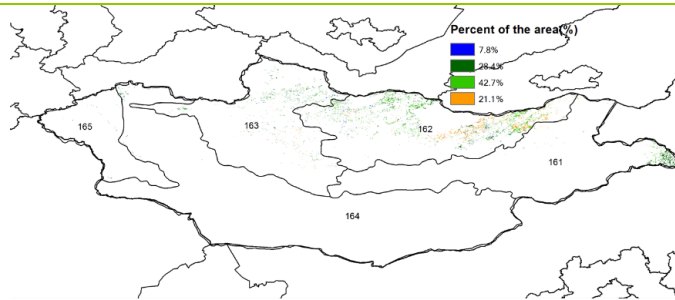
Figure 3.31 Mongolia's crop condition, January - April 2022



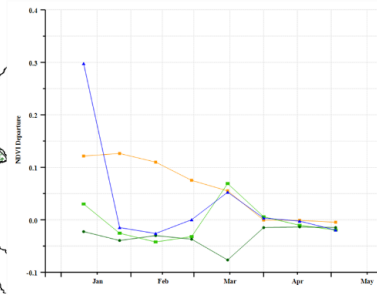
(a) Phenology of major crops



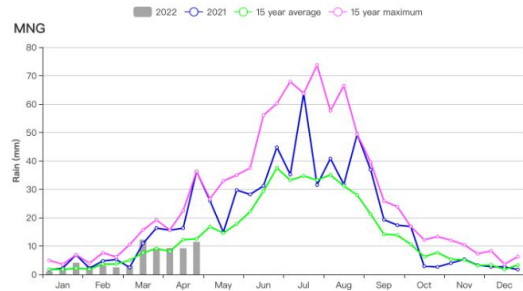
(b) Crop condition development graph based on NDVI



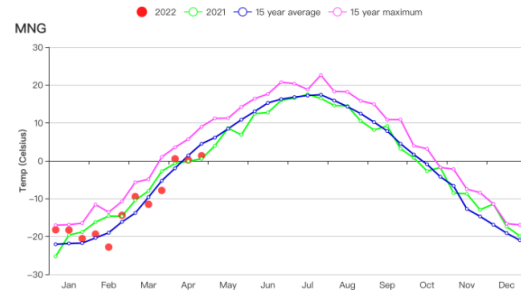
(c) Maximum VCI



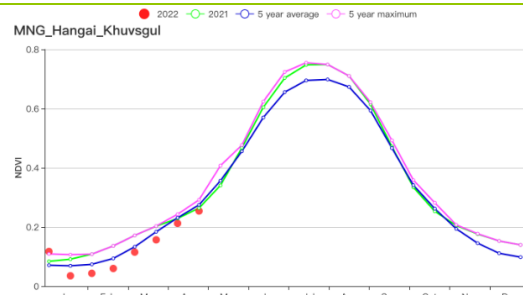
(d) Spatial NDVI patterns compared to 5YA



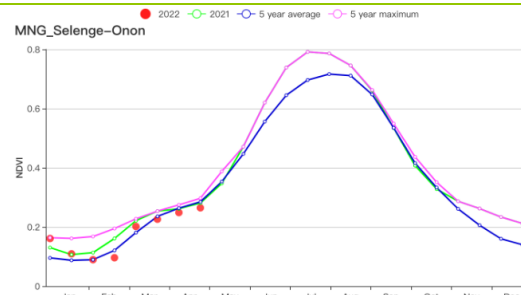
(e) NDVI profiles



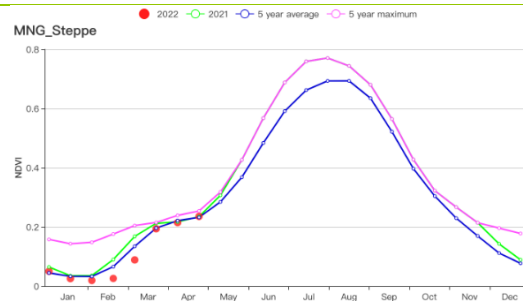
(f) Rainfall profiles



(g) Temperature profiles



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



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

Table 3.55 Mongolia's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
Hangai Khuvsgul Region	64	-5	-13.3	0.2	787	-2	125	-8
Selenge-Onon Region	72	3	-10.9	0.5	773	-2	172	5
Central and Eastern Steppe Region	82	23	-11.2	0.5	789	-3	182	14
Altai Region	72	-41	-11.6	0.6	744	0	129	-9
Gobi Desert Region	30	-52	-10.9	0.8	767	3	89	-29

Table 3.56 Mongolia's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Hangai Khuvsgul Region	3	173	0.89
Selenge-Onon Region	7	312	0.96
Central and Eastern Steppe Region	0	669	1.13
Altai Region	2	1525	0.76
Gobi Desert Region	0	-21	0.74

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[MOZ] Mozambique

In Mozambique, the agricultural season lasts from November to May of the following year. Coinciding with the rainy season, the current monitoring period (January- April 2022) covers the growing stages of rainfed maize and rice crops in the northern region of the country, while in the south, the harvesting of both maize and rice was completed in April. This period also covers the growing stages of wheat, which has its harvesting scheduled for May.

The proportion of irrigated cropland in Mozambique is only 4% and agro-meteorological conditions play a decisive role in the growth of almost all crops. Nationwide, climate adversities played a significant role in crop development. The monsoon season was off to a late start last year, as rain was 30% below the 15YA in the period from October to December. During this monitoring period, the country recorded three tropical storms and cyclones (including Ana, Batsirai and Gombe). These events brought together intensive rains that contributed to the increases recorded in rainfall (RAIN +9%). The temperature increased by 0.2°C. Radiation dropped by 2% while the total biomass production was near average.

The effects of the climate adversities (tropical storms and cyclones) are shown by the national crop conditions development graph based on NDVI, in which the crop conditions were below the average of the past five years from early January to late April. This is also confirmed by the spatial NDVI patterns together with the NDVI profiles revealing that nationwide, crop conditions were unfavourable during a major part of the growing season, recovering in late April only. Provinces of Zambezia, Nampula, Tete and Sofala are the provinces that showed the worst crop conditions. The cropped arable land fractions were near average and the maximum VCI was 0.92. The crop conditions were unfavorable due to erratic rainfall.

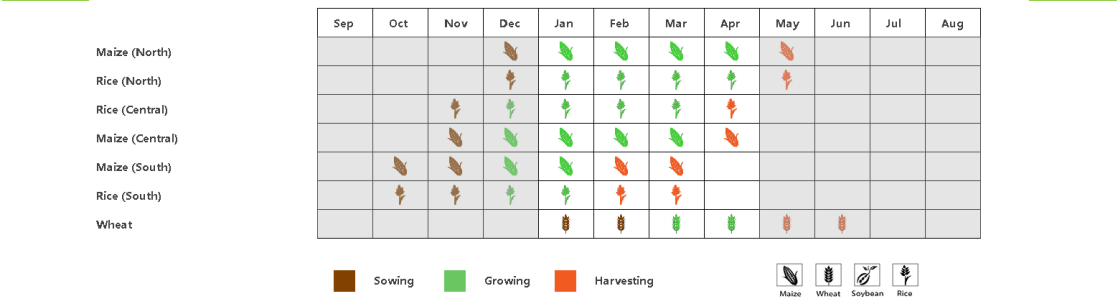
Regional analysis

Based on the national cropping system, topography and climate, CropWatch has subdivided Mozambique into five agroecological zones (AEZs) including the Buzi basin (140), Northern High-altitude areas (141), Low Zambezi River basin (142), Northern coast (143), and the Southern region (144).

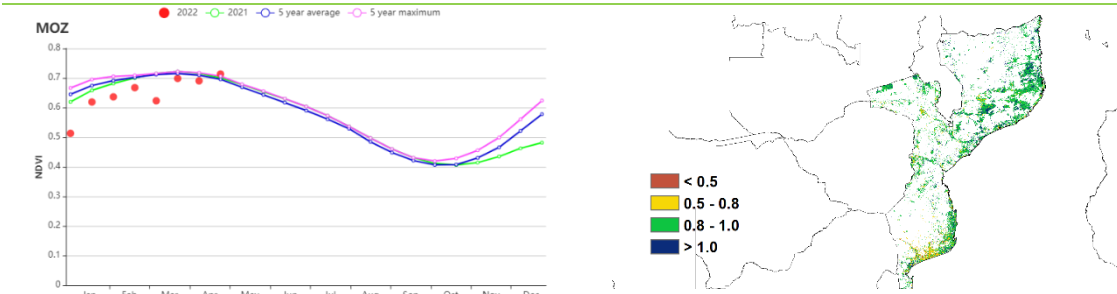
The regional crop development graphs based on NDVI indicate that the crop conditions were unfavourable in all regions from early January till late April when these conditions started to recover. During the monitoring period, the agroclimatic indicators show decreases in rainfall in the Buzi basin (-22%), Low Zambezi River basin (-1%) and the Southern region (-24%), while significant increases were observed in the Northern high-altitude areas (+11%) and the Northern Coast (+36%). The regions of the Buzi basin and Southern region were warmer, recording increases in temperature by 0.8°C and 0.6°C, respectively. Radiation decreased in the Northern high-altitude areas (-2%), Low Zambezi River basin (-3%), and Northern coast (-3%), while it increased in the Southern region by 1%. Influenced by the decreases recorded in rainfall, the total biomass production decreased by 2%, 5% and 7% in the Low Zambezi River basin, Buzi basin and Southern region, respectively. In the Northern high-altitude region and Northern coast, the biomass increased by 3% and 5% respectively.

The agronomic indicators show about average CALF in all agro-ecological regions and the maximum VCI in these regions varies from 0.86 to 0.96.

Figure 3.32 Mozambique’s crop condition, January-April 2022

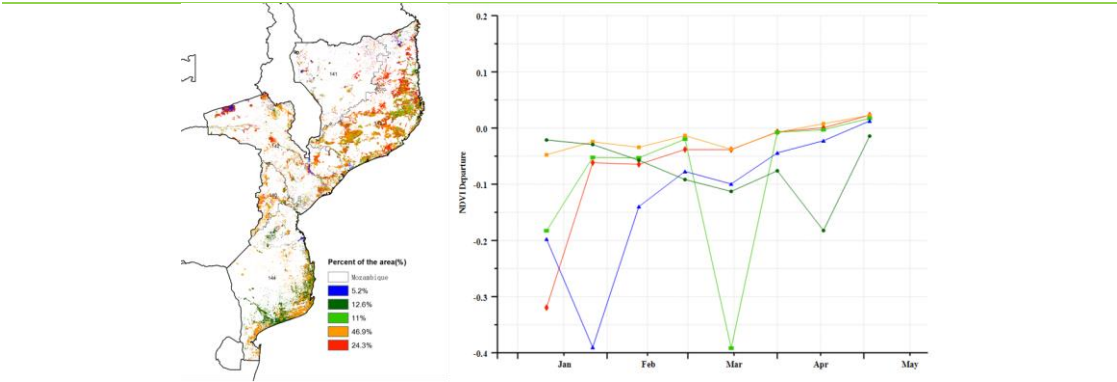


(a). Phenology of major crops



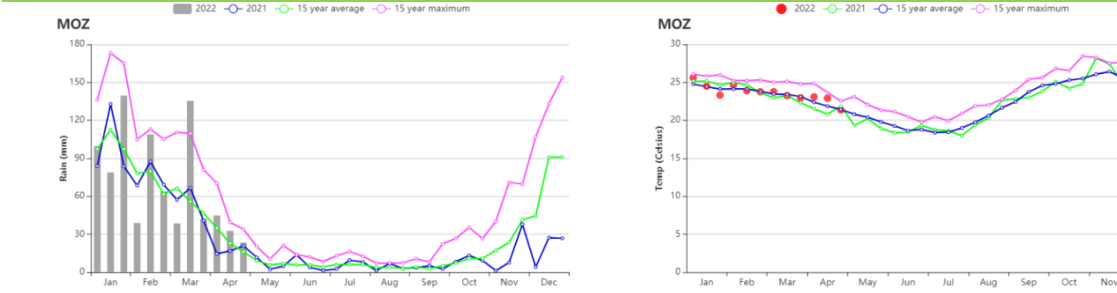
(b) Crop condition development graph based on NDVI

(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

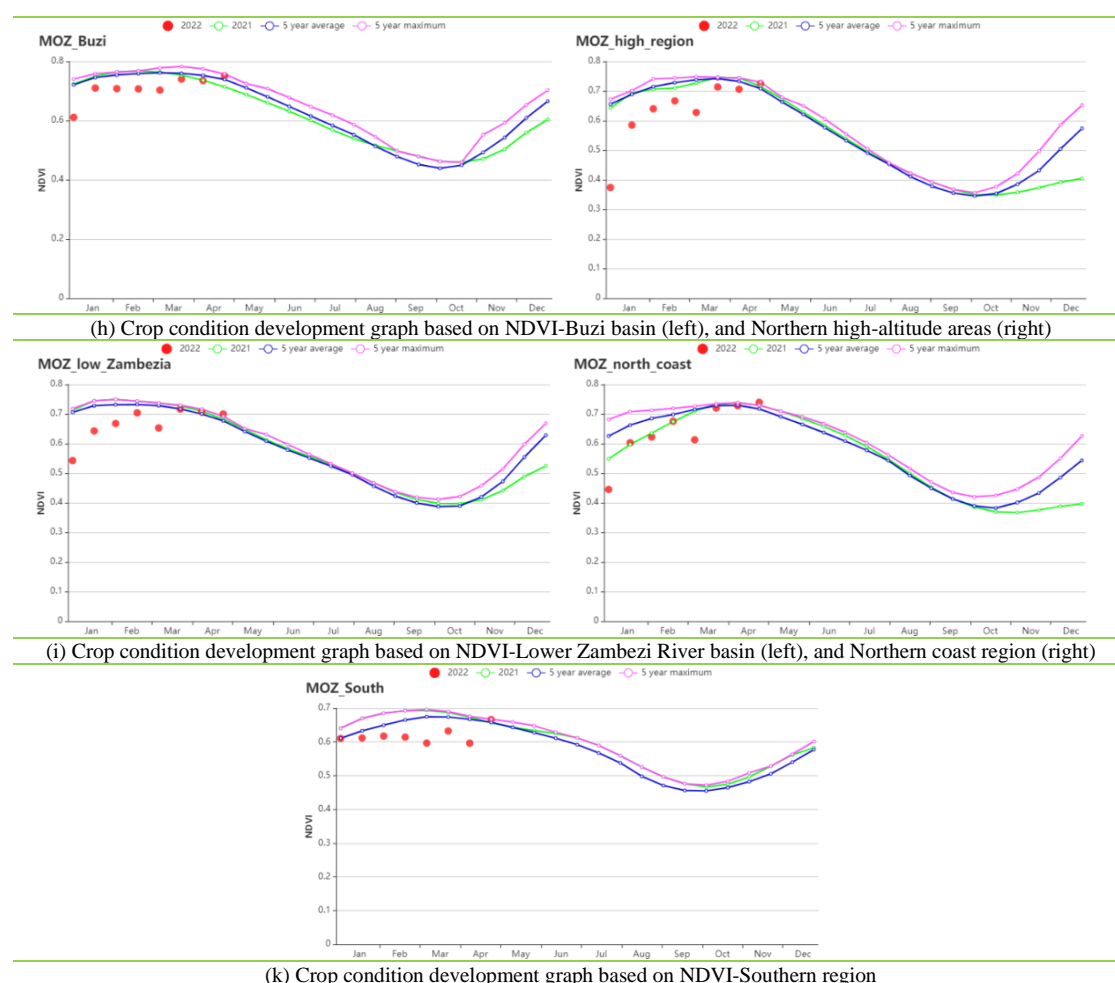


Table 3.57 Mozambique's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Buzi basin	546	-22	22.3	0.8	1241	0	1090	-5
Northern high-altitude areas	1112	11	21.9	0.0	1124	-2	1392	3
Low Zambezi a River basin	775	-1	23.5	0.1	1165	-3	1222	-2
Northern coast	1177	36	23.7	-0.1	1169	-3	1487	5
Southern region	364	-24	25.3	0.6	1224	1	995	-7

Table 3.58 Mozambique's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January - April 2022

Region	CALF		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current
Buzi basin	100	0	0.91
Northern high-altitude areas	100	0	0.96
Low Zambezia River basin	99	0	0.92
Northern coast	100	0	0.95
Southern region	99	0	0.86

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[NGA] Nigeria

This report covers the dry season of Nigeria. The harvesting of last year's second maize and irrigated rice crops ended in January. The sowing of maize started in March in the main and southern areas while the sowing of rainfed rice started in April.

The proportion of irrigated cropland in Nigeria is only 0.4% and agro-meteorological conditions play a decisive role in the growth of almost all crops. The CropWatch agroclimatic indicators showed that the rainfall was below the 15YA (-20%) and the average temperature was lower than the 15YA (-0.6°C). Significant rains started in mid-April only, causing a delay in the start of the growing season, as can be seen in the development of the NDVI curve. Solar radiation increased by 2%. Due to the decline of rainfall, the BIOMSS was below the 15YA (-2%).

According to the crop condition development graph based on NDVI, the NDVI of the country was near the 5YA at the start and the end of this period, and below the 5YA in the middle of this period. The maximum VCI graph showed that the lower values appeared mainly in the northern area and the higher value appeared mainly in the middle and southwestern area. As shown in the spatial NDVI profiles and distribution map, 56.6% of the total cropped areas were near the 5YA during the whole period mainly in the middle and northern area of the country. About 30.2% of the total cropped areas were slightly below the 5YA during the whole period, mainly in the middle area of the country. In the southern area of the country, the NDVI was below the 5YA in March and April. Overall, the crop conditions in most areas were near the average at the end of this monitoring period.

Regional Analysis

The analysis focuses on four major agroecological zones in the country, i.e., **Sudan-Sahel savanna** region across the northern region, **Guinea savanna and Derived savanna** within the central region and **Humid forest** situated towards the southern region.

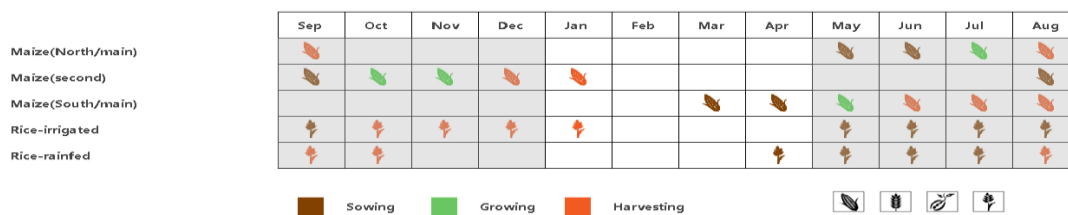
The **Sudan-Sahel savanna** zone is located in northern Nigeria. The agro-climatic condition showed that rainfall decreased by 63% and the overall temperature decreased by 0.9°C. The radiation increased by 0.4%. The BIOMSS was above the 15YA (+8%). The CALF was 2% and the maximum VCI was 0.72. According to the NDVI development graph, crop conditions in the zone were near average from January to April.

The **Guinea savanna** region is predominantly located in the central region of the country. Compared to the 15YA, TEMP decreased by 0.6°C, RAIN decreased by 17%, RADPAR was 1% above the 15YA, and BIOMSS was above the 15YA (+4%). The CALF was 9% and the maximum VCI was 0.80. According to the NDVI development graph, crop conditions in the region were near average from January to February and below average from March to April.

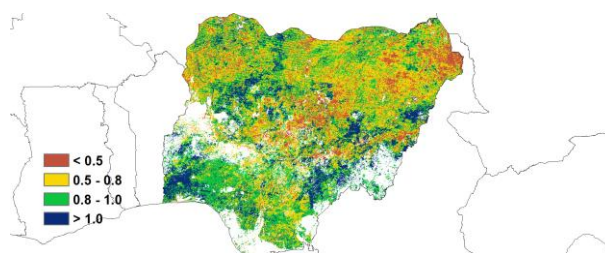
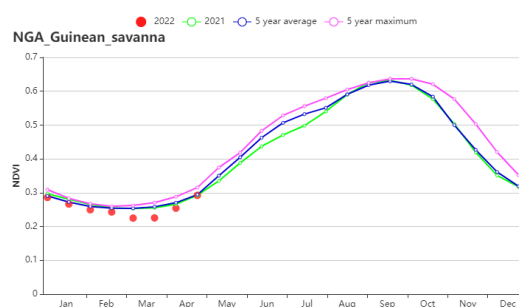
The **Derived savanna** region is a transition zone between the Guinea savanna and Humid forest zones. Rainfall increased by 2% and the temperature decreased by 0.7°C. The radiation increased by 3% compared to the 15YA and the BIOMSS decreased by 3% compared to the 15YA. The CALF was 71% and the maximum VCI was 0.88. According to the NDVI development graph, crop conditions in the region were near the average in January and below average from February to April.

The **Humid forest** zone is in the southern area of the country. The rainfall decreased by 30% and the average temperature was near the 15YA (-0.1°C). The radiation increased by 2% and the BIOMSS decreased by 12%. The CALF was 96% and the maximum VCI was 0.87. According to the NDVI development graph, crop conditions in the zone were near the average in January and below average from February to April.

Figure 3.33 Nigeria's crop condition, January-April 2022

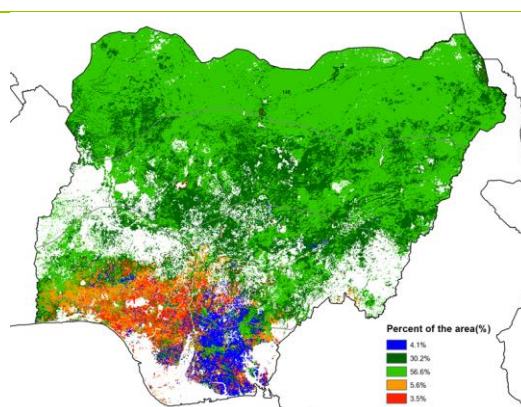


(a) Phenology of major crops

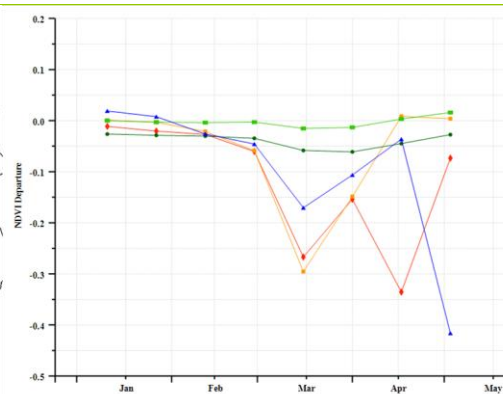


(b) Crop condition development graph based on NDVI

(c) Maximum VCI



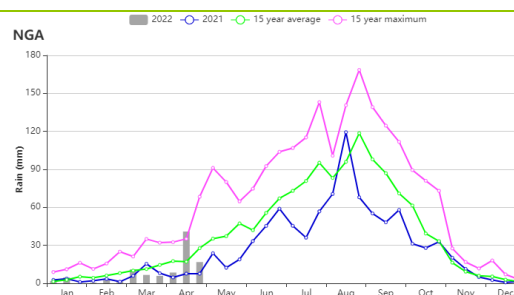
(d) Spatial NDVI pattern compared to 5YA



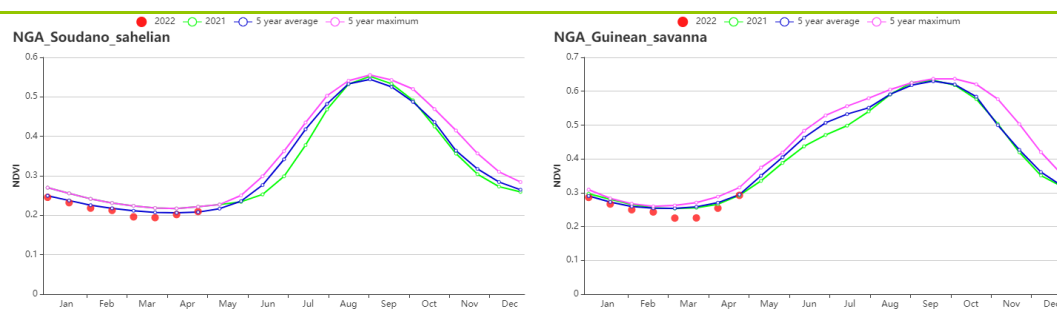
(e) NDVI profiles



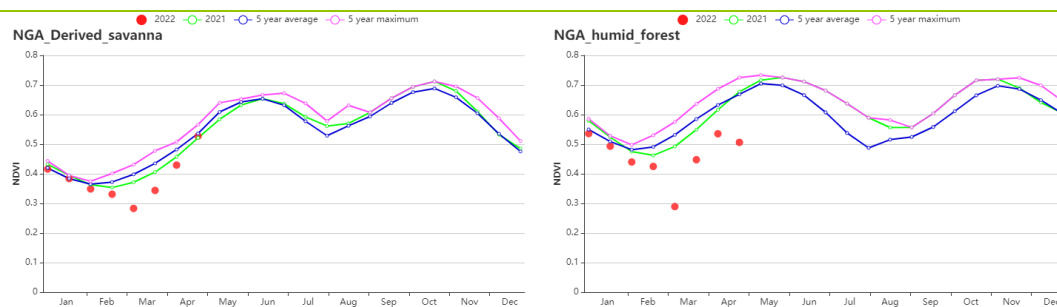
(f) Time series temperature profile



(g) Time series rainfall profile



(h) Crop condition development graph based on NDVI (Left:Sudan-Sahel savanna, Right:Guinean savanna)



(i) Crop condition development graph based on NDVI (Left:Derived savanna, Right:Humid forest)

Table 3.59 Nigeria's agro-climatic indicators by sub-national regions, current season's values and departure from 15YA. January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Sudan-Sahel savanna	1	-63	25.7	-0.9	1386	0	347	8
Guinea savanna	20	-17	25.8	-0.6	1390	1	501	4
Derived savanna	113	2	27.0	-0.7	1350	3	608	-3
Humid forest	307	-30	27.2	-0.1	1288	2	931	-12

Table 3.60 Nigeria's agro-climatic indicators by sub-national regions, current season's values and departure from 5YA. January-April 2022

Region	CALF		Maximum VCI
	Current (%)	Departure from 5YA (%)	Current
Sudan-Sahel savanna	2	-8	0.72
Guinea savanna	9	-1	0.80
Derived savanna	71	0	0.88
Humid forest	96	-2	0.87

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[PAK] Pakistan

This monitoring period covers most of the winter wheat cycle from the vegetative stage to harvest. It also includes the field preparation and sowing of maize. Crop conditions were unfavorable from January to April based on the agroclimatic and agronomic indicators.

The proportion of irrigated cropland in Pakistan is 80% and rainfall is not the major impact factors in the growth of crops. Compared to the 15YA, RAIN was 40% below, while air temperature (TEMP +1.9°C) and photosynthetically active radiation (RADPAR +5%) were above average during this period. The combination of all the agro-climatic indicators resulted in a below-average BIOMSS (-5%). At the national level, the dekad RAIN was continuously below average from the middle of March to April, together with TEMP reaching or exceeding the 15YA maximum values in the same period. Drier and hot weather resulted in below-average estimates of BIOMSS. In the Northern highlands and Northern Punjab the decreases were 14% and 8% respectively.

The crop condition development graph based on NDVI for Pakistan presented close to average levels from January to early March. Subsequently, conditions were below average from middle March to April mainly due to the drier and warmer weather mentioned above. The spatial NDVI patterns and profiles showed that 39.1% of the cropped areas were below average, mainly distributed in North highlands, Punjab and Sindh after March. Especially Punjab, which is an important wheat producing state, experienced a heat wave starting from mid-March. This may have caused a yield loss for winter wheat, because of terminal heat stress during the grain-filling period. The fraction of cropped arable land (CALF) increased by 4%. Crop conditions were slightly below average for Pakistan.

Regional analysis

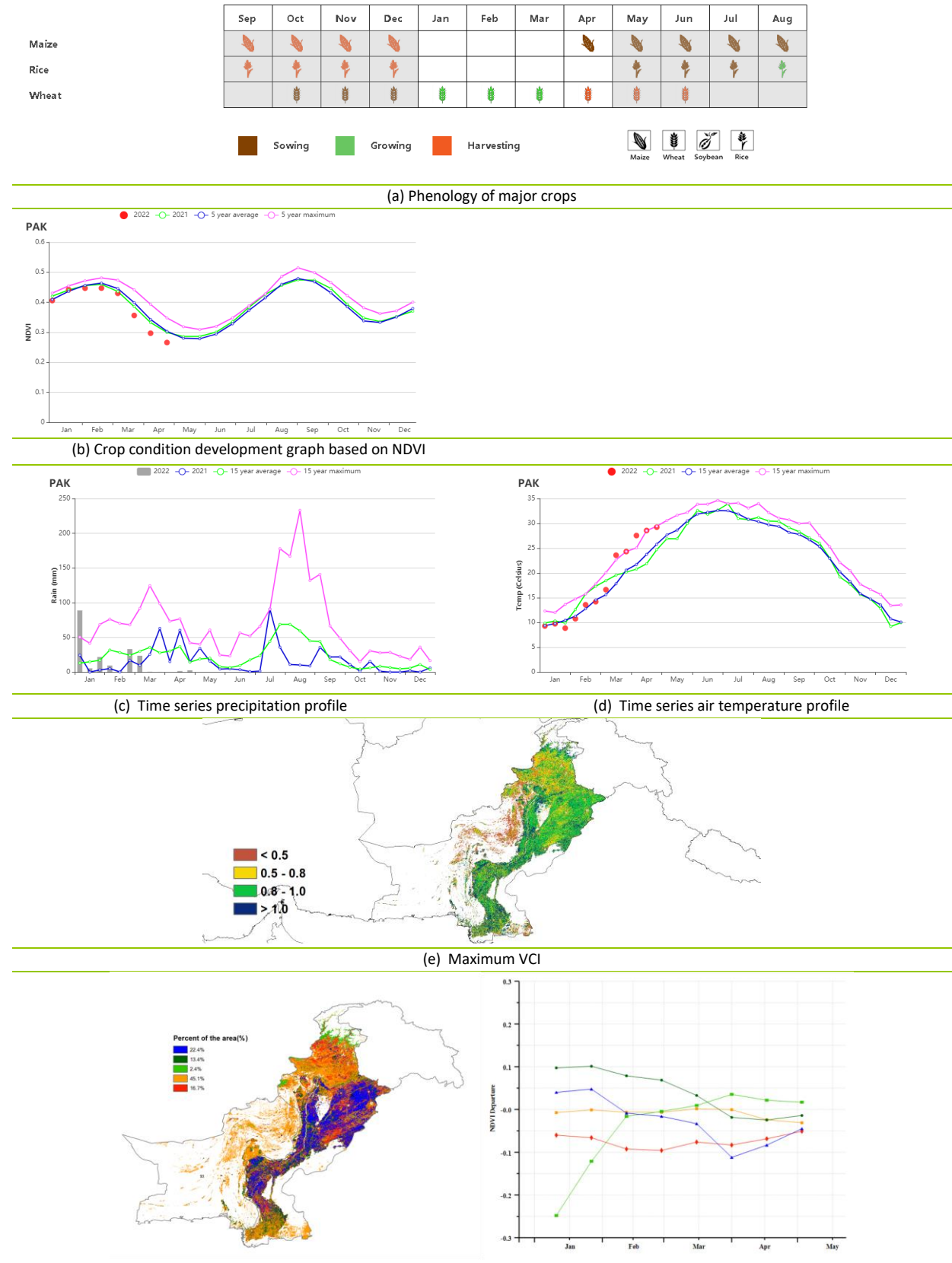
For a more detailed spatial analysis, CropWatch subdivides Pakistan into three agro-ecological regions based essentially on geography and agro-climatic conditions: the Northern highlands, Northern Punjab region and the Lower Indus river basin.

RAIN of **Northern highlands** was 44% below average. TEMP (+2.2°C) and RADPAR (+8%) were both above average. The region experienced warmer and drier weather, and the estimated BIOMSS departure was -14%. The NDVI development graph shows below-average crop conditions except for March during this period, especially in the north. The region had the lowest CALF of 49% among the three AEZs, but it was above the 5YA by 1%. Crop conditions were below average.

Northern Punjab is the main agricultural region in Pakistan. It recorded low RAIN, 11% below average. TEMP (+1.4°C) and RADPAR (+3%) were both above average. Drier and hot weather resulted in below-average estimates of BIOMSS by 8% compared to the recent fifteen-year average. The NDVI development graph shows above average crop conditions in the key growing period from January to early March. Later, crop conditions were below average due to hot and dry weather. The region had a CALF of 88%, which was above the 5YA by 1%. The combination of these factors is causing a reduction in crop production as compared to last year.

In the **Lower Indus river basin in south Punjab and Sindh**, RAIN was below average by 7%, while TEMP (+1.6°C) and RADPAR (+1%) were both above average. The estimated BIOMSS departure was +7%. Crop condition based on NDVI were close to or above average from January to early March, indicating favorable conditions. The CALF of 71% was above the average by 7%. Overall, prospects were satisfactory.

Figure 3.34 Pakistan crop condition, January-April 2022



PAK

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(e) Maximum VCI

Percent of the area(%)

22.4%

13.4%

2.4%

45.1%

16.7%

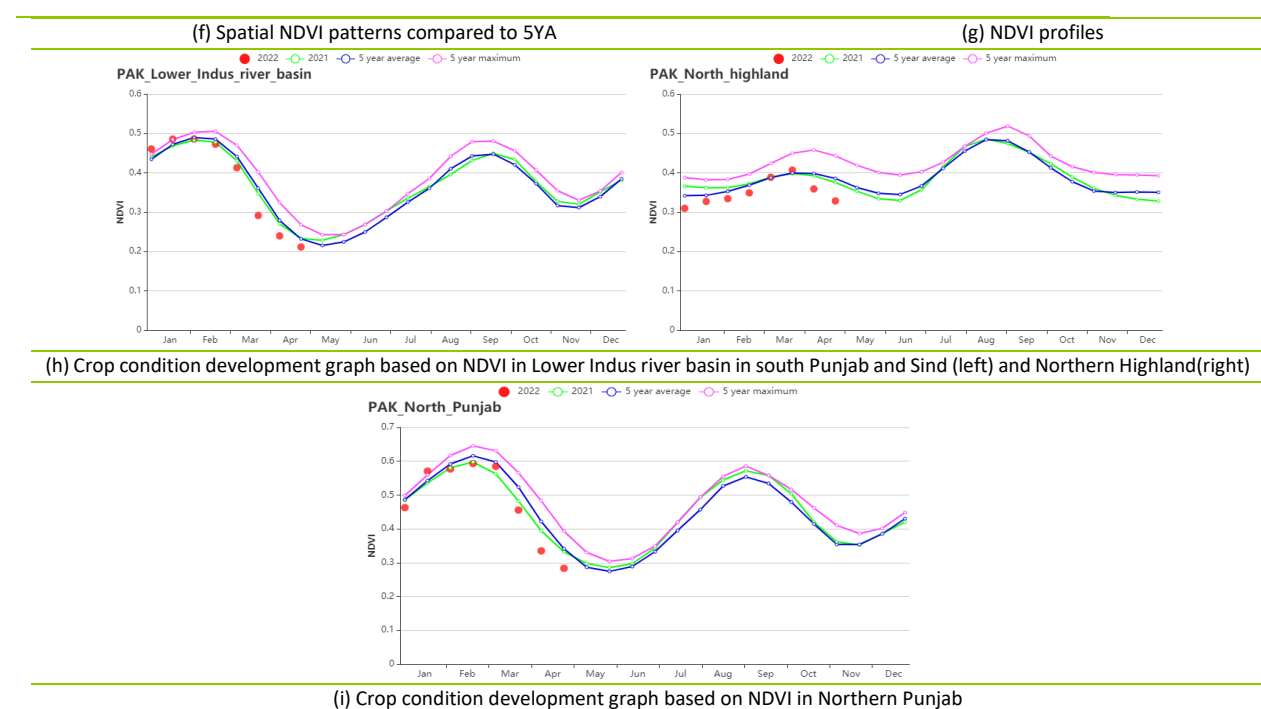


Table 3.61 Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Lower Indus river basin	47	-7	23.8	1.6	1176	1	478	7
Northern highlands	253	-44	10.1	2.2	1020	8	442	-14
Northern Punjab	183	-11	19.7	1.4	1043	3	542	-8

Table 3.62 Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Lower Indus river basin	71	7	0.86
Northern highlands	49	1	0.77
Northern Punjab	88	1	0.87

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[PHL] Philippines

This reporting period covers the grain-filling and harvest periods of the second rice and maize crops. Sowing of main maize and rice started in April. The proportion of irrigated cropland in Philippines is 20% and agro-meteorological conditions play an important role in the growth of most crops. The Philippines experienced significantly wetter conditions. Compared to the 15YA, the precipitation during the reporting period in the Philippines was significantly higher (RAIN +47%), while the temperature (TEMP) was almost at average and radiation was slightly lower (RADPAR -1%). The abundant precipitation resulted in a higher potential biomass (BIOMSS +12%) compared to the average. However, more precipitation did not bring expected better crop conditions. As is shown by the NDVI profile, the national NDVI stayed below average before mid-March, and then kept close to average. Considering the increased precipitation, the below-average NDVI in February and March can be partly attributed to the cloud cover in the satellite images. According to the spatial NDVI patterns, there are generally three patterns, 1) about 66.5% cropland (in light green) maintained a close-to-average NDVI the whole period. These regions were mainly located on Luzon Island and middle to western Mindanao Island. 2) around 19.3% of croplands (in dark green and blue) underwent a slightly below-average NDVI with a sudden drop. The sudden drop was concentrated in March, which was the result of a low pressure, bringing high intensity rainfall and triggering flooding in Region XII and BARMM of the Philippines. 3) about 15.5% of the cropland experienced a decline in NDVI after early March, and these regions mainly appeared in the eastern Mindanao Island. Considering that the crop NDVI was mostly close to average, and the CALF almost reached 100%, and the VCIx index was at 0.95, the estimated production for the Philippines is normal.

Regional analysis

Based on the cropping systems, climatic zones, and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are **the Lowlands region** (northern islands), **the Hilly region** (Island of Bohol, Sebu, and Negros), and **the Forest region** (mostly southern and western islands). All the regions are characterized by a stable cropped arable land fraction (CALF almost 100%) and a high maximum VCI value (VCIx ≥ 0.92).

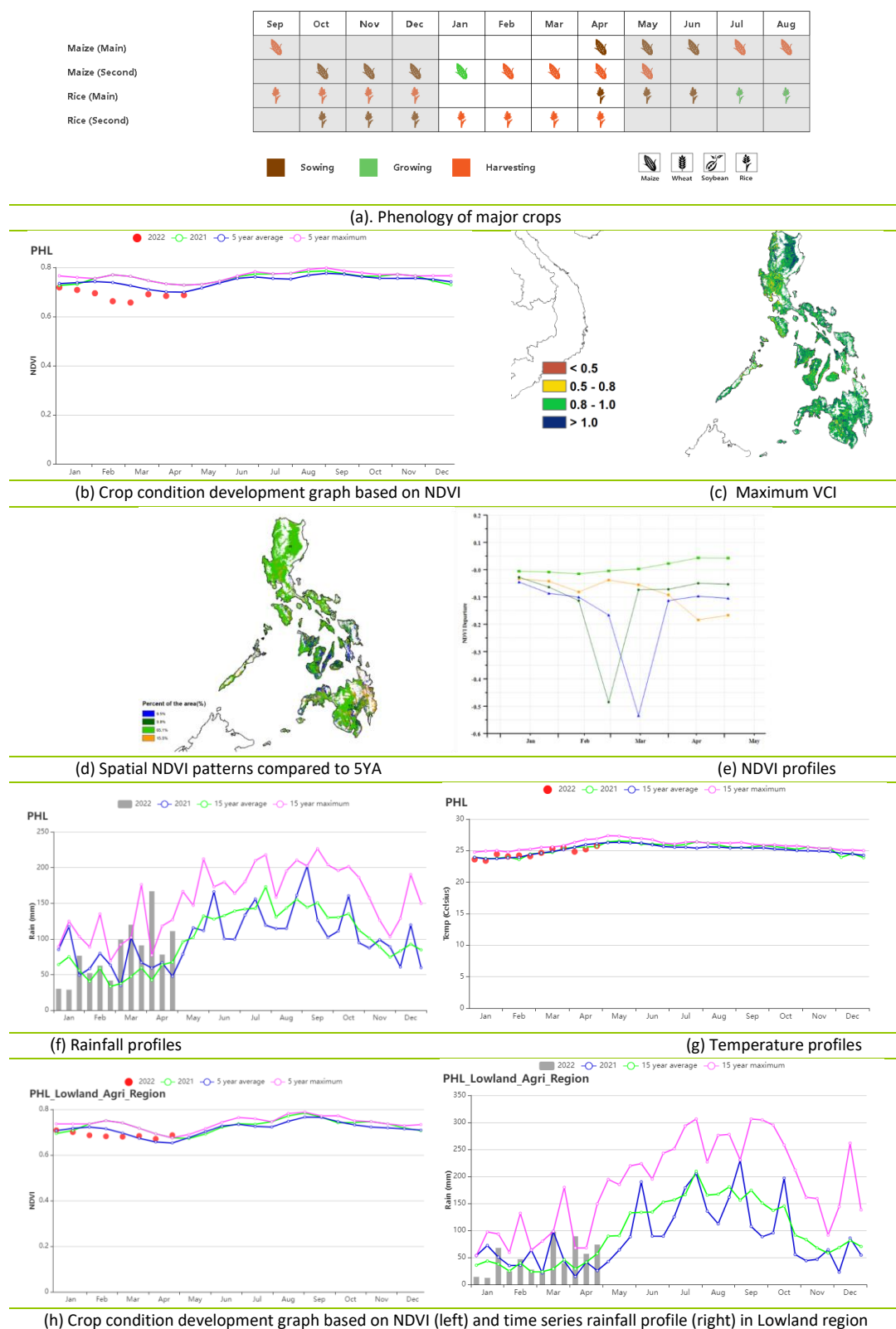
For the **Lowland region**, 32% higher precipitation (RAIN), average temperature (TEMP), and about 3% higher radiation (RADPAR) were observed. The higher precipitation brought a higher potential biomass (BIOMSS +12%). As is shown by regional rainfall series profile, the increased precipitation occurred mainly in March and April, resulting in an above-average NDVI at the end of this period. Moreover, the CALF was almost at 100% and the VCIx value was as high as 0.94, indicating normal crop conditions in this region.

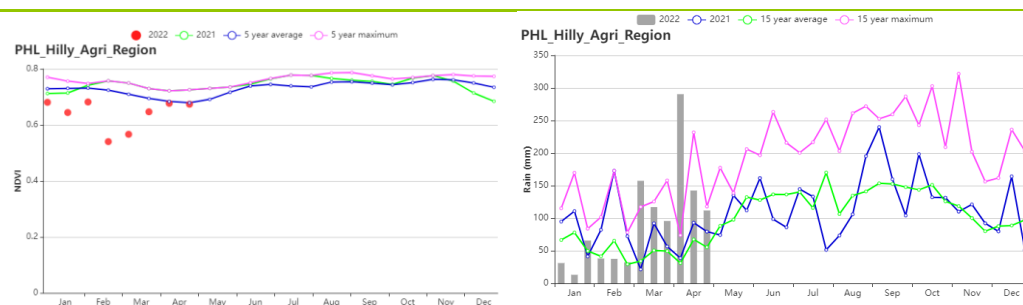
In the **Hilly region**, precipitation was about 83% higher, temperature was 0.3°C lower, and radiation was 3% higher than average. Increased precipitation and radiation promoted the potential biomass as expected, resulting in an increase of 16% (BIOMSS). However, NDVI for crops in this zone fluctuated widely and remained below average before April and stayed near average in April. The big drop of NDVI in February and March was mainly due to the influence of moisture and clouds in the hilly region, thus it does not reflect the real dynamic of crop growth. The NDVI recovered to average at the end of monitoring period, indicating a normal crop growth.

For the **Forest region**, the precipitation increased by about 53%, resulting in an increase of potential biomass as well (BIOMSS +12%). The temperature (TEMP) was near average, and the radiation (RADPAR) was lower by 4%. Although precipitation increased a lot, the NDVI in this region stayed below average during the whole monitoring period. The NDVI gradually declined starting in February, which corresponds to the harvest of second maize and second rice. The increase of NDVI starting in mid-March corresponds to the sowing of main rice and main maize.

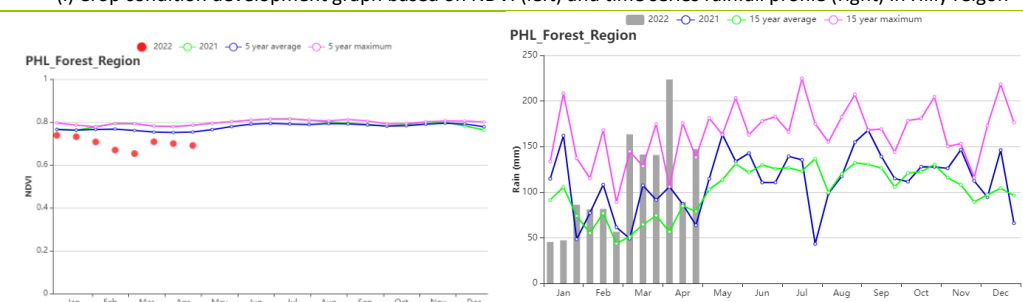
However, the NDVI was still below average. Although the CALF index in the area is close to 100% and the VCIx index is 0.96, it is presumed that the crop growth in the region was slightly below average considering the low NDVI.

Figure 3.35 Philippines' crop condition, January - April 2022





(i) Crop condition development graph based on NDVI (left) and time series rainfall profile (right) in Hilly region



(j) Crop condition development graph based on NDVI (left) and time series rainfall profile (right) in Forest region

Table 3.63 Philippines' agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (%)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Forest region	1303	52	24.6	0.0	1133	-4	1418	12
Hilly region	1133	83	26.1	-0.3	1217	-3	1388	16
Lowlands region	573	32	24.4	0.0	1145	3	1078	12

Table 3.64 Philippines' agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Forest region	100	0	0.96
Hilly region	100	0	0.93
Lowlands region	100	0	0.94

[POL] Poland

During this monitoring period winter, wheat, triticale, barley and rye passed through winter dormancy and spring green-up. The proportion of irrigated cropland in Poland is only 1% and agro-meteorological conditions play a decisive role in the growth of crops. Agroclimatic conditions at the national scale were close to normal, with cumulative precipitation, average temperature and photosynthetically active radiation only slightly higher by 1%, 0.2°C and 1%, respectively, compared to the average for the same period in the last 15 years. However, the potential biomass level was slightly lower by 1% due to the dry and cold March. This can also be seen in the NDVI trend line, where NDVI in January and February was overall higher than the average level of the previous year and the same period of the last 5 years, but in March, NDVI suddenly dropped to the average level of the previous year and the same period of the last 5 years until mid-April. This drop was due to below-average precipitation in March. However, thanks to high rainfall in early April, the crops were able to recover and the overall crop growth was similar to the historical level by the end of the monitoring period. As can be seen from the spatial NDVI profiles, there were significant differences in growth in different regions in January and February. This was probably due to snow cover on the ground. The best vegetation condition index at the national scale was 0.89, whereas the areas below 0.8 were mainly located in the northern and eastern parts of the country. The proportion of cultivated land was 97%, a decrease of 2% compared with the average of the last 5 years.

Overall, although crop growth in March was lower than historical levels due to the dry and cold weather, abundant precipitation in January and February and timely precipitation in April allowed crop growth to recover quickly in April, and overall crop growth was close to average at the end of this monitoring period.

Regional analysis

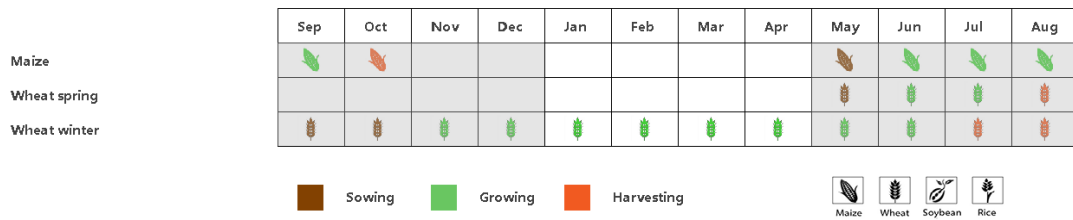
Poland is divided into four subregions based on agro-ecological characteristics, namely: (a) **Northern oats and potatoes area** (including the Western Pomeranian, Eastern Pomeranian and Wamania-Masuria regions), (b) **Northern-central wheat and sugar-beet area** (including the Cuyavia-Pomeranian to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

The agronomic indicators in the **Northern oats and potatoes area** and the **Northern-central wheat and sugar-beet area** were higher than the previous averages. Compared with the averages of the same period in the last 15 years, RAIN in the two subregions was 4% and 1% higher, TEMP was 0.6°C higher, the RADPAR was 2% and 3% higher, and BIOMSS was 2% higher. CALF in the two subregions was 93% and 96%, which was 4% and 1% lower, respectively, and VCIx were 0.83 and 0.89. Similar to the national NDVI trend, conditions in the two subregions also dropped to the average level of the same period in the last 5 years in March and remained below average until the end of April.

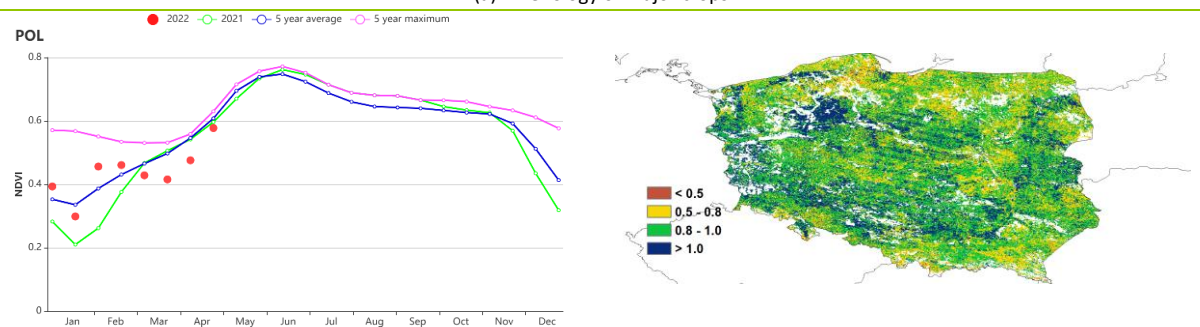
Compared to the average of the same period of the last 15 years, TEMP and RADPAR in the **Central rye and potatoes area** were slightly higher by 0.3°C and 1%, respectively, and RAIN and BIOMSS were both at the same level as before. CALF in this zone was 97%, which was 1% lower than the average level of the last 5 years, and VCIx was 0.91. The overall distribution of crop growth was the same as in the above-mentioned regions, but the crop growth in this zone had recovered to the average level of the same period of the last 5 years at the end of April.

RAIN and RADPAR in Southern wheat and sugar-beet area were 2% and 1% higher, respectively, compared with the average of the last 15 years, but TEMP and BIOMSS were 0.3°C and 4% lower, respectively. CALF was 96%, which was 2% lower than the average of the last 5 years, and VCIx was 0.88. The crop growth process in this region was similar to the other 3 sub-regions, and by the end of April, the crop growth recovered to near the average of the last 5 years and was higher than last year in late April.

Figure 3.36 Poland's crop condition, January – April 2022

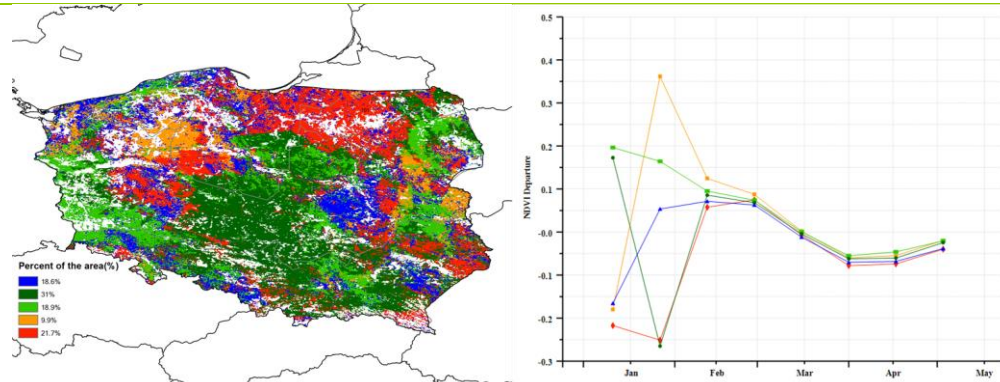


(a). Phenology of major crops



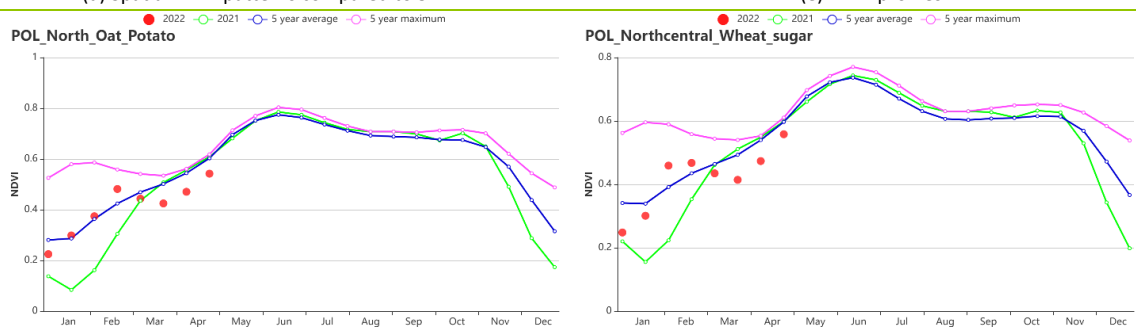
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



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

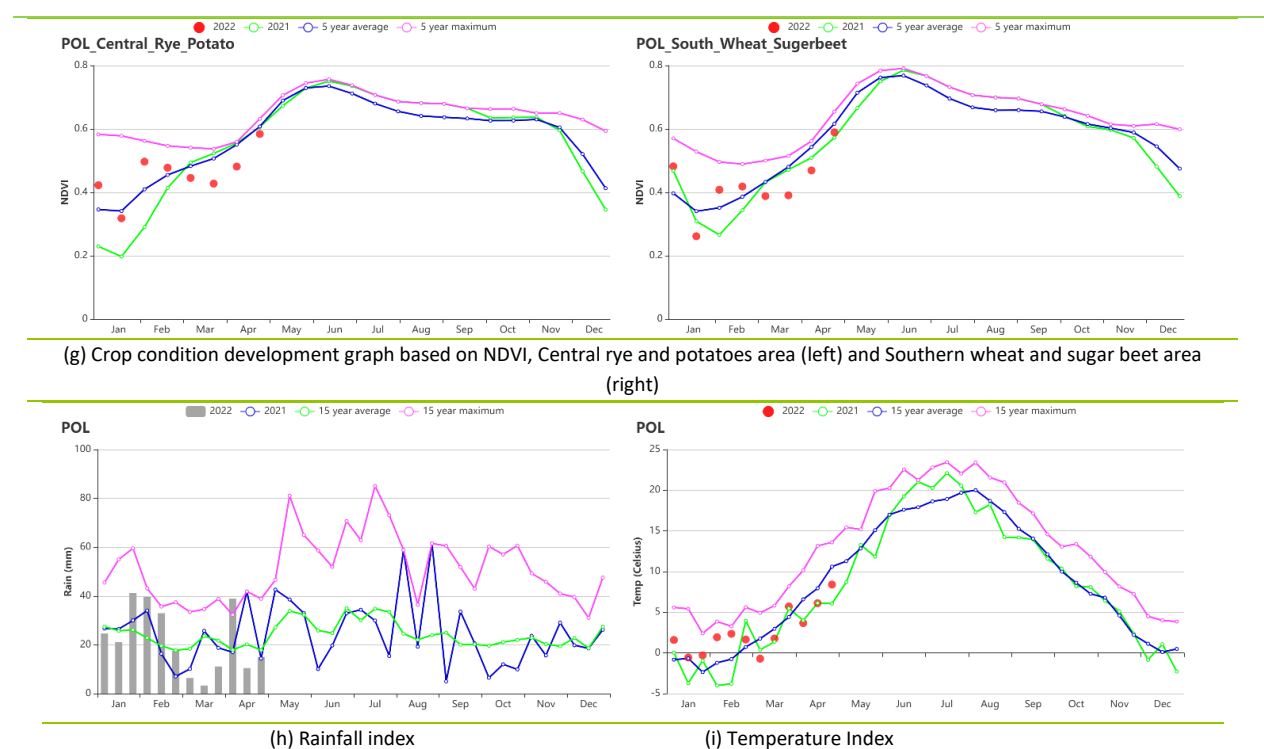


Table 3.65 Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

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

Table 3.66 Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

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

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

[ROU] Romania

Winter wheat is the main crop that is grown in Romania during this reporting period. It was sown last October. The proportion of irrigated cropland in Romania is only 4% and agro-meteorological conditions play a decisive role in the growth of most crops. At the national level, rainfall was 31% below average, down to 179 mm; average temperature was 0.3°C lower and radiation 5% above average. The influence of low rainfall should be noted, as the water supply is vital for wheat growth. Due to the low rainfall, biomass decreased by 16%. The CALF of Romania decreased by 15% and the current maximum VCI is at 0.76, which is unfavorable for production. According to the NDVI at the country level, crop conditions were lower than average during the reporting period, which was consistent with the low rainfall.

Overall, crop conditions were not optimal in Romania during this reporting period. Winter wheat already suffered from drier-than-normal conditions between October and January. Rainfall in the coming months will be critical for sustained crop growth. Currently, the outlook for the 2022 wheat harvest in Romania is unfavorable.

Regional analysis

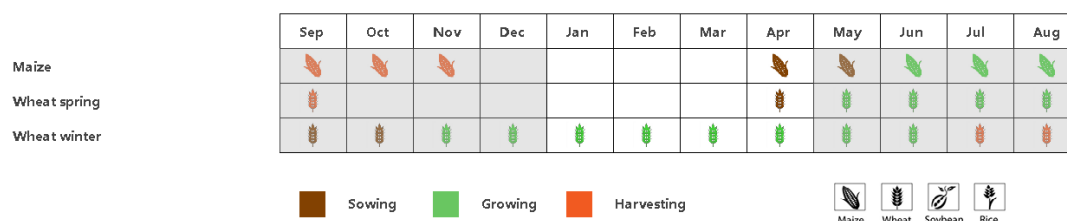
More spatial detail is provided below for three main agro-ecological zones: the **Central mixed farming and pasture Carpathian hills**, the **Eastern and southern maize, wheat and sugar beet plains** and the **Western and central maize, wheat and sugar beet plateau**.

For the **Central mixed farming and pasture Carpathian hills**, compared to the 15YA, rainfall decreased by as much as 25%, temperature was 0.4 °C lower and radiation was 4% up. The BIOMSS decreased by 11%. According to the NDVI development graph, crop conditions were below average almost throughout the entire reporting period. The regional average VCI maximum was 0.82. Since this agro-ecological zone occupies only a small fraction of cropland in Romania, its low NDVI is not significant for Romania's crop production.

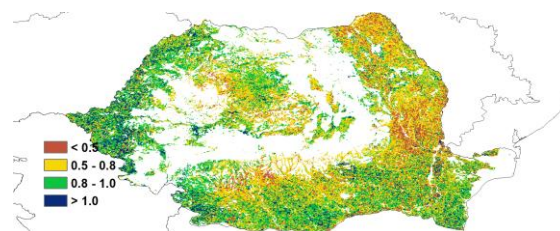
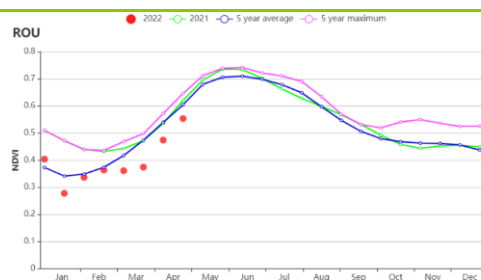
For the **Eastern and Southern maize, wheat and sugar beet plains**, as compared to the 15YA, rainfall decreased by 42%, temperature increased by 0.3 °C, radiation increased by 6% and biomass decreased by 20%, which is the largest decrease among the three sub regions. The NDVI development graph shows that crop conditions dropped to below average after February. The VCI max value of this region was 0.73 and according to the distribution map, the blue and red line shows that VCI values were decreasing in March 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. They indicate unfavorable crop conditions.

For the **Western and central maize, wheat and sugar beet plateau**, rainfall was lower than average by 21%, temperature was lower by 1.1 °C, radiation was 3% higher and the biomass decreased by 11%. Maximum VCI of this region was 0.81. NDVI dropped below the 5YA starting in early March, but climbed to near average levels by the end of this monitoring period. Crop conditions were slightly unfavorable.

Figure 3.37 Romania's crop condition, January - April 2022

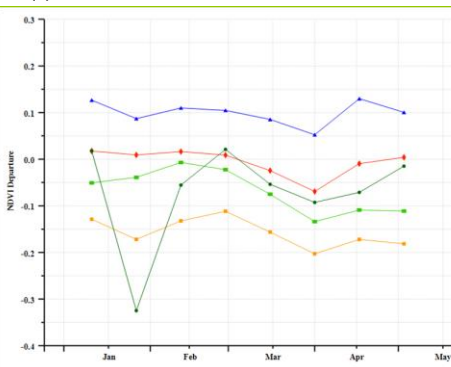
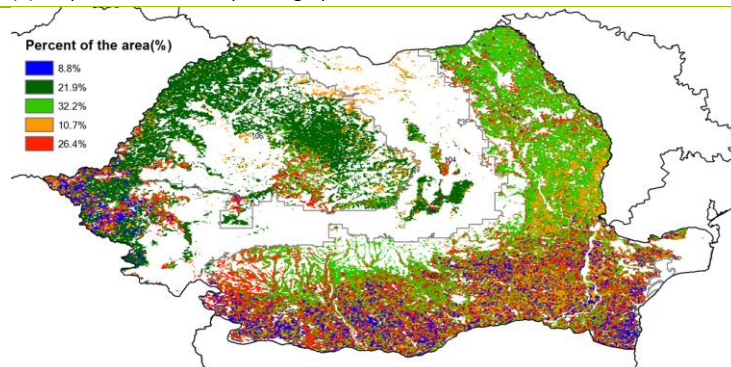


(a). Phenology of major crops



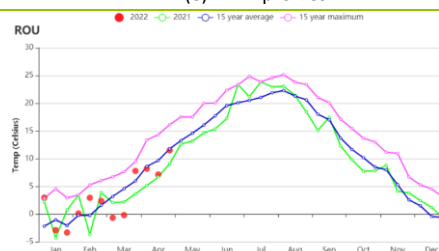
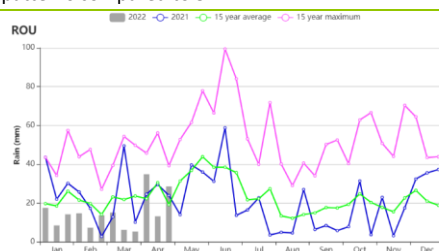
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



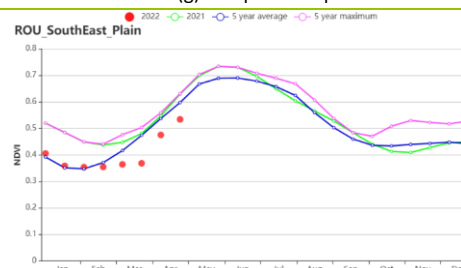
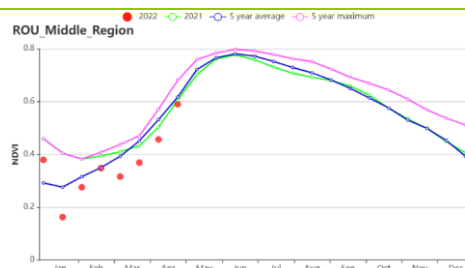
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

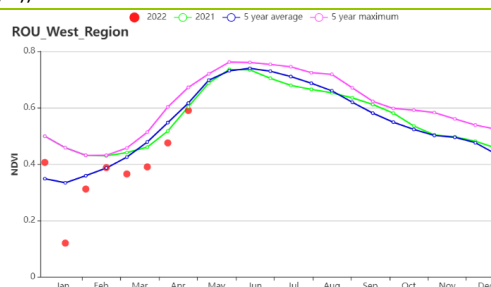


(f) Rainfall profiles

(g) Temperature profiles



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



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

Table 3.67 Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central mixed farming and pasture Carpathian hills	218	-25	1.3	-0.4	664	4	381	-11
Eastern and southern maize, wheat and sugar beet plains	141	-42	4.1	0.3	694	6	391	-20
Western and central maize, wheat and sugar beet plateau	211	-21	2.2	-1.1	665	3	425	-11

Table 3.68 Romania's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central mixed farming and pasture Carpathian hills	90	-7	0.82
Eastern and southern maize, wheat and sugar beet plains	74	-19	0.73
Western and central maize, wheat and sugar beet plateau	90	-7	0.81

[RUS] Russia

From February to May in the Russian Federation, the snow melts and crops begin to grow. Different regions of Russia have different dates for the beginning of the growing season, depending on climatic conditions. Winter crops resume their growth after the winter dormancy and snow melt periods. The sowing of summer crops starts in April and lasts until late May.

The proportion of irrigated cropland in Russia is only 3% and agro-meteorological conditions play a decisive role in the growth of almost all crops. According to national data, NDVI development was slightly delayed until the end of March but reached the 5-year average by the end of April. Atmospheric precipitation generally remained above the 15-year average, except for late February, mid-March and late April. The air temperature mainly remained above the 15-year average values until March, and then it became equal to the 15-year average and the level of the previous year from March to April.

Most main regions of winter crop production showed a negative NDVI departure during the winter period. The only exception was the North Caucasus, which had mostly positive NDVI departure during almost the whole reporting period. Positive NDVI departures were observed in April in South Caucasus, Middle Volga and Central Chernozem regions. VCIx for these regions was 0.8-1 or even above 1. In most regions of winter crop production, winter crop yields are expected to be close to the level of the previous year or slightly above it. However, the agroclimatic conditions of the coming months are important and may still affect the yield of the winter crops.

Regional analysis

South Caucasus

Precipitation was below the 15-year average by 17%, which is the highest negative departure in Russia. Temperatures was equal to the 15-year average. RADPAR was 2% above the 15-year average. Biomass was below the 15-year average by 3%. The VCIx was 0.83. CALF was below the 5-year average by 2%. NDVI was mostly above the 5-year average from January to February, then slightly below average and returned to average levels in April. The decrease in precipitation during the analyzed period may indicate lower snow cover and lower soil moisture after winter dormancy period. But as the general situation was close to the average in April, we expect winter crop yields to be close to the level of the 5-year average.

North Caucasus

Atmospheric precipitation was 14% above the 15-year average. Temperatures was by 1.3°C above the 15-year average. RADPAR was 5% below the 15-year average. Biomass was 8% above the 15-year average. The VCIx was 0.90. CALF was 12% above the 5-year average. NDVI remained below the 5-year average and the previous year's level during winter possibly due to higher snow cover as indicated by the increase in precipitation. In April, NDVI increased significantly exceeding the 5-year maximum. As agroclimatic conditions for winter crops in the region were favorable, we can expect winter crop yields to be higher than the 5-year average and close to 5-year maximum.

Central Russia

Atmospheric precipitation was 18% above the 15-year average. Air temperatures were by 0.8°C above the 15-year average. RADPAR was 17% below the 15-year average. Biomass was 3% below the 15-year average. The VCIx was 0.80. CALF was 40% below the 5-year average. NDVI was mostly below the 5-year average and the previous year's level possibly due to decrease in CALF and higher snow cover in winter.

Generally, precipitation was favorable for winter crops, but the decrease in CALF can result in decrease in winter crop production. It might get compensated for by increased sowing of summer crops.

Central black soil area

The amount of precipitation was 30% above the 15-year average. Air temperatures were 1.3°C above the 15-year average. RADPAR was 19% below the 15-year average. Biomass was 4% above the 15-year average. The VCIx was 0.92. CALF was 6% below the 5-year average. NDVI was mostly below the 5-year average and the previous year's level during winter possibly due to higher snow cover. However, in April it increased reaching the level of the previous year and the 5-year average as agroclimatic conditions were generally favorable. As a result, we expect winter crop yields to be at the level of the 5-year average or above it.

Middle Volga

Atmospheric precipitation was 19% above the 15-year average. Air temperatures were 2.4°C above the 15-year average. RADPAR was 20% below the 15-year average. Biomass was 12% above the 15-year average. VCIx was 0.86. CALF was by 25% below 5-year average. Due to higher amount of snow indicated by increased atmospheric precipitation and lower CALF, registered NDVI was mostly below the 5-year average and the previous year's level until April, when it reached the previous year's level. As agroclimatic conditions were mainly favorable, and judging by NDVI pattern, we expect winter crop yields to be close to the level of the previous year.

Ural and western Volga

Atmospheric precipitation was 1% below the 15-year average. Temperatures were 2.3°C above the 15-year average. RADPAR was 8% below the 15-year average. Biomass was 12% above the 15-year average. VCIx was 0.83. CALF was 63% below the 5-year average. Possibly due to lower CALF, NDVI was mostly lower compared to the 5-year average and the previous year's level. Only in early April it became equal to the 5-year average. As agroclimatic conditions were close to average, we expect yields to be close to the 5-year average.

Eastern Siberia

Atmospheric precipitation was 17% above the 15-year average. Temperatures were 1.7°C above the 15-year average. RADPAR was 7% below the 15-year average. Biomass was 5% above the 15-year average. The VCIx was 0.55. CALF was 51% below 5-year average. Due to higher amount of snow, registered NDVI was significantly lower compared to the 5-year average and the previous year's level. The significant decrease in CALF can result in lower winter crop production. However, as the area of winter crops in this region is insignificant, it will not affect the production of winter crops in the Russian Federation.

Middle Siberia

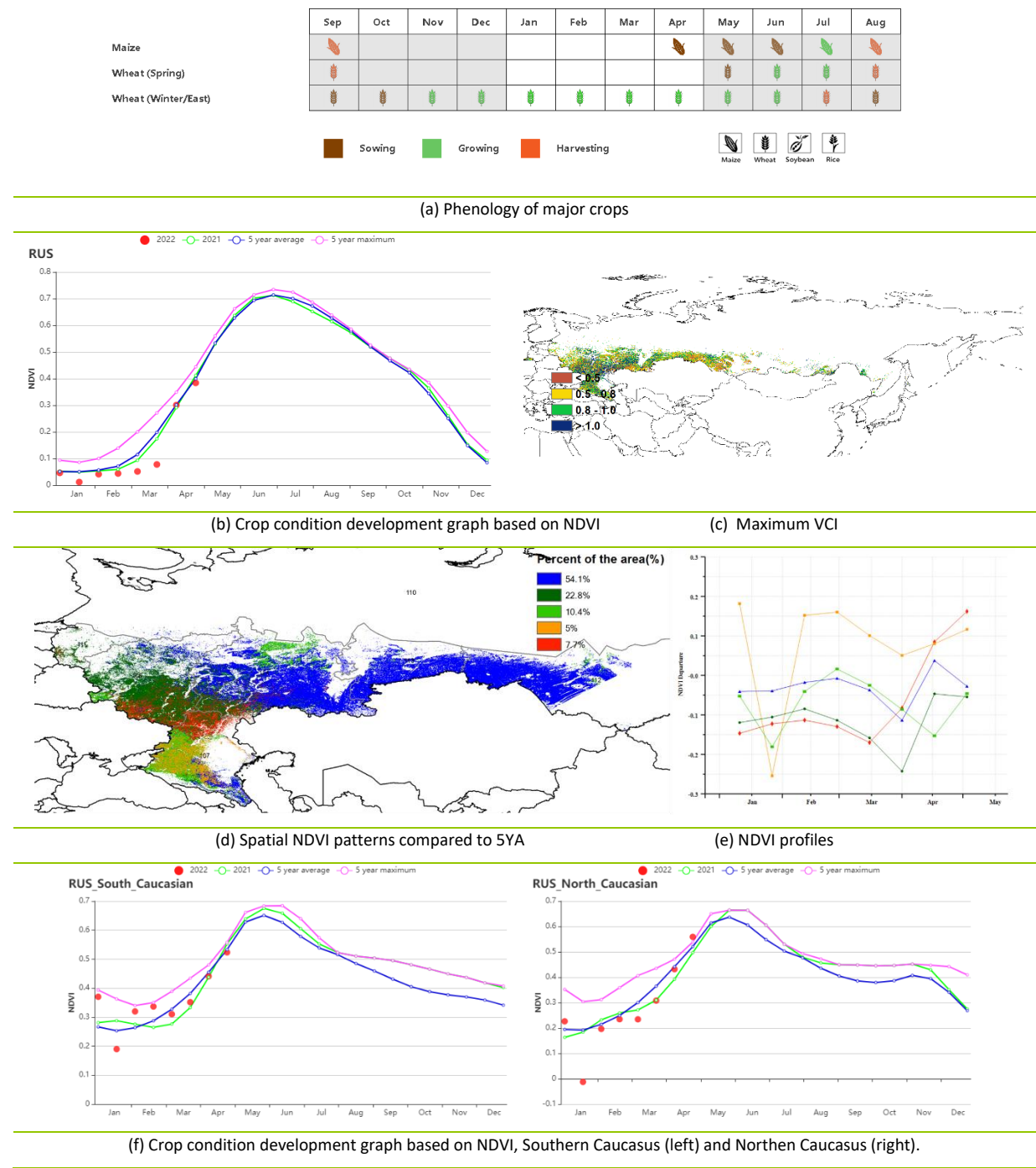
Precipitation was 9% below the 15-year average. Temperatures were by 0.8°C above the 15-year average. RADPAR was close to the 15-year average. Biomass was near the 15-year average. VCIx was 0.86. CALF was 20% above the 5-year average. NDVI was mostly below the 5-year average and the previous year's level possibly. As a result, winter crop production may decrease. But as the area of winter crops in this region is insignificant, the decrease in winter crop production will have little effect on the production of winter crops in the Russian Federation.

Western Siberia

The amount of precipitation was 15% below the 15-year average. Air temperatures were 2.5°C above the 15-year average. RADPAR was near the 15-year average. Biomass was 10% higher than the 15-year average. VCIx was 0.71. CALF was 82% below the 5-year average. NDVI was mostly below the 5-year average and

the previous year's level. As the area of winter crops in this region is insignificant, it will not affect the production of winter crops in the Russian Federation.

Figure 3.38 Russia’s crop condition, January – April 2022



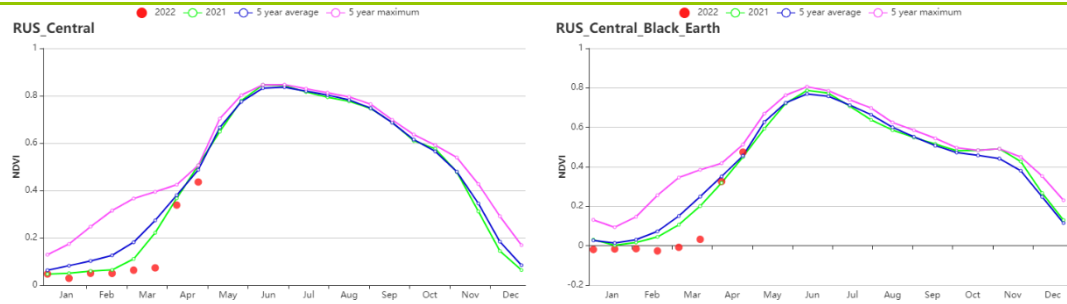
(b) Crop condition development graph based on NDVI

(c) Maximum VCI

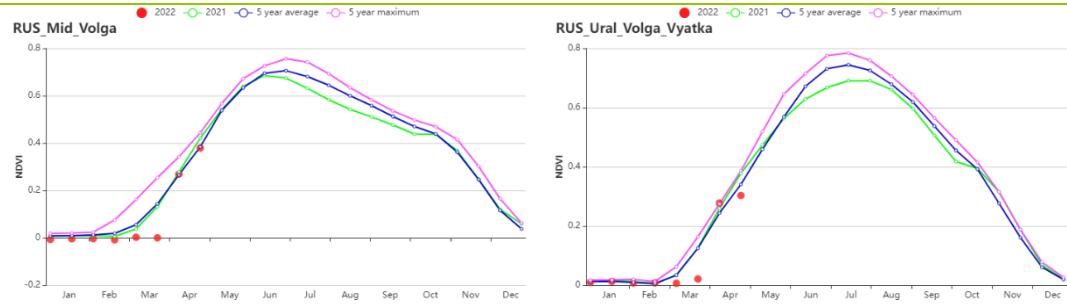
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

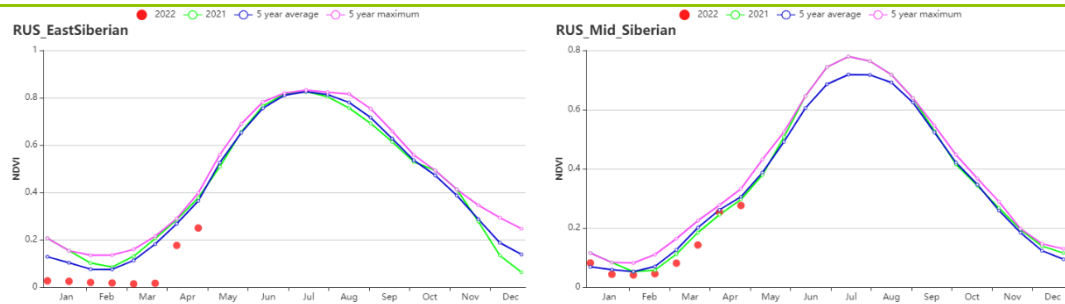
(f) Crop condition development graph based on NDVI, Southern Caucasus (left) and Northern Caucasus (right).



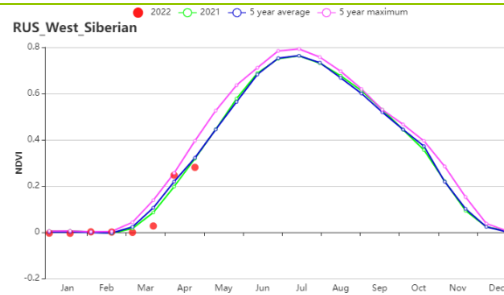
(g) Crop condition development graph based on NDVI, Central Russia (left) and Central black soils area (right).



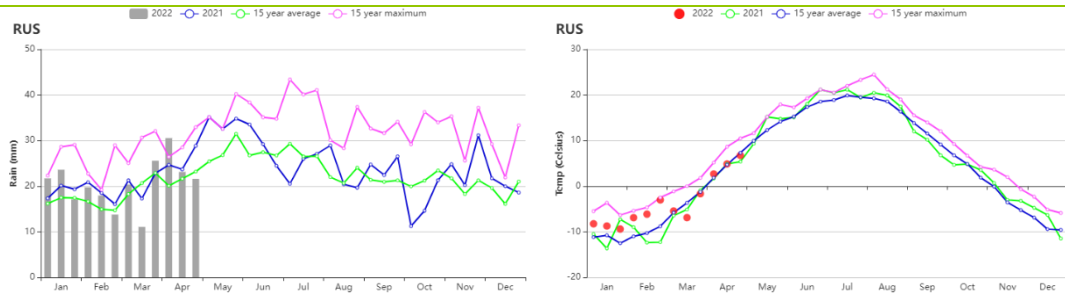
(h) Crop condition development graph based on NDVI, Middle Volga (left) and Ural and western Volga region (right).



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



(j) Crop condition development graph based on NDVI, Western Siberia.



(k) Rainfall index

(l) Temperature Index

Table 3.69 Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central Russia	314	18	-2.1	0.8	315	-17	294	-3
Central black soils area	339	30	-0.5	1.3	365	-19	354	4
Eastern Siberia	226	17	-8.2	1.7	604	-7	205	5
Middle Siberia	113	-9	-10.7	0.8	635	0	160	0
Middle Volga	306	19	-2.7	2.4	343	-20	297	12
Northern Caucasus	288	14	2.8	1.3	558	-5	466	8
Southern Caucasus	232	-17	1.5	0.0	688	2	389	-3
Ural and western Volga region	185	-1	-4.9	2.3	388	-8	254	12
Western Siberia	163	-15	-5.4	2.5	478	0	247	10

Table 3.70 Russia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January – April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central Russia	43	-40	0.80
Central black soils area	52	-6	0.92
Eastern Siberia	13	-51	0.55
Middle Siberia	8	20	0.86
Middle Volga	22	-25	0.86
Northern Caucasus	77	12	0.90
Southern Caucasus	71	-2	0.83
Ural and western Volga region	4	-63	0.83
Western Siberia	1	-82	0.71

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

[THA] Thailand

The period from January to April falls into the dry season in Thailand. It is the growing and harvest season for the second rice crop. Maize planting started in April. The proportion of irrigated cropland in Thailand is 23% and agro-meteorological conditions play an important role in the growth of most crops, rainfall is not the major influential factor. During this monitoring period, the rainfall was significantly above average (+34%), while the temperature was below the 15YA (TEMP -0.2°C) with below-average radiation (RADPAR -7%).

Sufficient rainfall led to above-average potential production (BIOMSS, +17%). According to the profile of the NDVI development graph, the crop conditions were favorable, even reaching the five-year maximum. The maximum vegetation condition index (VCIx) was relatively high at 0.94. The crop condition in 71.6% of cropped area was above average, while only 28.4% of the cropped area was below average, mainly in Chumphon, Prachuap Khilikhan, Surat Thani, Nakhon Si Thammarat, Kampaeng Phet and Udon Thani. Considering the cropped arable land fraction during the growing season was also above average (CALF, +12%), the CropWatch anticipated production for second rice is favorable.

Regional analysis

The regional analysis covers four main agro-ecological zones (AEZ) of Thailand: **Central double and triple-cropped rice lowlands**, **North-eastern single-cropped rice region**, **South-eastern horticulture area**, and **Western and southern hill areas**. The characteristics of rice planting are dependent on rice cultivation topology.

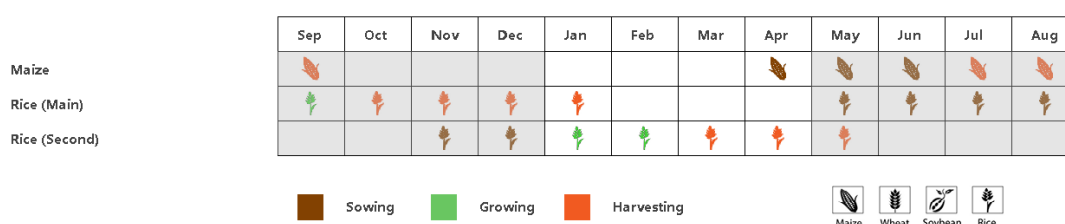
Central double and triple-cropped rice lowlands is the major region for the second rice. Indicators for this region show a similar pattern as for the whole country: Temperature and radiation were below average (TEMP -0.1°C; RADPAR -2%) whilst the rainfall was higher than the 15YA by 22%. These weather factors led to a biomass increase (+15%). The fraction of cropped arable land (CALF) increased by 8% and the maximum VCI was 0.88. According to the NDVI profile, the NDVI values exceeded the 5-year maximum from February to March 2022. In April, crop condition was close to the 5YA. The second rice production is forecasted to be favorable.

In the **North-eastern single-cropped rice region**, temperature was below average (-0.2°C) and rainfall and radiation had increased by 31% and 2%, respectively. Estimated biomass was 14% above the 15YA. VCIx was 0.94 and CALF increased by 3% compared with the 5Y average.

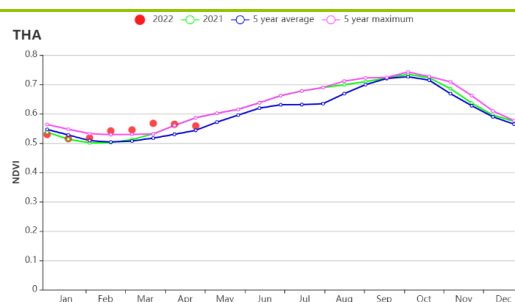
Crop conditions in the **Western and southern hill areas** experienced wetter than average conditions (RAIN +30%). Temperature and solar radiation were close to average (TEMP -0.2°C; RADPAR -1%). Estimated biomass was higher by 16%. VCIx was 0.93.

The **South-eastern horticulture area** experienced above-average rainfall (RAIN +48%) while the temperature was below average (TEMP -0.5°C) with averaged solar radiation (RADPAR 0%), leading to a biomass increase (BIOMSS 21%).

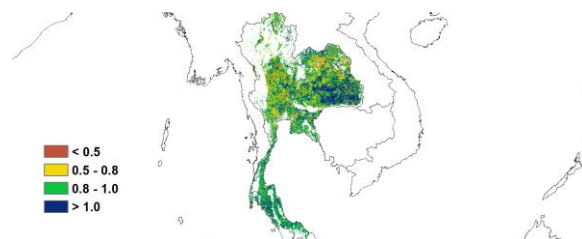
Figure 3.39 Thailand's crop condition, January - April 2022



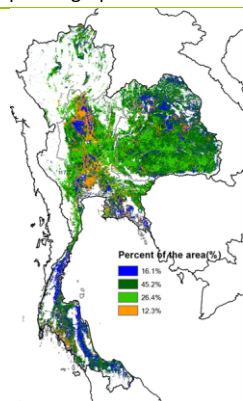
(a). Phenology of major crops



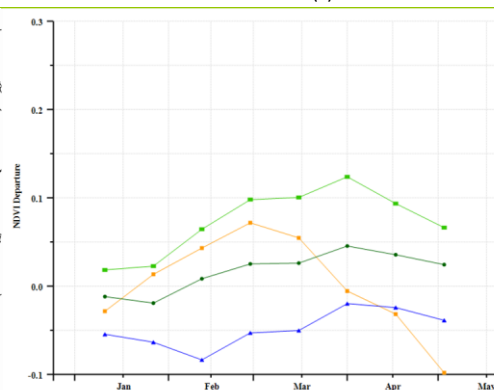
(b) Crop condition development graph based on NDVI



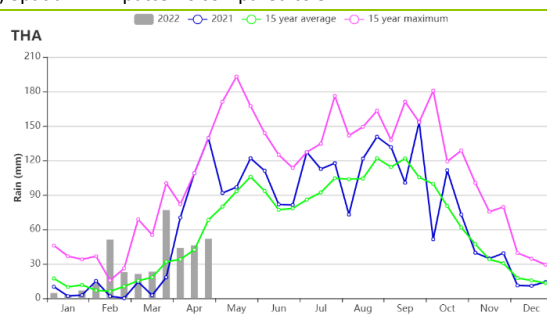
(c) Maximum VCI



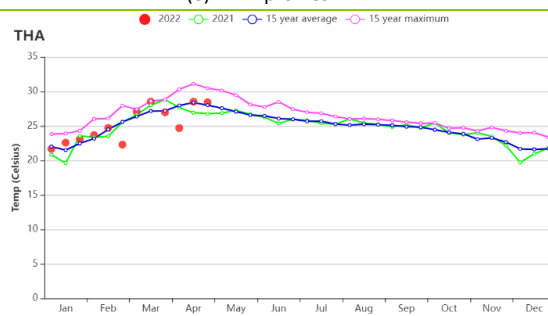
(d) Spatial NDVI patterns compared to 5YA



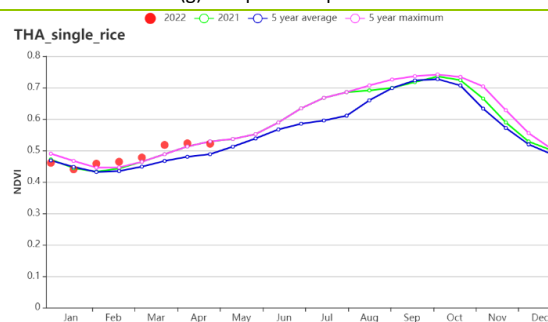
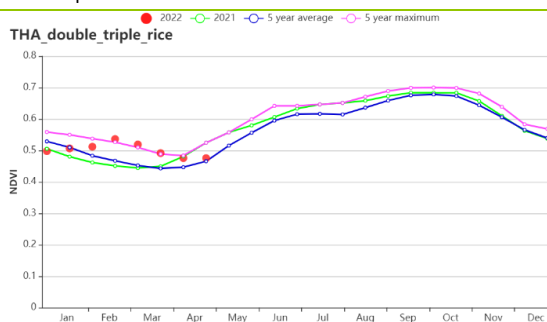
(e) NDVI profiles



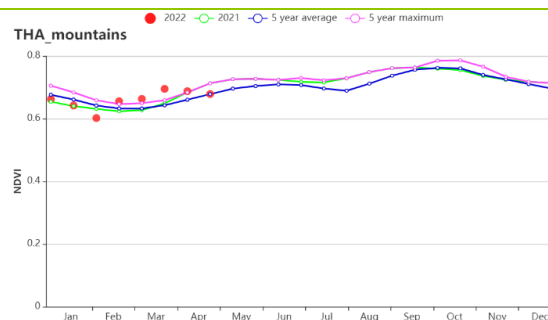
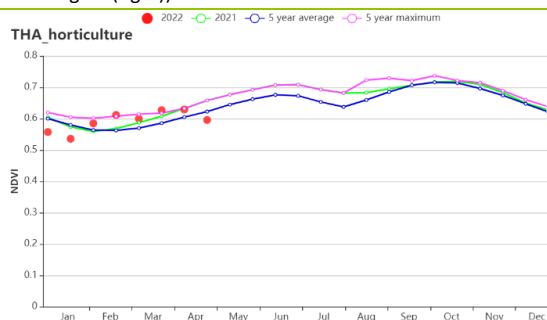
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI (double and triple-cropped rice lowlands (left) and single-cropped rice North-eastern region (right))



(i) Crop condition development graph based on NDVI (South-eastern horticulture area (left) and Western and southern hill areas (right))

Table 3.71 Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central double and triple-cropped rice lowlands	255	22	26.9	-0.1	1164	-2	819	15
South-eastern horticulture area	441	31	26.4	-0.2	1221	2	1060	14
Western and southern hill areas	395	30	24.3	0.0	1213	-1	936	16
Single-cropped rice north-eastern region	349	48	25.3	-0.5	1128	0	863	21

Table 3.72 Thailand's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central double and triple-cropped rice lowlands	93	8	0.88
South-eastern horticulture area	98	3	0.94
Western and southern hill areas	99	2	0.93
Single-cropped rice north-eastern region	88	24	0.96

[TUR] Turkey

Crop conditions in Turkey were generally below average throughout the monitoring period. The period from January to April is the growing season of winter crops. Winter wheat is the main crop. At the end of the monitoring period, maize and rice had been sown and winter wheat was in the late growth stages. The proportion of irrigated cropland in Turkey is 20% and agro-meteorological conditions play an important role in the growth of most crops, rainfall is not the major influential factor. Rainfall (RAIN -5%) was slightly below average, while sunshine (RADPAR +2%) and temperature (TEMP -0.1°C) were close to average, resulting in a potential biomass estimate that was below average (BIOMSS -5%). Cropped arable land fraction (CALF) was nearly 30% lower than the average level and the maximum VCI was 0.59.

From the crop condition development graph based on NDVI, NDVI nationwide was mostly lower than in the same period of last year. Especially in the eastern, central and western regions of Turkey, crop growth was below average during the monitoring period, mainly in the provinces of Bolu, Bilecik, Kutahya, Eskisehir, Afyonkarahisar, Sivas, Bingol, Mus, Erzurum and Bitlis, where CALF was also below average. The areas with better-than-average crop conditions were mainly located in and around the provinces of Edirne, Tekirdag, Kirklareli, Balikesir, Manisa, Izmir, and Aydin in western and northwestern Turkey. Overall, winter crop production in Turkey is likely to be lower than last year due to the largely inferior NDVI and lower CALF.

Regional analysis

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

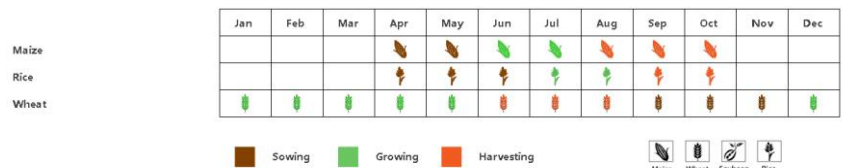
In **the Black Sea region**, crop conditions were below average throughout the monitoring period except for early January. Rainfall (RAIN +4.5%) was better than average, Temperature (TEMP -1.7°C) was slightly below average, and sunshine (RADPAR +1%) was slightly above average. Potential biomass (BIOMSS) was 9.6% lower than average. The maximum VCI was 0.7, and the cropped arable land fraction (CALF) had dropped by 7.5%. In summary, the crop yield is expected to be slightly lower than the average.

The Central Turkey's Anatolia region is the main grain producing area. Crop conditions were slightly below average throughout the monitoring period. Rainfall (RAIN -2.7%) was below average. Sunshine (RADPAR +2.7%) was slightly above average, temperature (TEMP -1.4°C) was slightly below average, and potential biomass (BIOMSS) decreased by 3.7%. Cropped arable land fraction (CALF) had dropped significantly. It was 51% lower than the average level. The time series rainfall profile for the area shows that rainfall in mid-February was significantly lower than the 15-year average, while it rose sharply in early March. Rainfall irregularities may have led to a significant reduction in the cropped arable land fraction (CALF). The maximum VCI average was 0.5 and crop yields in the region are expected to be below average.

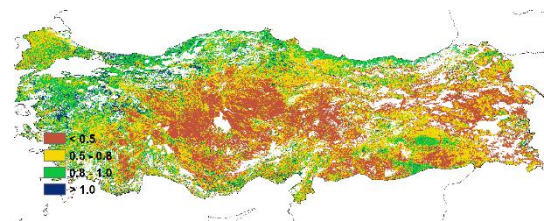
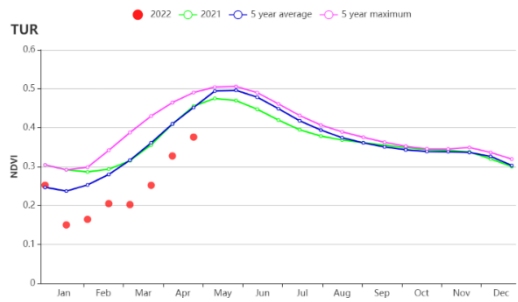
In **Eastern Anatolia**, crop conditions were above or near average in early and mid-January, but then below average. Rainfall (RAIN -13.3%) and temperature (TEMP -0.4°C) were below average. Sunshine was above average (RADPAR +1.4%). The combination of these factors led to a 6% reduction in potential biomass (BIOMSS). Cropped arable land fraction (CALF) decreased by 54%, the largest decrease among the four agro-ecological zones in Turkey, and the average value of the maximum VCI was 0.4. The significant CALF decrease for the region was due to the irregular rainfall during both the previous and current monitoring periods. Crop yields in the region are expected to be below average.

As shown by the crop condition development graph based on NDVI in **the Marmara Aegean and Mediterranean lowland region**, crop growth was near the average level or slightly better than the average level. Rainfall (RAIN -4.6%) and temperature (TEMP -0.7°C) were below average and Sunshine (RADPAR +2%) was slightly above average. Cropped arable land fraction (CALF) was lower than the 5YA (-11.7%). In addition, the maximum VCI for this area was 0.7. Crop yields and production in this region are expected to be slightly below average.

Figure 3.40 Turkey’s crop condition, January-April 2022

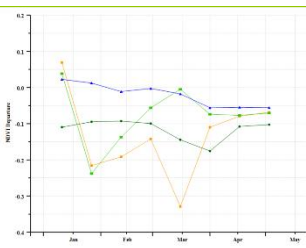
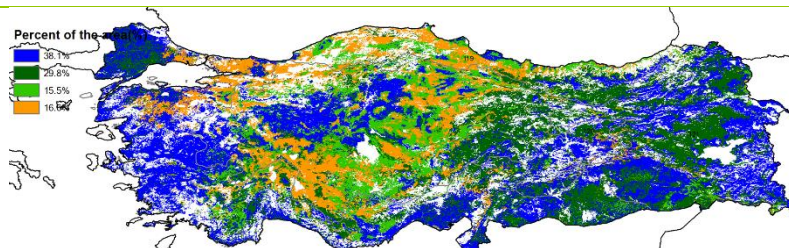


(a). Phenology of major crops



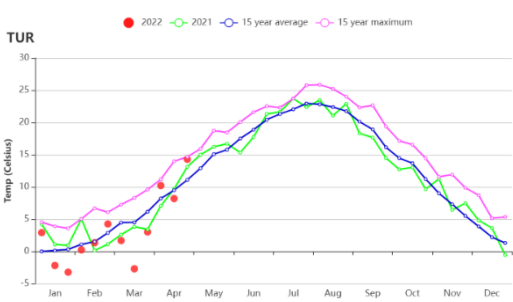
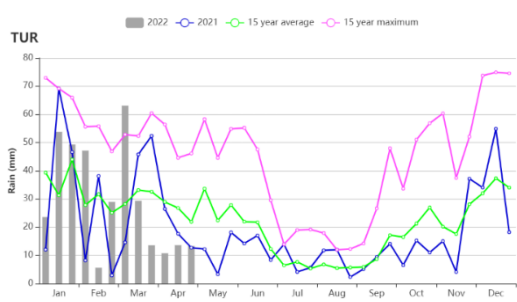
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



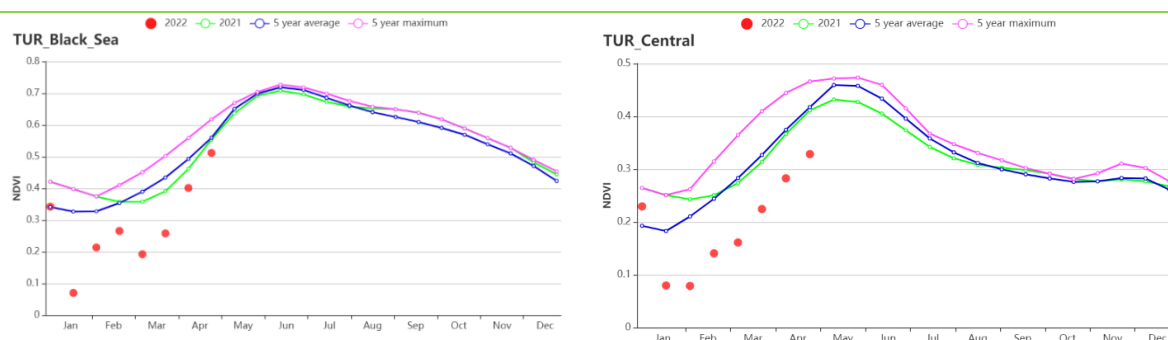
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

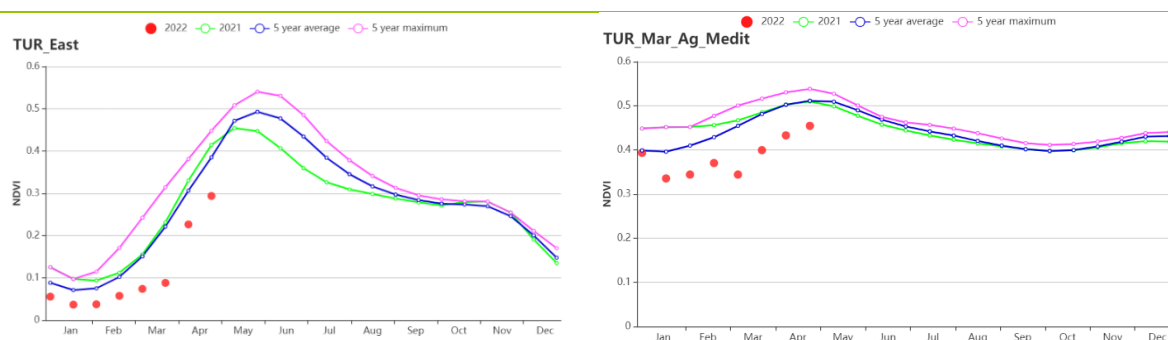


(f) Time series rainfall profile

(g) Time series temperature profile



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



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

Table 3. 73 Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (° C)	Departure from 15YA (° C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Black Sea region	451.6	4.5	0.6	-1.7	719.3	1.0	425.2	-9.6
Central Anatolia region	287.7	-2.7	1.8	-1.4	843.5	2.7	459.8	-3.7
Eastern Anatolia region	371.5	-13.3	-0.1	-0.4	837.2	1.4	383.9	-6.0
Marmara Agean Mediterranean lowland region	372.4	-4.6	6.6	-0.7	851.2	2.0	594.1	-4.1

Table 3. 74 Turkey's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2022

Region	CALF		Maximum VCI
	Current(%)	Departure from 5YA (%)	Current

Black Sea region	69.7	-7.5	0.7
Central Anatolia region	20.9	-51.1	0.5
Eastern Anatolia region	17.5	-54.3	0.4
Marmara Aegean Mediterranean lowland region	66.2	-11.7	0.7

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

In the Ukraine, wheat, maize, canola and sunflower are the major crops. This monitoring period (January to April, 2022) leads to the flowering stage of wheat and canola, which will be reached in May. Main sowing period for maize will be in May as well.

The proportion of irrigated cropland in Ukraine is only 2% and agro-meteorological conditions play a decisive role in the growth of almost all crops. Russia's conflict against the Ukraine had started in February. It is disrupting crop production and export to the world market. Accordingly, the G7 Foreign and Development Ministers' meeting in May stated that "Considering Ukraine accounts for a considerable share of global food supply, the current conflict has caused one of the most serious foods and energy crises in modern history, which now threatens the most vulnerable people in the world." During this period, CropWatch observed that the overall agroclimatic situation was not favorable for crop growth. The rainfall (225 mm) and sunshine (502 MJ/m²) were 7% and 5% below the 15-year average, respectively, while temperature (1.8°C) was 0.2°C above the average. Due to the drier and warmer climate, the potential biomass of crops was estimated to be 6% less than the 15-year average. In the agronomic aspect, the maximum VCI reached 0.73 only. Due to the conflict, only 61% of cropland was cropped in this season, which was significantly (-21%) lower than the 5-year average.

Remote sensing-based national crop condition development curve showed the NDVI was consistently lower than the 5-year average since March. In line with the national NDVI dynamics, NDVI in all crop areas was lower than average since March, especially in the fertile Donbas and other areas in eastern and northern Ukraine, accounting for 41.2% of the area. Crop productions prospects are highly unfavorable.

Since the winter crop area increased 3.8% in Ukraine, the production of winter crops increased 2.1% (520 thousand tonnes). The area increase of winter crops in the Donetsk and Luhansk regions of eastern Ukraine has led to a doubling of production in both regions.

Regional analysis

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

Central wheat area was a little deficient in rainfall (-6%) and had a lower radiation (-7%) in comparison to the 15-year average, while temperature was 0.4°C higher. Weather-based projected biomass was close to the average (-1%). CALF (-22%) was greatly reduced to 0.53, indicating a large reduction in land being cropped. VCIx was 0.71. NDVI trended below average as well. Considering the lower CALF and below average development of NDVI, total winter wheat production will be far below average.

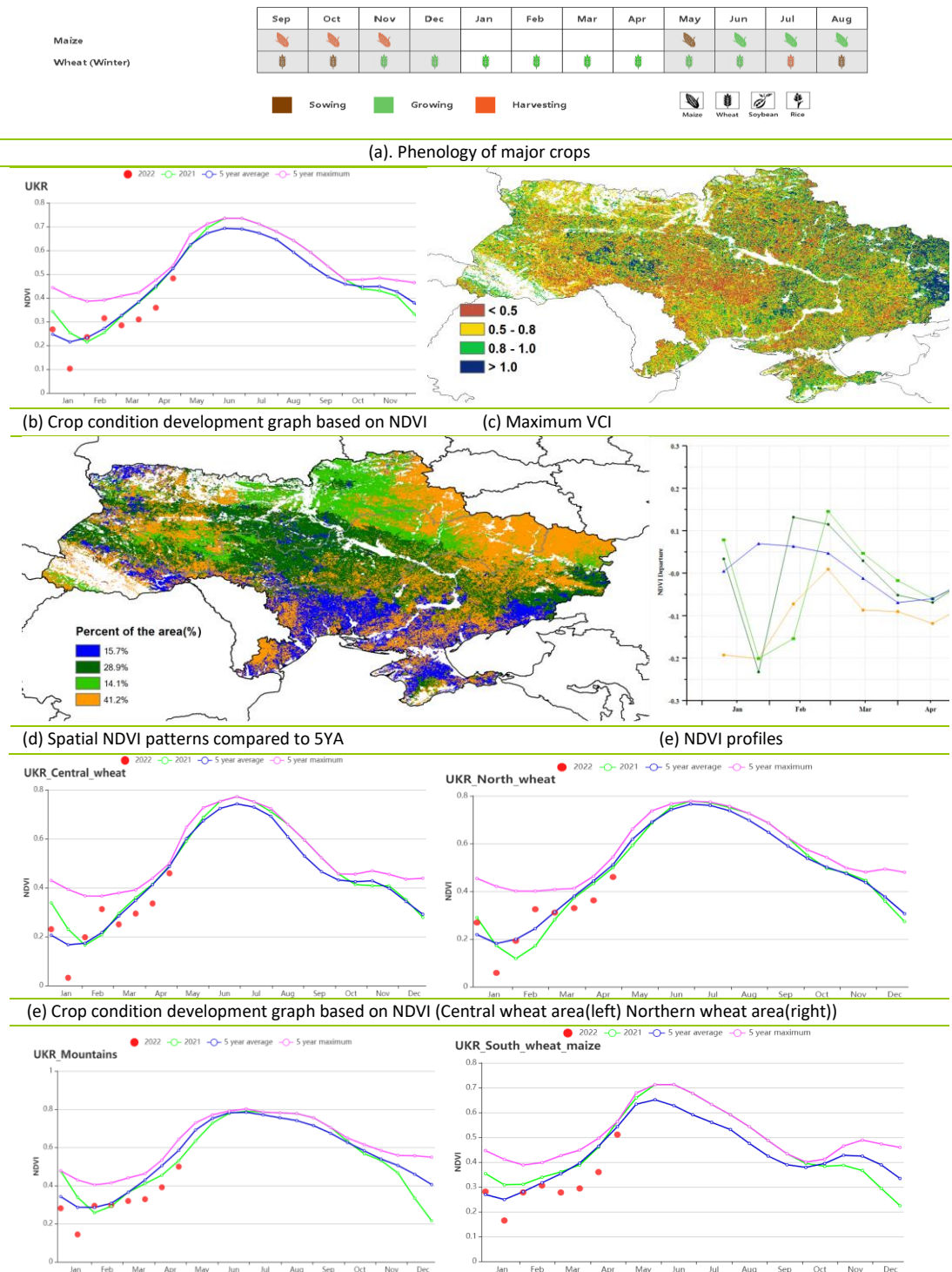
Eastern Carpathian hills received less rainfall (-6%) and had a lower temperature (-0.4°C). Radiation was near average. Lower rainfall and temperature negatively affected crops, and the potential biomass is estimated to be 6% lower than the 15-year average. Similar to the central wheat area, agronomic indicators showed low CALF (0.67, -28%) and VCIx (0.69). Combined with the low regional NDVI, the prospects for crop production are unfavorable.

Northern wheat area experienced average rainfall (+0%) and higher temperature (+0.2°C) compared to the 15-year average. Sunshine decreased by 10% in this season. CropWatch estimated the potential biomass to be 3% below average. A 0.57 CALF indicates that only half of the arable land is cropped. This indicator was decreased by 26% compared to the 5-year

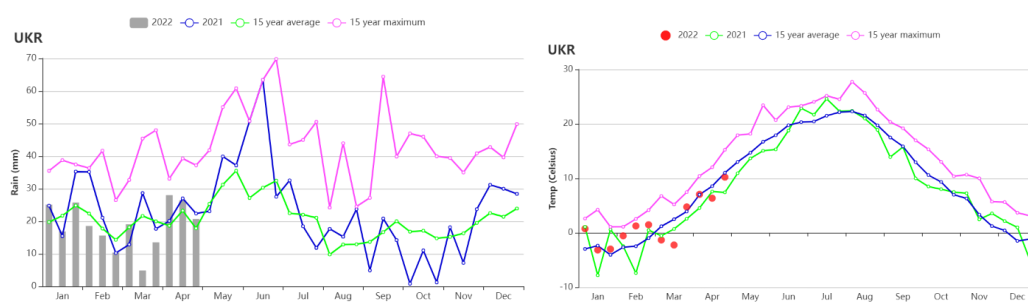
average. The area also reached a moderate VCIx (0.72). In summary, the prospects for crop condition are unfavorable.

Southern wheat and maize area were highly deficient in rainfall (-19%) but experienced a higher temperature (+0.4°C) and a normal radiation (-1%). The shortage in rainfall led to an 11% decrease in potential biomass. Agronomic indicators were consistent with other AEZs, the region had a relatively low CALF (0.68, -16%) and VCIx (0.75). Regional NDVI was also marginally lower than the 5-year average indicating the crop condition was below average.

Figure 3.41 Ukraine's crop condition, January - April 2022



(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. 75 Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Central wheat area	217	-6	1.5	0.4	483	-7	415	-1
Eastern Carpathian hills	264	-6	1.1	-0.4	551	0	407	-6
Northern wheat area	251	0	1.2	0.2	432	-10	404	-3
Southern wheat and maize area	180	-19	2.7	0.4	567	-1	399	-11

Table 3. 76 Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central wheat area	53	-22	0.71
Eastern Carpathian hills	67	-28	0.69
Northern wheat area	57	-26	0.72
Southern wheat and maize area	68	-16	0.75

Outlook for Ukraine winter crops production

Ukrainian winter crops were planted from September to November of the previous year. According to CropWatch, the total area of winter crops for the 2021/2022 season increased by 350 thousand ha from 2020/2021 season, or up by 3.8%. Among the winter crops, the wheat and barley area accounts for 7.595 million ha, while rapeseed accounts for 1.775 million ha.

About 3.076 million hectares of crops are distributed in the conflict zone, accounting for about 32.8% of the winter sown area in Ukraine, which is significantly lower than the current international mainstream report (50%). Of these, 2.376 million hectares are wheat crops, or about 31.3% of total wheat area. The area of oil seed rape is 700,000 hectares, or about 39.4% of the total oilseed rape area of the Ukraine.

The area under crops in the Lugansk and Donetsk regions increased by 364,000 hectares and 377,000 hectares, respectively, compared to last year, with a significant increase of 126.7% and 96.3%, respectively. Dnepropetrovsk and Odessa regions, which are more affected by the conflict, are the main winter crop producing regions in Ukraine, with 914,900 and 852,700 hectares of winter crop area, accounting for 9.8% and 9.1% of Ukraine's winter sown area, respectively. The conflict makes it dangerous for farmers to manage their fields due to land mines and shelling. They also lack access to inputs, such as fuel, seeds, fertilizer, chemicals for crop protection and last but not least, manpower. Farming operations also face economic uncertainty, as they do not know whether they can harvest and market their crops.

Table 3. 77 Monitoring and variation of winter crop area in Ukraine in 2022

State	Winter Crop area in 2021	Winter Crop area in 2022	Variation	Departure
	(Thousand ha)	(Thousand ha)	(Thousand ha)	(%)
Cherkasy	253.3	306.6	53.3	21
Chernihiv	209.8	170.2	-39.6	-18.9
Chernivtsi	37	29.7	-7.3	-19.9
Dnepropetrovsk	741.6	914.9	173.3	23.4
Donetsk	399.2	775.8	376.6	94.3
Ivano-Frankivsk	69.5	85.1	15.6	22.5
Kharkiv	594.8	627.1	32.3	5.4
Kherson	715.5	781.7	66.2	9.3
Khmelnysky	304.2	209.3	-94.9	-31.2
Kirovograd	488	446.4	-41.6	-8.5
Kiev	232.6	172.5	-60.1	-25.8
Lugansk	287.1	650.7	363.6	126.7
Lviv	219.5	135.7	-83.8	-38.2
Nikolaev	765.7	911.8	146.1	19.1
Odessa	1107.5	852.7	-254.8	-23
Poltava	267.3	231.3	-36	-13.5
Rivne	141	152.9	11.9	8.5
Sumy	190.9	99.6	-91.3	-47.8
Ternopil	270	204.2	-65.8	-24.4
Vinnytsia	400.4	269.2	-131.2	-32.8
Volyn	206.4	197.6	-8.8	-4.2
Transcarpathian	24.4	18.3	-6.1	-25.1
Zaporozhye	862.6	973.4	110.8	12.8

Zhytomyr	195.4	153	-42.4	-21.7
Ukraine*	9020.9	9369.9	349	3.90%

* Crimea is not included

Most of the Ukraine is rain-fed arable land. Rainfall was 6-19% below the average of the past 15 years. This, in combination with cooler spring temperatures and lack of inputs led to an overall decline in crop growth across Ukraine in late April (Figure 1), with 51% of the country's winter crop growing areas having lower crop growth than the average level of the same period of the past five years. The situation improved in early May (Figure 1). Only 29% of winter crops were worse than average level, while 52% was close to average. The potential total national winter cereal production is estimated at 44.967 million tons, an increase of 520,000 tons or only 1.2% (Table 2).

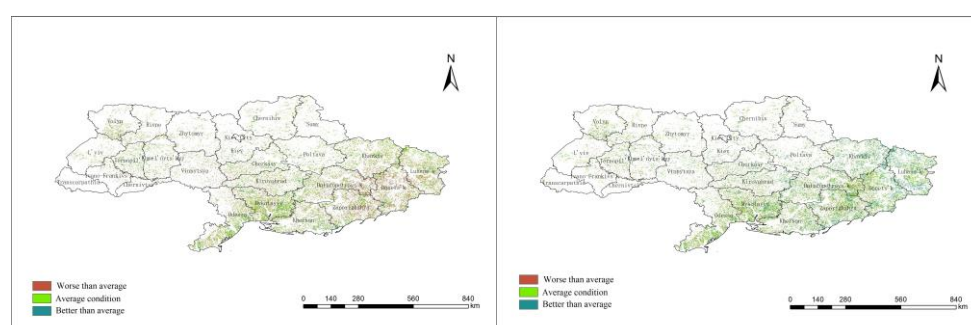


Figure 3.42 Winter crop condition in Ukraine in later April (left) and early May (right) 2022

The situation of winter crops varies significantly among the Ukrainian regions. Donetsk, Luhansk and Kharkiv in eastern Ukraine had 10% higher precipitation, which makes the winter grain yields in the three regions increase by 18%, 13.3% and 3.9% year-on-year, respectively. Coupled with the increase in winter crops planting area, the total winter crops production in Donetsk and Luhansk regions could potentially double, increasing by 2.468 million tons and 1.871 million tons, respectively. In Kharkiv, winter crop production is anticipated to increase by 319 thousand tons, or 9.6%. These numbers show the current potential for winter wheat production. They do not take into account the impact of the conflict on farming operations, logistics and trade.

In the south-central Ukraine, the Cherkasy, Dnepropetrovsk, Kherson, Nikolaev and Zaporozhye regions were affected by dry weather and the forecasted crop yields decreased to different degrees, but thanks to the significant increase in the area planted with winter cereals, most of the major producing regions in the south-central Ukraine achieved an increase in potential production. Most of the northern and western regions of Ukraine suffered from the double impact of shrinking acreage and drought-induced yield decline, and an overall decline in winter cereal production.

Table 3. 78 Crop production forecast for winter crops for 2022 in Ukraine

States	2021				2022			
	Production (Thousand to ns)	Yield variati on (%)	Area tion (%)	Varia	Production (Thousand to ns)	Variation of Productio n (%)	Variation of Production (Thousand to ns)	of
Cherkasy	1509	-1.8	21		1793	18.9	285	
Chernihiv	1120	-7	-18.9		844	-24.6	-275	
Chernivtsi	241	-1.7	-19.7		190	-21.1	-51	
Dnepropetr ovsk	3466	-5.6	23.4		4038	16.5	572	
Donetsk	1907	18	94.3		4375	129.4	2468	
Ivano- Frankivsk	413	-2.8	22.4		492	19	79	
Kharkiv	3333	3.9	5.4		3653	9.6	319	
Kherson	3129	-6.8	9.3		3187	1.8	58	
Khmelnysk y	1931	-3.7	-31.2		1279	-33.8	-652	
Kirovograd	2470	-7.6	-8.5		2088	-15.5	-383	
Kiev	1435	-2.6	-25.8		1037	-27.8	-398	
Lugansk	1194	13.3	126.6		3065	156.8	1871	
Lviv	1178	-0.7	-38.2		723	-38.6	-455	
Nikolaev	3350	-2.4	19.1		3893	16.2	543	
Odessa	4439	-3.5	-23		3299	-25.7	-1139	
Poltava	1561	-4.7	-13.5		1287	-17.6	-274	
Rivne	795	-1.3	8.4		851	7.1	56	
Sumy	1056	-4.6	-47.8		526	-50.2	-530	
Ternopil	1773	1.9	-24.4		1367	-22.9	-406	
Vinnytsia	2396	-11.2	-32.8		1431	-40.3	-965	
Volyn	979	-3.2	-4.3		907	-7.4	-72	
Transcarpat hian	87	-1.8	-25		64	-26.3	-23	
Zaporozhye	3577	-8.4	12.8		3697	3.4	120	
Zhytomyr	997	-1.3	-21.7		770	-22.7	-227	
Ukraine*	44447	-2.6	3.9		44967	1.2	520	

* Crimea is not included

[USA] United States

During this monitoring period from January to April 2022, winter wheat was the main crop being cultivated. It passed through tillering, green up, jointing and heading stages. Maize, rice and soybeans planting started in April. In general, the conditions for winter wheat were below average due to dry and cool weather.

The proportion of irrigated cropland in United States is 16% and agro-meteorological conditions play an important role in the growth of most crops. Rainfall is not the major influential factor on irrigated cropland. Rainfall and temperature were 5% and 0.3°C below the 15-year average, respectively. Rainfall deficits were prevalent in major wheat production areas such as Kansas (-27%), Texas (-30%), Nebraska (-34%) and California (-66%). Below average rainfall in those major winter crops producing states resulted in water stress as the water demands for winter wheat increased significantly from green-up. The serious shortage of water caused a significant decrease of potential biomass, such as in Kansas (-17%), Texas (-18%), Nebraska (-17%) and California (-33%). Due to below average rainfall, poor crop conditions were observed by CropWatch agronomic indicators. The cropped arable land fraction (CALF) was 47%, which was 11% below the average of the past five years. Main regions with a drop in CALF were the Southern and Northern Plains, as well as the Corn belt. Crop conditions were poor across the highlands with maximum VCI values below 0.5. Normalized Difference Vegetation Index (NDVI) departure clustering showed that the area most affected by the drought conditions was the Southern Plains. In short, CropWatch assesses that crop conditions were poor for most of the winter wheat during this reporting period.

Regional Analysis

Winter crops are grown mainly in the Southern Plains (No. 196), Northwest (No. 195) and California (No. 190). Winter wheat growth conditions are highly spatially heterogeneous due to different agroclimatic, agronomic and irrigation infrastructure conditions.

1. Southern Plains

The Southern Plains is the most important winter wheat growing region and includes Kansas, Oklahoma and Texas. During this reporting period, winter wheat growth was poor due to severe water shortages caused by insufficient rainfall between March and April (Figure h). CropWatch agroclimatic indicators showed below-average rainfall (-14%) and temperature (-0.4°C), which were not conducive to winter wheat growth. The maximum vegetation condition index (VCI_x) was 0.58 and potential biomass was 13% below average. In addition to the poor conditions, it is noteworthy that the percentage of the cropped arable land fraction was reduced by 24% compared to the 5-year average. The reduced CALF might be related to the delayed sowing of the summer crops. In short, CropWatch assesses crop growth in the southern plains as below average and crop production for this monitoring period is expected to be below average.

2. Northwest

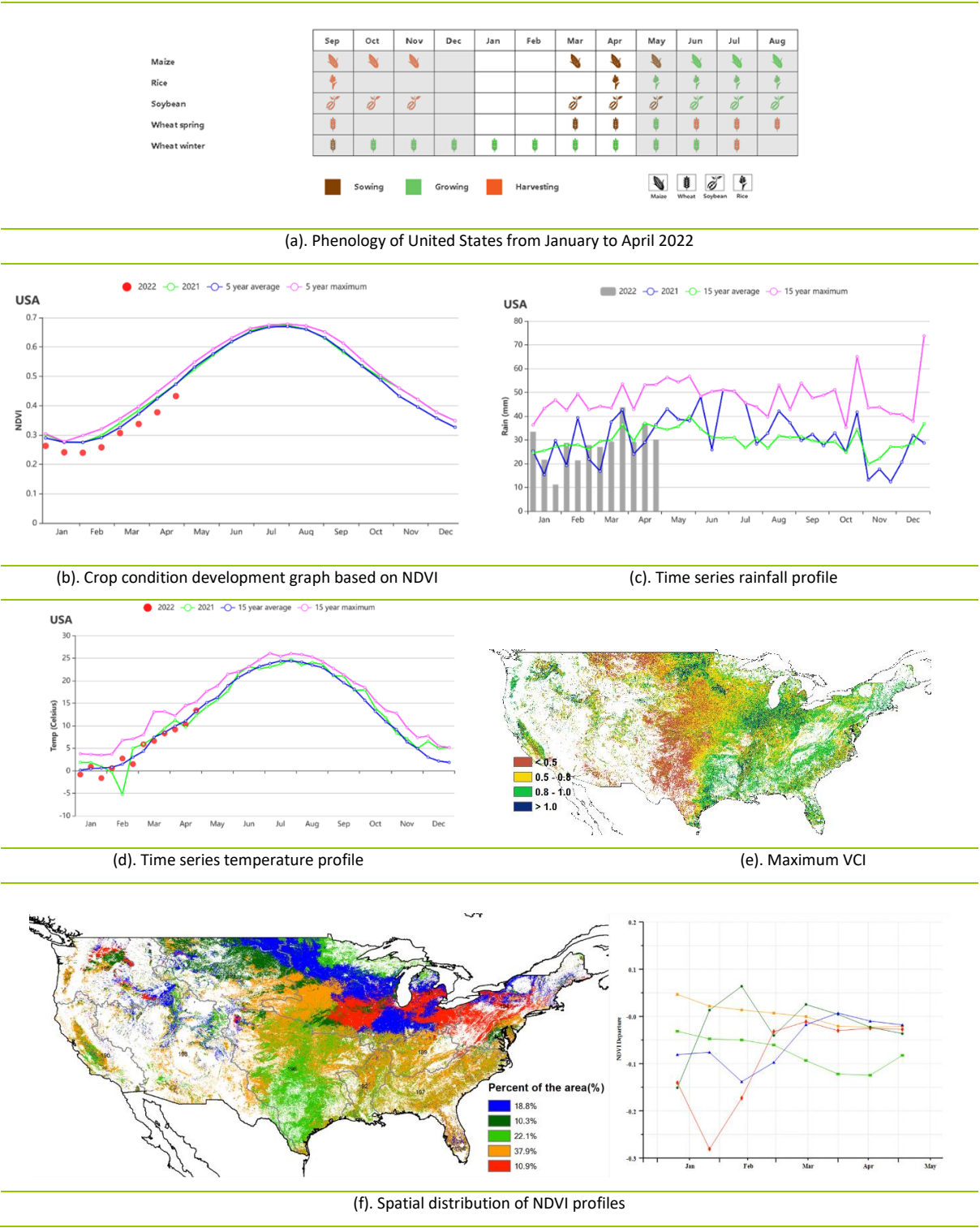
The Northwest is another important winter wheat production area in the United States. Crop growth conditions in this region were slightly below average due to cold and dry weather, but still better than in 2021. Compared to the past 15-year average, rainfall and temperatures were 14% and 0.8°C below average, respectively. Potential biomass in the Northwest was 7% below average due to dry and cold weather. Other agronomic indicators show near-average crop conditions, with CALF 3% above average and a maximum vegetation condition index of 0.78.

3. California

California is the most important producer of vegetables and fruits in the United States. It also is a major producer of winter wheat, which reached the maturity stage by late April. NDVI development profile indicates below-average crop conditions. California experienced severe rainfall deficits throughout the monitoring period. Rainfall was 65% lower than the 15YA and temperatures were 0.5°C warmer than the 15YA. The severe drought resulted in a 32% reduction in potential biomass. Most crops in California can be irrigated, although water levels in the reservoirs are relatively low due to the prolonged drought. As a result

of the irrigation, CALF and the VCIX were near average during this reporting period. In short, CropWatch assesses California's crop conditions as below average.

Figure 3. 43 United States crop condition, January-April 2022



USA

● 2022 ● 2021 ● 5 year average ● 5 year maximum

USA

■ 2022 ● 2021 ● 15 year average ● 15 year maximum

(b). Crop condition development graph based on NDVI

(c). Time series rainfall profile

USA

● 2022 ● 2021 ● 15 year average ● 15 year maximum

(d). Time series temperature profile

(e). Maximum VCI

(f). Spatial distribution of NDVI profiles

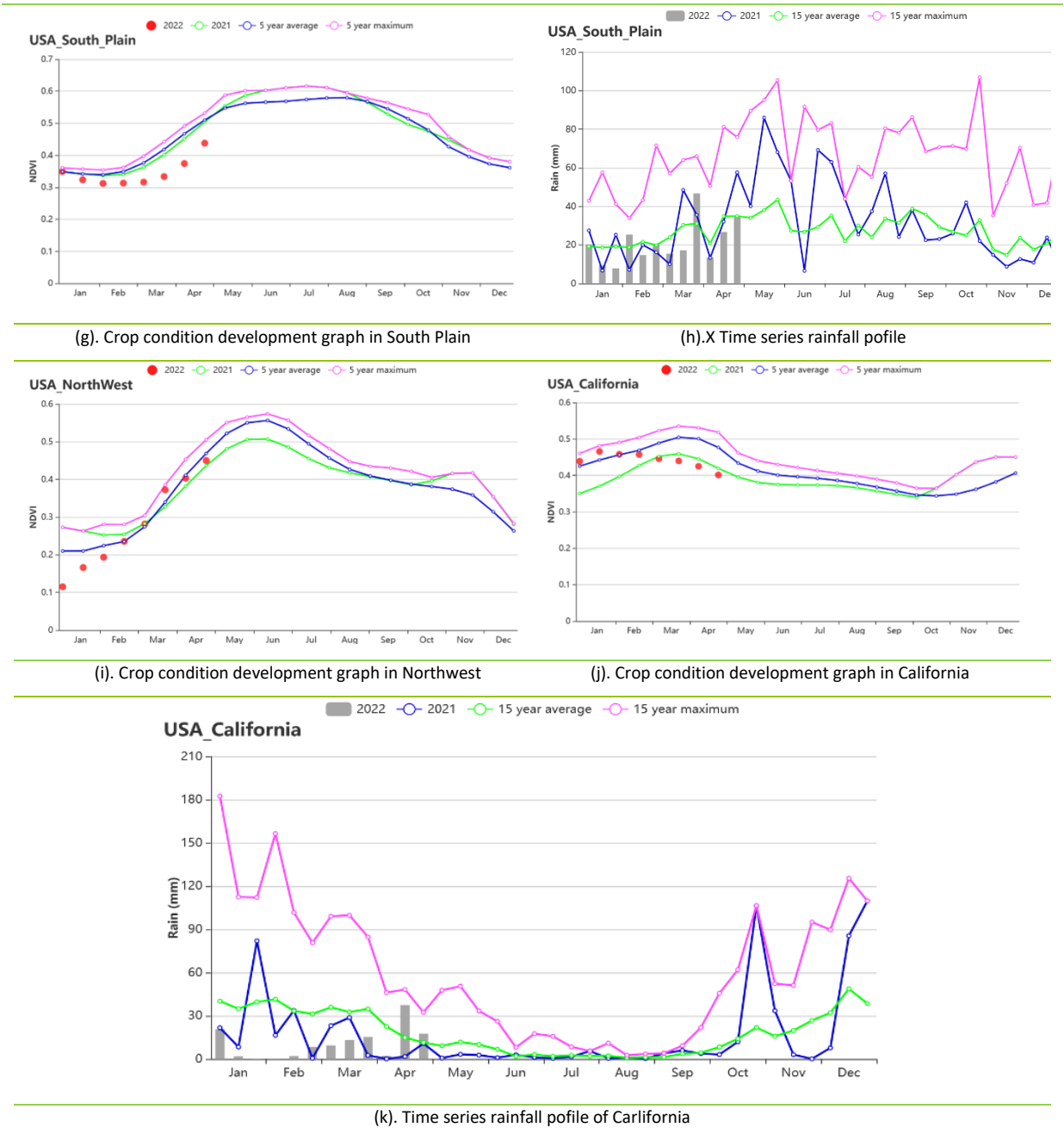


Table 3.79 United States' agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Corn Belt	343	3	-0.9	-1.1	663	-2	358	-12
Northern Plains	217	1	-2.3	-0.9	746	0	319	-9
Lower Mississippi	526	-3	10.8	-0.4	859	7	813	-3
Southeast	435	-1	12.7	0.6	922	4	847	5
Southern Plains	435	-1	12.7	0.6	922	4	847	5
North-eastern areas	419	-1	1.5	0.1	703	3	444	1
Northwest	377	-14	0.4	-0.8	663	1	371	-7
Blue Grass region	559	7	6.3	-0.2	796	7	647	-1
California	129	-65	9.3	0.5	981	9	358	-32

Table 3.80 United States' agronomic indicators by sub-national regions, current season's values and departure, January - April 2022

Region	CALF		Maximum VCI
	Current(%)	Departure from 5YA (%)	Current
Corn Belt	30	-19	0.77
Northern Plains	4	-63	0.63
Lower Mississippi	78	4	0.85
Southeast	99	0	0.83
Southern Plains	48	-24	0.58
North-eastern areas	95	2	0.83
Northwest	56	3	0.78
Blue Grass region	97	0	0.78
California	74	-1	0.75

[UZB] Uzbekistan

The monitoring period from January to April covers the main growth period of winter wheat and the planting of maize in Uzbekistan. The proportion of irrigated cropland in Uzbekistan is 30% and agro-meteorological conditions play an important role in the growth of most crops. Rainfall is not the major influential factor on irrigated cropland. The national average VCIx was 0.86, and the cropped arable land fraction increased by 11%. Among the CropWatch agroclimatic indicators, the temperature had increased by 1.7°C compared to the 15YA, especially in January and April. Rainfall was significantly above average in January and March, while below average in February and April. The accumulated rainfall decreased by 9%. RADPAR was close to average. The combination of these factors resulted in a decreased BIOMSS (-4%) compared to the 15YA.

The monitoring results reported in the last bulletin showed that the agroclimatic conditions were not favorable for the sowing and early growth of winter wheat, and the results of this monitoring period also indicated that the overall crop conditions were unfavorable, especially for the western part of Kashkadarya in the Eastern hilly cereals zone. Both the NDVI cluster graph and maximum VCI map show poor crop condition in those regions. At the national level, the NDVI of Uzbekistan had returned to the average level in April. Prospects for production of winter cereals are slightly unfavorable.

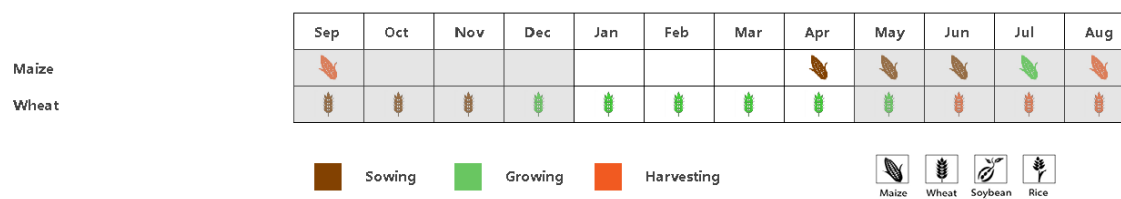
Regional analysis

In **the Central region with sparse crops**, crop conditions were roughly average. RAIN and RADPAR were below the fifteen-year average (-3% and -2%), whereas the temperature was significantly above average (TEMP +2.2°C). Therefore, BIOMSS had decreased by 6%. The cropped arable land fraction was only 2%, and the maximum VCI was 0.68.

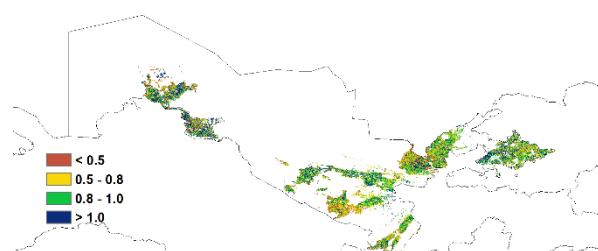
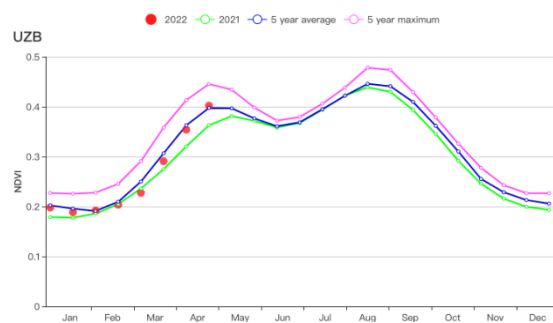
In **the Eastern hilly cereals zone**, NDVI was below the five-year average from late February to middle April and returned to the average level in late April. The RAIN was below 15YA (-9%), and TEMP was above the average (+1.7°C). The combination of these factors resulted in a decreased BIOMSS (-4%). The maximum VCI index was 0.84 and Cropped Arable Land Fraction increased by 11% compared to the five-year average. Overall crop prospects are expected to be close to normal.

In **the Aral Sea cotton zone**, RAIN was 16% below the fifteen-year average and RADPAR was below average as well (-4%), while TEMP was above average (+1.6°C). These factors resulted in a slight decrease in BIOMSS (-6%). The maximum VCI graph shows that most of this region had high values of VCIx (>1.0), and the average VCIx of this region is 0.98. No croplands are cultivated during this monitoring period.

Figure 3.44 Uzbekistan crop condition, January - April 2022

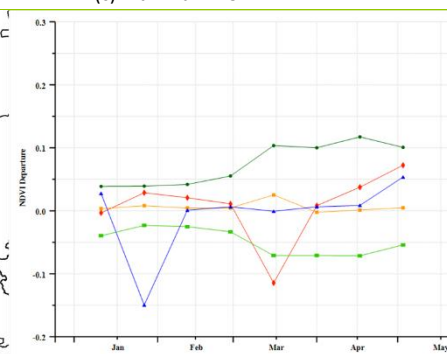
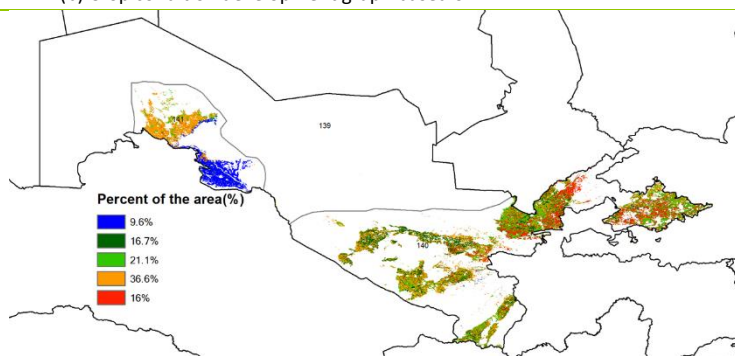


(a) Phenology of major crops



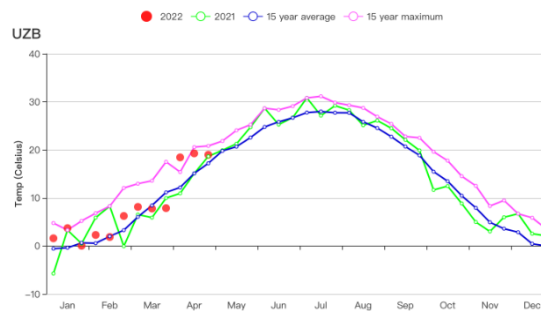
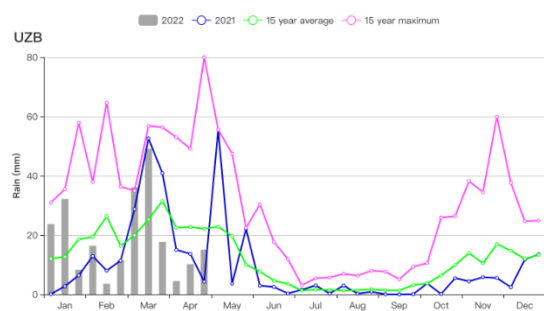
(b) Crop condition development graph based on NDVI

(c) Maximum VCI



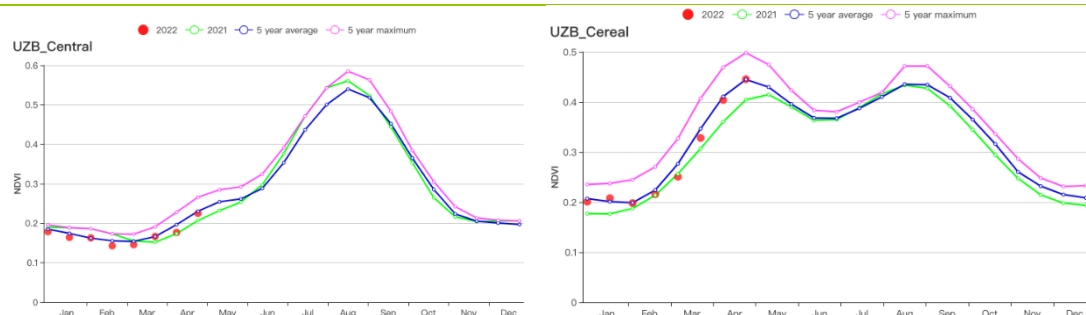
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

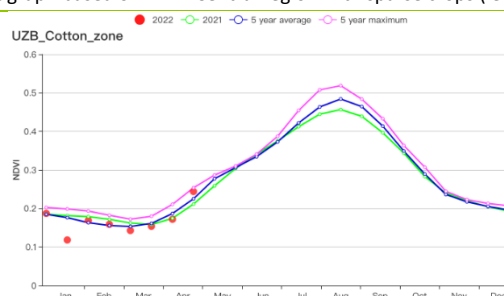


(f) Rainfall profiles

(g) Temperature profiles



(h) Crop condition development graph based on NDVI Central region with sparse crops (left) Eastern hilly cereals region (right)



(i) Crop condition development graph based on NDVI Aral Sea cotton region

Table 3.81 Uzbekistan's agroclimatic indicators by sub-national regions, current season's values, and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m2)	Departure (%)	Current (gDM/m2)	Departure (%)
Central region with sparse crops	118	-3	9	2.2	810	-2	314	-6
Eastern hilly cereals zone	248	-9	8.1	1.7	842	0	463	-4
Aral Sea cotton zone	55	-16	7.3	1.6	773	-4	242	-6

Table 3.82 Uzbekistan's agronomic indicators by sub-national regions, current season's values, and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	
Central region with sparse crops	2	25	0.68
Eastern hilly cereals zone	58	11	0.82
Aral Sea cotton zone	2	119	0.98

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PHL POL ROU RUS THA TUR UKR USA UZB **VNM** ZAF ZMB

[VNM] Vietnam

This monitoring period covers the growing period and harvest of winter rice, followed by planting of summer rice in the central part. The winter-spring rice in the Mekong Delta and southeast of Vietnam was harvested in February. It was followed by summer-autumn rice in March. The planting of winter-spring rice in the north had started in January. It will be harvested in May.

The proportion of irrigated cropland in Vietnam is 32% and agro-meteorological conditions play an important role in the growth of most crops. Rainfall is not the major influential factor on irrigated cropland. CropWatch agro-climatic indicators showed average radiation (975 MJ/m², +0%) and temperature (20.7°C, -0.1°C). Because of higher precipitation (381 mm, +24%), the BIOMSS (+11%) showed an increase compared to the 15YA. The VCIx (0.93) was high, and the CALF (96%, +0%) was close to the 5YA.

Based on the NDVI development graph, the crop conditions were below the 5YA in the first half of this monitoring period. The large negative departures in January and February were presumably caused by cloud cover in the satellite images. The crop conditions rose to near the 5YA in early March and exceeded the maximum in late March. From January to April the precipitation was generally near the 15YA and surpassed the fifteen-year-maximum in mid-February and late March. While the temperature was above the 15YA, except for late February and early April, when it was below the 15YA. As to the spatial distribution of NDVI profiles, crop conditions on 54.2% were near average, located in the northwest and the south of Vietnam. Overall, the crop conditions were favorable. The winter rice in the north, which will be harvested in May, experienced above-average conditions.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, several agro-ecological zones (AEZ) can be distinguished for Vietnam: **Central Highlands, Mekong River Delta, North Central Coast, North East, North West, Red River Delta, South Central Coast and South East.**

In the **Central Highlands**, due to the significant increase of RAIN (309 mm, +20%), the BIOMSS increased by 12%. CALF was 99% and VCIx was 0.96. According to the NDVI development graph, crop conditions were higher than the 5YA since February and exceeded the five-year-maximum at the end of the monitoring period. Based on the agroclimatic indicators, the crop conditions were expected to be above average.

In the **Mekong River Delta region**, TEMP (27.5°C, +0.1°C) was close to the 15YA, and RADPAR (1235 MJ/m², +3%) was above the 15YA. The RAIN (432 mm, +39%) and the BIOMSS (+20%) were significantly increased. CALF was same as the 5YA and VCIx was 0.89. According to the NDVI development graph, crop conditions were slightly below the 5YA. Overall, the winter crop production was slightly below average.

In the region of **North Central Coast**, the RADPAR was same as the 15YA, and the TEMP was 19.0°C with a decrease by 0.4°C. RAIN (471 mm, +34%) showed a significant increase, and BIOMSS increased (+12%). CALF was same as the 5YA, and VCIx was 0.96. The crop condition development graph shows that NDVI fluctuated greatly. Crop condition in this region were expected to be near average.

In the **North East region**, RAIN (393 mm, +18%) increased, while RADPAR (697 MJ/m², -2%) decreased. The BIOMSS increased by 7%. CALF was 99% and VCIx was 0.94. According to the NDVI development graph, crop conditions fluctuated widely, and in March showed a high value exceeding the five-year-maximum. The crop conditions were expected to be above average.

In the **North West region**, RAIN (314 mm, +24%) showed a markable increase, and the TEMP (17.3°C) was same as the 15YA. RADPAR decreased by 2%. The BIOMSS significantly increased (+12%). CALF was 100% and VCIx was 0.97. According to the NDVI development graph, except in early January and

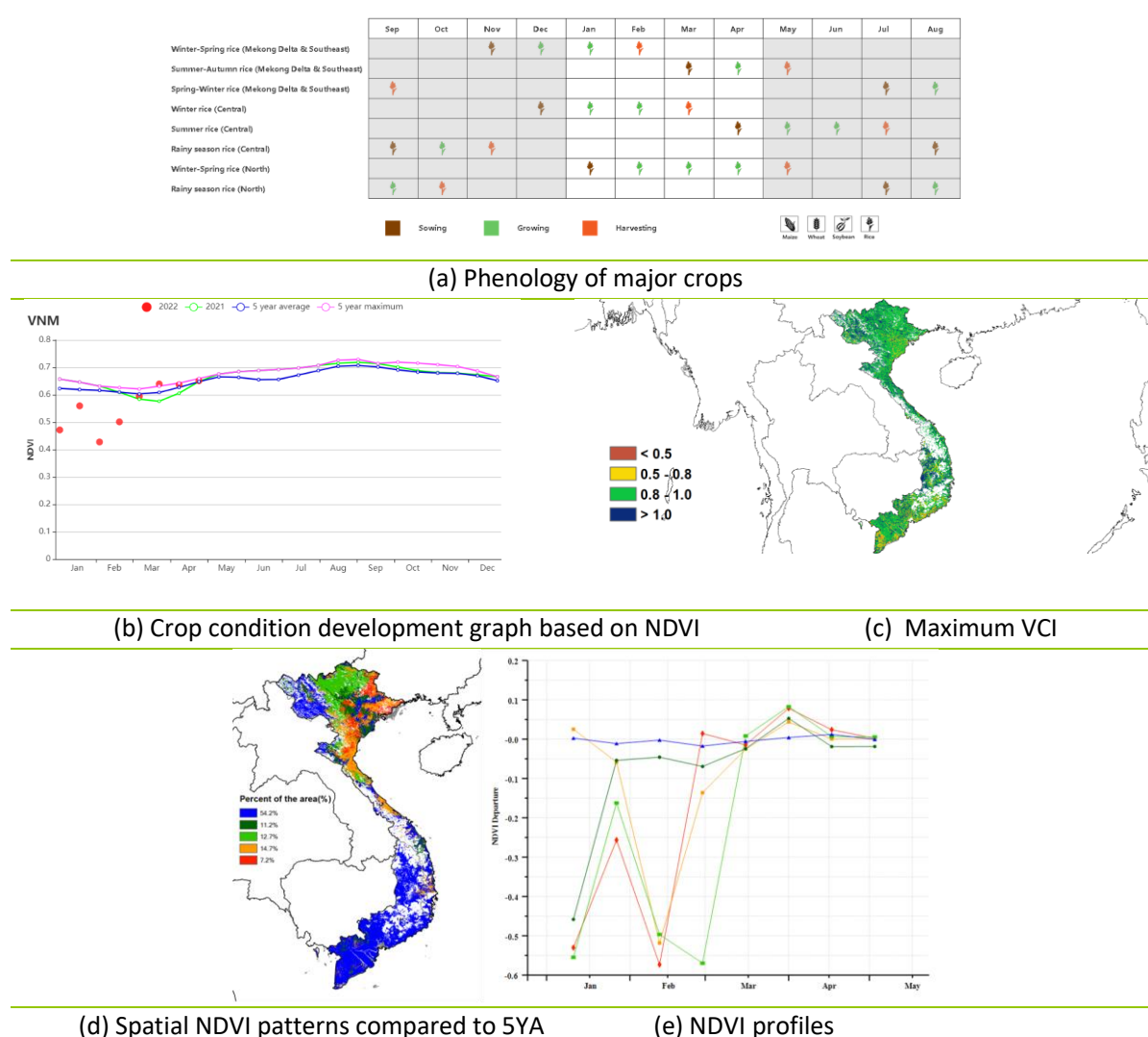
February, NDVI values were near the 5YA and peaked in late March. Crop conditions in this region were expected to be above average.

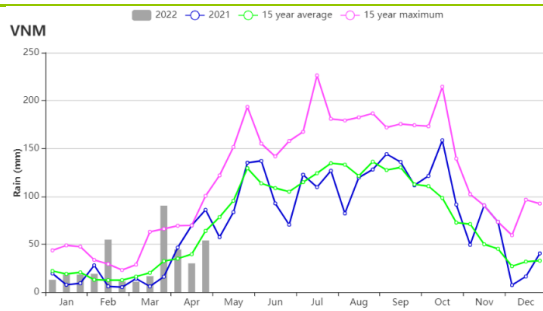
In the region of **Red River Delta**, RAIN (350 mm, +13%) and BIOMSS (803 gDM/m², +4%) increased significantly. TEMP (18.7°C, -0.6°C) was below average. CALF was 95% and VCIx was 0.87. According to the crop condition development graph, the NDVI was below the 15YA, except at the end of March, NDVI exceeded the five-year-maximum. Based on the agroclimatic indicators, the crop conditions in this region were above the average.

In the **South Central Coast**, with the increased of RAIN (486 mm, +16%), TEMP (20.7°C, +0.2°C) and RADPAR (1070 MJ/m², +4%), BIOMSS (969 gDM/m², 10%) significantly increased. CALF was 98% and VCIx was 0.95. According to the crop condition development graph, the NDVI fluctuated widely until in March. Thus, crop conditions in this region were close to the average.

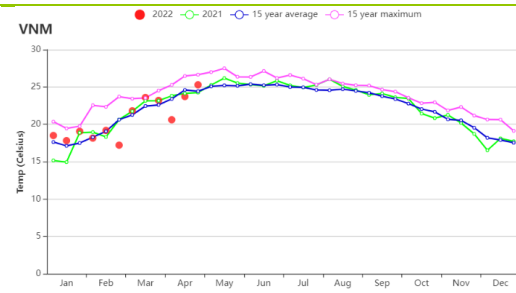
In the **South East region**, RADPAR (1189 MJ/m²) was same as the 15YA, TEMP (26.2°C, +0.2%) and RAIN (270 mm, +83%) were both above the 15YA, BIOMSS (828 gDM/m², +8%) increased. CALF was 94% and VCIx was 0.88. According to the crop condition development graph, the NDVI values were near the 5YA. According to the agroclimatic indicators, crop conditions in this region were about average.

Figure 3. 45 Vietnam's crop conditions, January – April 2022

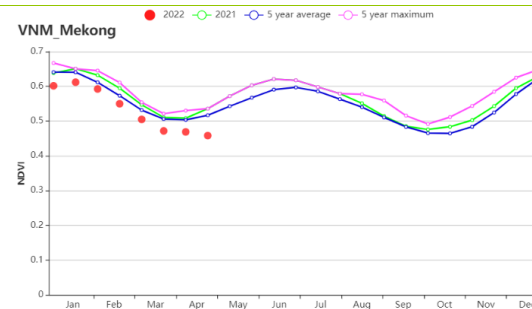
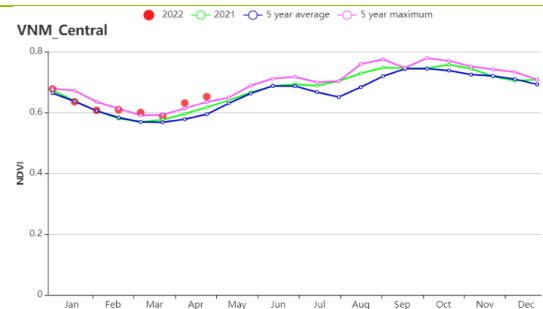




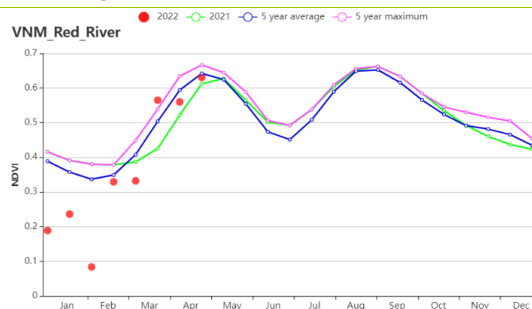
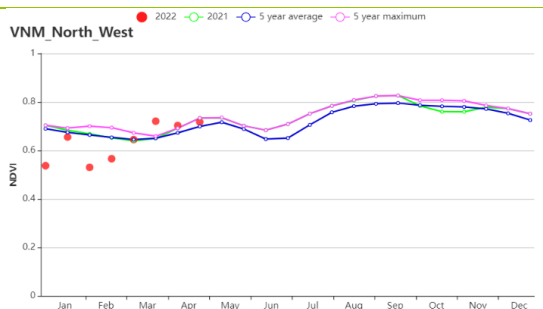
(f) Rainfall profiles



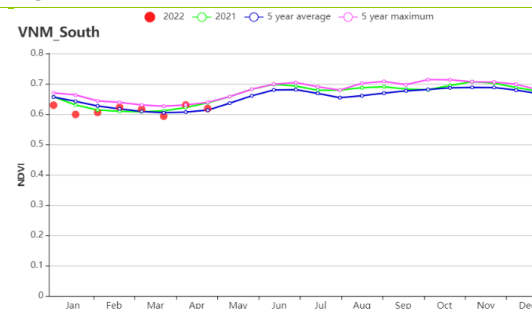
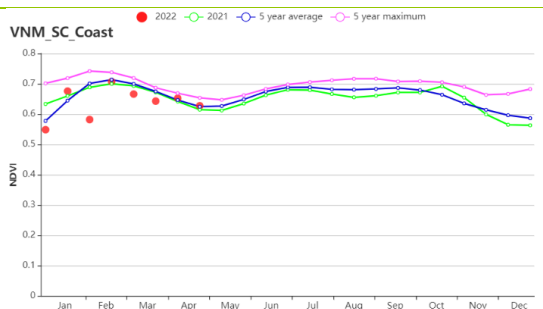
(g) Temperature profiles



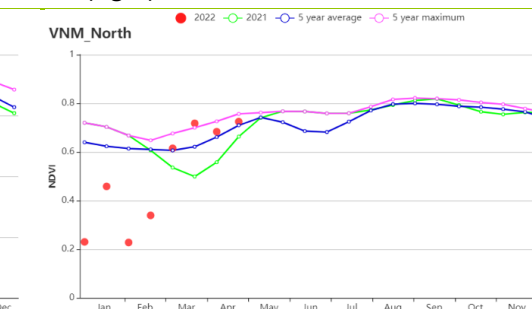
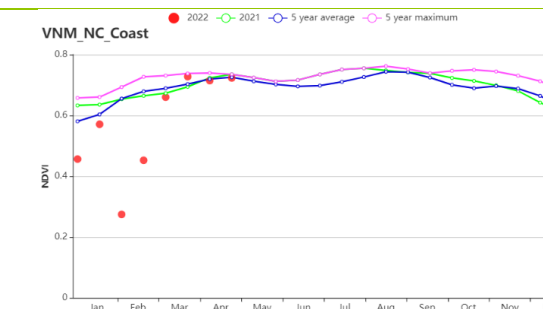
(h) Crop condition development graph based on NDVI Central Highlands Vietnam (left), and Mekong River Delta (right)



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



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



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

Table 3. 83 Vietnam's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January – April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	当前值 (MJ/m ²)	Current (mm)	Departure (%)	Current (°C)
Central Highlands	309	20	21.9	-0.2	1142	1	818	12
Mekong River Delta	432	39	27.5	0.1	1235	3	1065	20
North Central Coast	471	34	19.0	-0.4	888	-0	917	12
North East	393	18	16.7	-0.0	697	-2	806	7
North West	314	24	17.3	0.0	943	-2	763	12
Red River Delta	350	13	18.7	-0.6	656	2	803	4
South Central Coast	486	16	20.7	0.2	1070	4	969	10
South East	270	8	26.2	0.2	1189	-0	828	8

Table 3. 84 Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January – April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Central Highlands	99	1	0.96
Mekong River Delta	86	-0	0.89
North Central Coast	99	0	0.96
North East	99	0	0.94
North West	100	0	0.97
Red River Delta	95	2	0.87
South Central Coast	98	1	0.95
South East	94	1	0.88

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

[ZAF] South Africa

In South Africa, soybean and maize are the main crops being produced during this monitoring period. In the west, maize planting finished in January and harvest will start in June. In the east, maize harvest started in April. Soybean was grown from January to March and harvest began in April.

The proportion of irrigated cropland in South Africa is 9% and agro-meteorological conditions play an important role in the growth of most crops. Based on the NDVI development graph, the crop conditions were above the 5-year average during the entire monitoring period. At the national level, the CropWatch agroclimatic indicators show that radiation was above the 15-year average (RADPAR +2%). With a lower rainfall (RAIN -40%) and average temperature (TEMP +0.1 °C), the potential biomass decreased by 16% compared to the 15-year average mainly due to the below average rainfall. The maximum vegetation condition index (VCIx) was 0.92, and the cropped arable land fraction (CALF) increased by 4% compared with the last 5 years. According to the VCIx, conditions in the Mediterranean zone, where wheat is an important crop, were better than in the western region (Gauteng, Mpumalanga). As to the spatial distribution of NDVI profiles, crop conditions on about 15.7% of the cropland were below average mainly in the central and southern parts, and on about 57.6% above average mainly in the northern regions during the whole monitoring period, respectively. Crop conditions on 19.2% were above average until March, then below average, and 7.4% was below average until February and then above average. The areas with negative departures were mainly in the center of the western region, most located in Gauteng, Mpumalanga, North West and Orange free state province. Overall, crop conditions were favorable.

Regional analysis

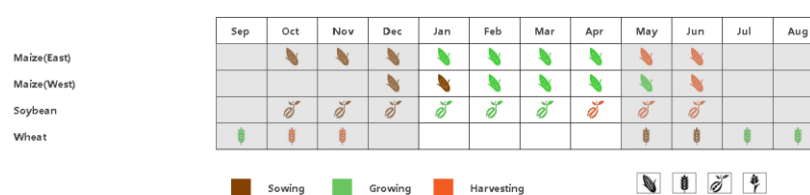
Rainfall in the Arid and desert zones was significantly below average (88mm, -22%) and the temperature was near average (20.6 °C, -0.1 °C), whereas radiation was slightly above average (+2%), and potential biomass decreased by 5% due to the insufficient rainfall. Cropped arable land fraction (CALF) increased significantly (+21%) and VCIx was 0.99. The crop condition development graph based on NDVI indicates that the crop conditions were generally above the 5-year average and even above the 5-year maximum after March. Crop production is expected to be favorable.

In the Humid Cape Fold mountains, the temperature was near average (+0.4 °C), and rainfall was below average (-25%). With lower rainfall, potential biomass was below the 15-year average (-8%). CALF was 97% and VCIx was 0.93. The crop condition development graph based on NDVI also indicates normal crop conditions.

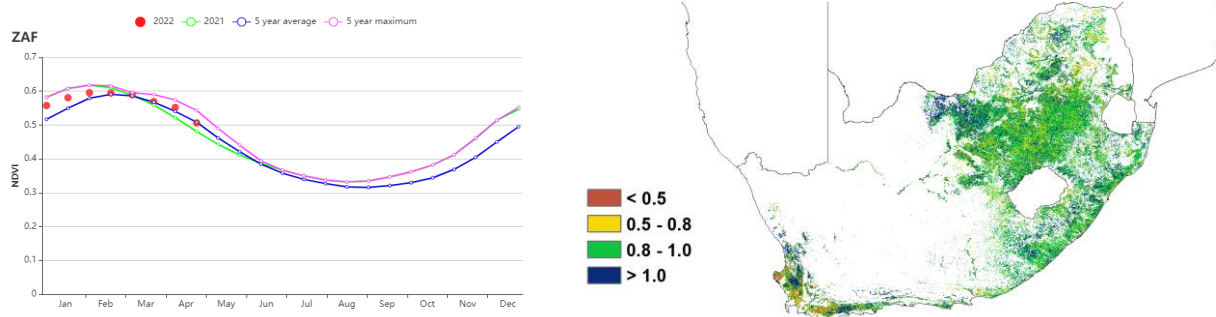
In the Mediterranean zone, the temperature was near average (19.5 °C, +0.2 °C), while rainfall witnessed a significant decrease (68 mm, -31%) and radiation was slightly above average (+1%). The estimated potential biomass decreased by 8% due to the insufficient rainfall. CALF increased substantially (29%, +44%) and VCIx was 0.94. According to the crop condition development graph, the NDVI was above the 5-year average for most of the period and even above 5-year maximum in January. Crop conditions were favorable.

In the Dry Highveld and Bushveld maize areas, rainfall (RAIN -44%) was below the 15-year average and temperature was near average (+0.1 °C). Radiation was near average (+2%). Potential biomass decreased by 20%. CALF was slightly above the 5YA (99%, +3%) and VCIx was 0.91. Notably, during this monitoring period, the area was in the rainy season. The rainfall was below average, but able to sustain the crop growth (RAIN 127mm). Therefore, maize was not under water stress and the crop condition development graph based on NDVI shows that the NDVI was above the 5-year average for most of the period. In all, the crop conditions were favorable.

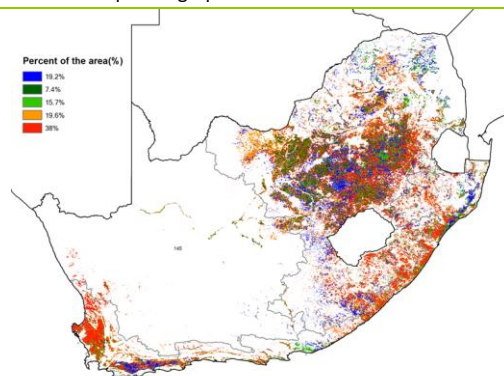
Figure 3.46 South Africa's crop condition, January - April 2022



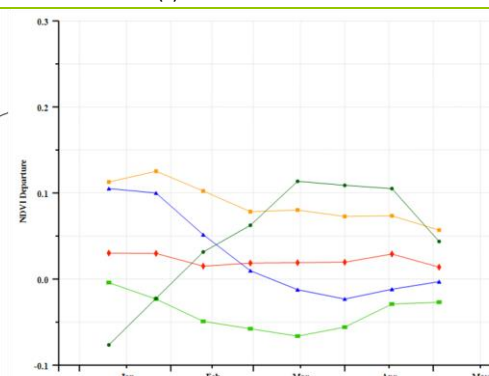
(a). Phenology of major crops



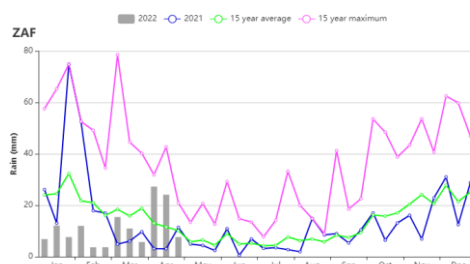
(b) Crop condition development graph based on NDVI



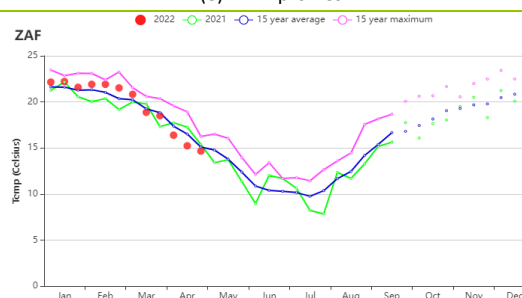
(c) Maximum VCI



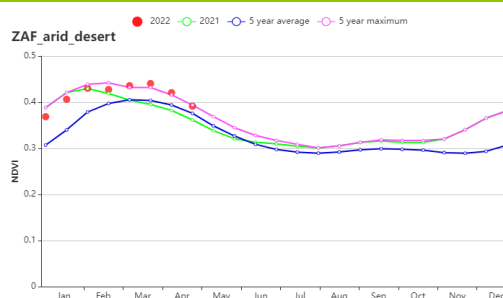
(d) Spatial NDVI patterns compared to 5YA



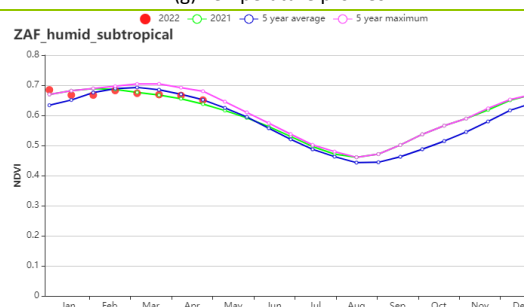
(e) NDVI profiles



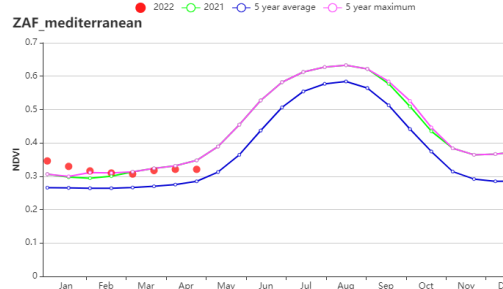
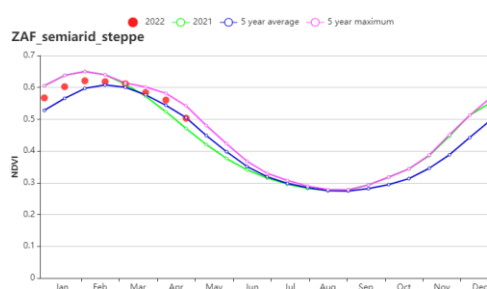
(f) Rainfall profiles



(g) Temperature profiles



(h) Crop condition development graph based on NDVI Arid desert (left) and Humid sub-tropical (right)



(i) Crop condition development graph based on NDVI semiarid steppe (left) and Mediterranean (right)

Table 3.85 South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Arid and desert zones	88	-22	20.6	-0.1	1350	2	564	-5
Humid Cape Fold mountains	252	-25	20.0	0.4	1168	3	797	-8
Mediterranean zone	68	-31	19.5	0.2	1323	1	512	-8
Dry Highveld and Bushveld maize areas	127	-44	19.6	0.1	1293	2	587	-20

Table 3.86 South Africa's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Arid and desert zones	67	21	0.99
Humid Cape Fold mountains	97	1	0.93
Mediterranean zone	29	44	0.94
Dry Highveld and Bushveld maize areas	99	3	0.91

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

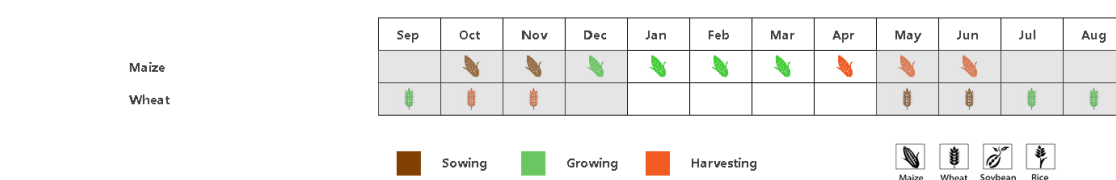
[ZMB] Zambia

This report covers the main growth period for rainfed crop production in Zambia. The major cereal crops in the field included maize, sorghum and millet. They were planted from mid-November to early January, depending on the agro-ecological region. The proportion of irrigated cropland in Zambia is only 4% and agro-meteorological conditions play a decisive role in the growth of almost all crops. In the eastern parts of the country, below-average monthly rainfall in November and December and above-average temperatures during the same period contributed to a lack of soil moisture and affected land preparation, planting and germination. The CropWatch agronomic indicators at the national scale showed a decrease in rainfall (919 mm, -6%) while the temperature was unchanged (20.9°C, +0%). Similarly, there was no significant changes in radiation (1166 MJ/m², 0%), biomass production (1242 gDM/m², 0%) and CALF (100%). The NDVI profile indicated below 5-year average conditions from January to March, which could be attributed to the late planting of the crops. However, the crops had mostly recovered by the time of the peak of the growing season. Overall, the VCIx was 0.94 varying from 0.80 to 1.00, with some instances in the southern and eastern parts of the country, which experienced values below 0.8.

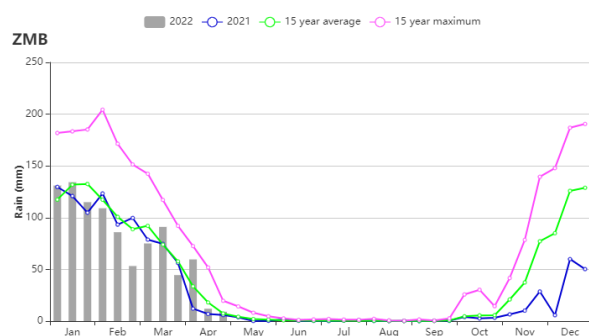
Regional Analysis

The regional analysis showed a reduction in rainfall in the Western Semi-arid plain (-25%), Luangwa-Zambezi valley (-16%), and Central Eastern and Southern plateau (-5%), while the Northern high rainfall region experienced an increase in rainfall (1152 mm, +2%). A reduction in solar radiation (-4%) was observed in Western semi-arid plain, and when combined with reduced rainfall, there was a decline in potential biomass production (-5%). The Luangwa-Zambezi rift valley also experienced a decrease in biomass production. Poor plant establishment early in the year due to lack of moisture heavily affected biomass production in most of the three critically affected regions. The VCIx varied from 0.92 to 0.94 across the regions, with the lowest recorded in the Western semi-arid plain (0.92) and Luangwa-Zambezi rift valley (0.93). However, the area under cultivation remained at 100% in all the regions. The reported period is critical for the development of cereal crops, and moisture stress can cause large crop yield reduction nationwide.

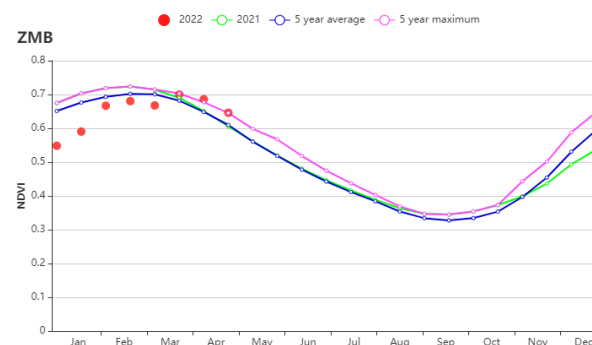
Figure 3. 47 Zambia's crop condition, January - April 2022



(a). Phenology of major crops



(b) Time series rainfall profile



(c) Crop condition development graph based on NDVI

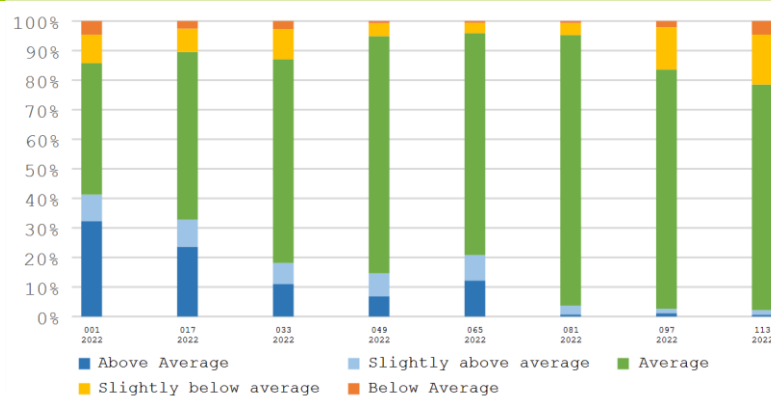
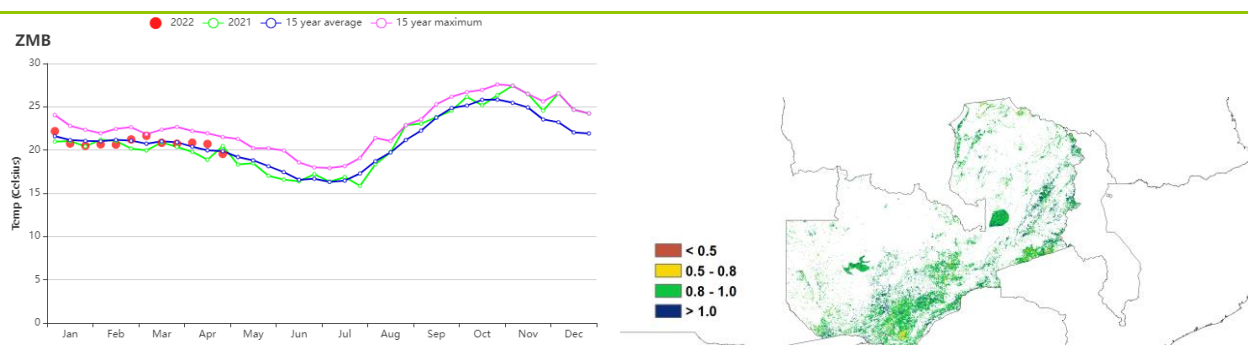


Table 3.87 Zambia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January - April 2022

Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m ²)	Departure (%)	Current (gDM/m ²)	Departure (%)
Luangwa-Zambezi rift valley	691	-16	22.0	+0.1	1248	+1	1136	-3
Western Semi-arid plain	569	-25	22.5	0.0	1175	-4	1142	-5
Central-Eastern, Southern Plateau	908	-5	20.9	0.0	1186	+2	1288	+3
Northern High rainfall	1152	+2	19.7	0.0	1102	0	1314	+1

Table 3.88 Zambia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January - April 2022

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Luangwa-Zambezi rift valley	100		0.93
Western Semi-arid plain	100		0.92
Central-Eastern, Southern Plateau	100		0.95

Region	Cropped arable land fraction		Maximum VCI
	Current (%)	Departure (%)	Current
Northern High rainfall	100		0.94