Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMSS— as those used in Chapter 1, and combines them with the agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), and minimum vegetation health index (VHIn)— to describe crop condition in six Major Production Zones (MPZ) across all continents. For more information about these zones and methodologies used, see the quick reference guide in Annex B as well as the CropWatch bulletin online resources at http://www.cropwatch.com.cn/htm/en/bullAction!showBulletin.action#.

2.1 Overview

Tables 2.1 and 2.2 present an overview of the agroclimatic (Table 2.1) and agronomic (Table 2.2) indicators for each of the six MPZs, comparing the indicators to their fifteen-year and five-year averages, respectively. The text mostly refers simply to "average" with the averaging period implied.

Table 2.1 Agroclimatic indicators by Major Production Zone, current value and departure from 15YA (April to July 2020)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m²)	Departure (%)	Current (gDM/m²)	Departure (%)
West Africa	485	-19	27.8	0.5	1205	1	767	3
North America	428	8	18.5	-0.7	1318	-2	645	-3
South America	280	-14	17	-1.2	810	-2	325	-6
S. and SE Asia	924	-1	28.3	-0.2	1252	1	746	7
Western Europe	322	-7	14.5	-0.1	1251	1	496	0
C. Europe and W. Russia	375	18	13.8	-0.9	1165	-2	473	-6

*Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the fifteen-year average (15YA) for the same period (April - July) for 2005-2019.*

Table 2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (April to July 2020)

	CALF (Cropped arable land fraction)		Maximum VCI
	Current (%)	5A Departure (%)	Current
West Africa	89	-2	0.89
North America	95	0	0.90
South America	97	-1	0.86

S. and SE Asia	83	8	1.02
Western Europe	98	2	0.92
Central Europe and W Russia	98	0	0.92

Note: See note for Table 2.1, with reference value R defined as the five-year average (5YA) for the same period (April - July) for 2015-2019.

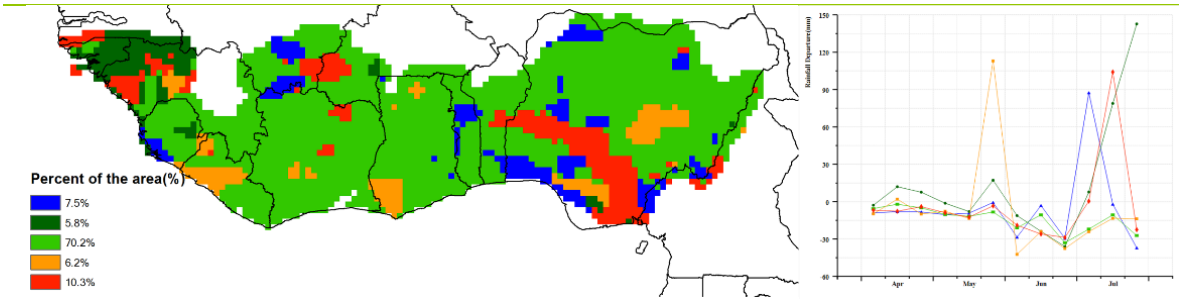
2.2 West Africa

This reporting period covers the main rainy season, during which predominant cereal crops are grown, such as maize, sorghum, millet and rice. Tuber crops, cassava and yams, are equally important crops in the coastal areas which are also mapped as part of the cropped land. Planting of the major crops took place as soon as the rains started in May and June. Seasonal migration of domestic livestock from the south to the north also started with the onset of the rains.

The average temperature for the region was 27.8 degrees (+0.5°C). The MPZ received 485 mm rainfall. This is 19% below the 15YA. For the major portion (70%) of this MPZ, rain was near average. Equatorial Guinea (1546 mm, +18% Dep.), Sierra Leone (1012 mm, -9% Dep.), Gabon (849 mm, +12% Dep.) and Liberia (804 mm, -14% Dep.) experienced near-average rainfall. Reduced rainfall was observed in Côte d'Ivoire (-36%), Burkina Faso (-32%), Togo (-29%), Ghana (-28%) and Nigeria (-24%) indicating potential water stress as reflected in the VHI map of the region with moderate to severe drought in central to northern parts of the MPZ. Regionwide the average solar radiation was 1205 MJ/m2 with a slight increase (+1%, 15YA Dep.) resulting in a slight increase in biomass production potential (BIOMSS = 767 gDM/m2, +3% 15Yr Dep.). The VCIx map shows that the areas with the highest values (>0.8) were located in the in the coastal and central regions, whereas lower values were observed in the northern parts of the MPZ, which were also drier. The cropped arable land fraction (CALF) was at 89% with a slight decrease (-1% 5YA Dep.) The lowest CALF values were observed in Nigeria (77%, -4% Dep.), Gambia (64%, -6% Dep.) and Burkina Faso (62%, -8% Dep.). This can be attributed to the conflict in northern Nigeria and dry environments in Gambia and Burkina Faso. The rest of the region had CALF values of more 95%.

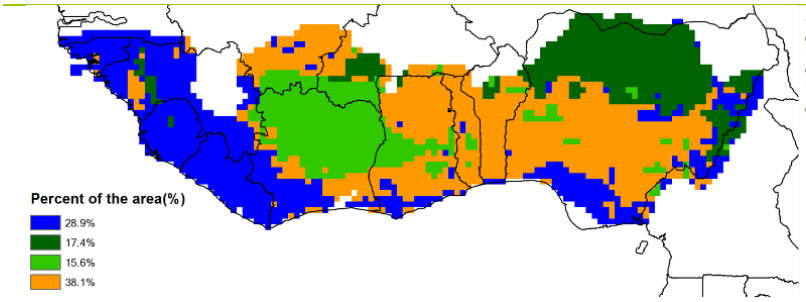
Generally, both climatic and agronomic indicators show good potential for agriculture production during this rainy season. There were some pockets of moderate to severe drought in this region as well. Some areas showed favorable BIOMSS departures. However, the final outcome for this season will depend on the distribution of the rains during the remainder of the rainy season.

Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, April to July 2020

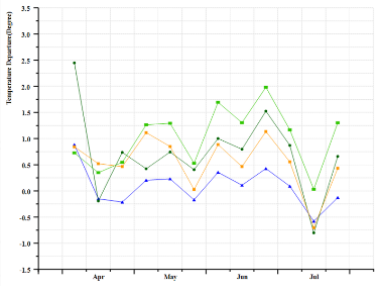


a. Spatial distribution of rainfall profiles

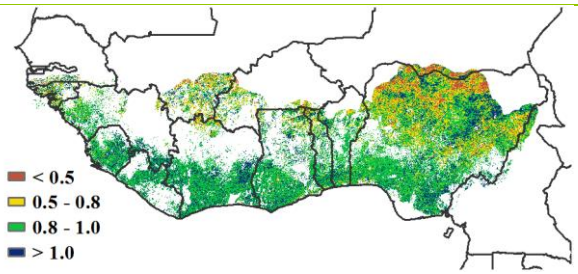
b. Profiles of rainfall departure from average (mm)



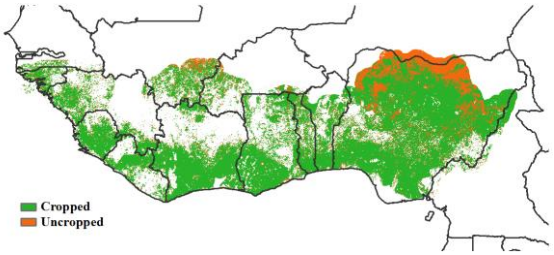
c. Spatial distribution of temperature profiles



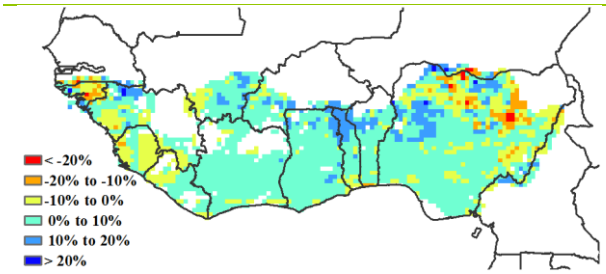
d. Profiles of temperature departure from average (mm)



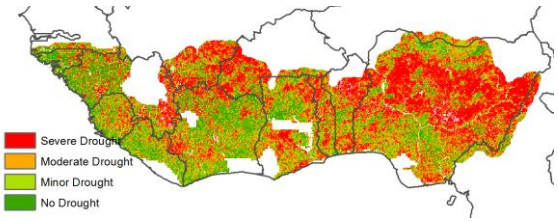
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.3 North America

During the current monitoring period from April to July 2020, winter wheat reached maturity. Maize planting started in April, followed by soybean in May. Maize reached the silking period in late July and in soybean, seed filling started at around that time, whereas spring wheat was in its late grain filling phase. In general, the crop conditions in North America are favorable.

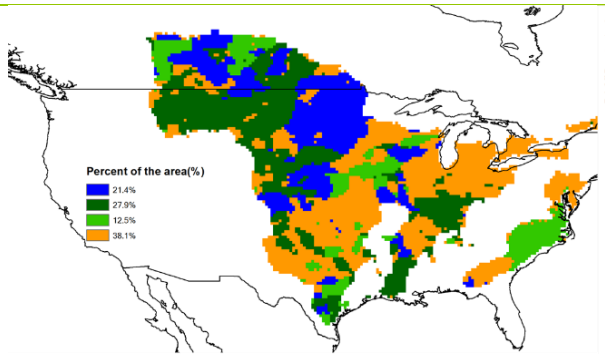
Compared with the 15YA, the weather conditions in the North American production area during the monitoring period were slightly wetter and cooler. Rainfall was 8% higher, temperature was 0.7°C lower and photosynthetically active radiation was 2% lower than the 15YA. As a result, estimated potential biomass was 3% lower than the 5YA. All parts of North America experienced a cooler than normal period in mid-April, but the temperatures subsequently rose quickly to 1.5-3.5°C above average by the end of April. Starting in May, the temperatures closely followed the 15-year trajectory, exceeding it in July. The pattern for precipitation was different: During the period from May to June, the precipitation in the Prairies and the Northern Plains was significantly higher than average, while the precipitation in other regions was close to average.

The potential biomass in the north and west of the Corn Belt and the north and south of the Great Plains is estimated to be above average, which may be attributed to slightly above-average precipitation and close-to-average temperature and RADPAR. On the contrary, the potential biomass in the Prairies was significantly lower than average, which may have been caused by cooler temperatures and lower RADPAR.

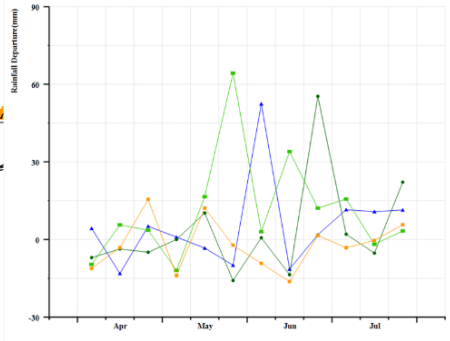
The maximum VCI index as high as 0.9 indicates favorable crop conditions in the monitoring area. During the period from May to June, thanks to abundant rainfall, crop conditions in most parts of the Prairies and in the west of the Corn Belt were excellent. Areas with poor crop conditions were mainly distributed in the western part of the southern plain, which may be related to the relatively dry conditions. On the contrary, very wet conditions may have prevented some planting in North and South Dakota. During the monitoring period, the proportion of cultivated land reached 95%, which was the same as the 5YA.

In short, the crop conditions in this MPZ area are favorable. In the next monitoring period, all spring and summer crops will reach maturity and harvest of soybean and maize will start in September.

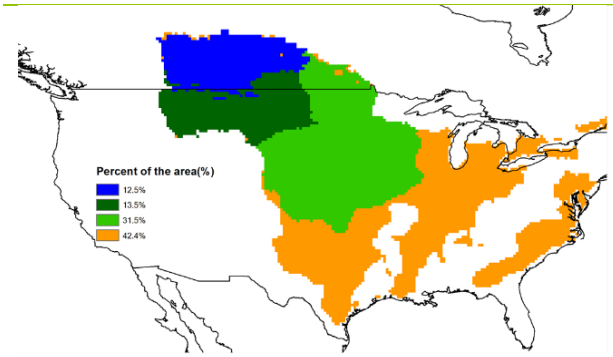
Figure 2.2 North America MPZ: Agroclimatic and agronomic indicators, April to July 2020



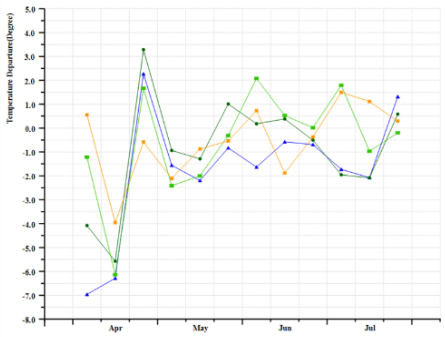
a. Spatial distribution of rainfall profiles



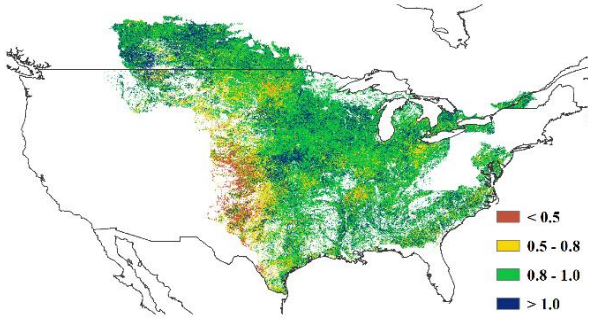
b. Profiles of rainfall departure from average (mm)



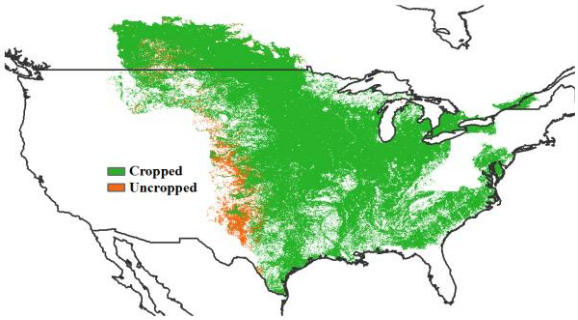
c. Spatial distribution of temperature profiles



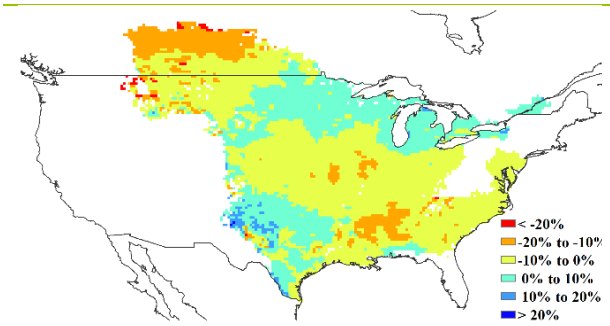
d. Profiles of temperature departure from average (mm)



e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure

Note: For more information about the indicators, see Annex B.

2.4 South America

This reporting period covers the harvest of late maize and soybean, followed by a fallow period or sowing of wheat. The CropWatch indices reveal average conditions for this region.

Spatial distribution of rainfall profiles showed a quite clear North-South pattern. Rainfall in the North was stable and near average. A pattern located in the center and south of Brazil, Paraguay and Uruguay showed negative anomalies during April and positive anomalies during May, June and July. On the contrary, in the South, including most of Argentina's agricultural area, a pattern with a positive anomaly during April, followed by a quite stable and near average values pattern was observed. In addition, the dynamics of VHI categories moved from near 20% of the area with moderate and severe drought conditions in April to less than 10% in July, suggesting a general improvement in conditions at the end of the period.

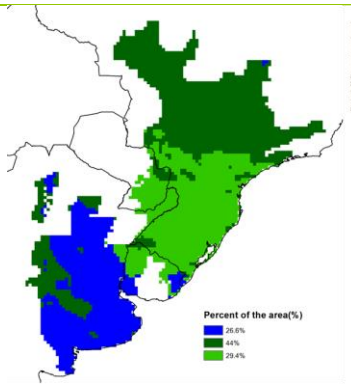
Temperature profiles were grouped along five areas distributed along a latitude gradient. Nevertheless, it is difficult to find clear differences among profiles. In general, they showed positive anomalies at the end of April and in the middle of June and July. In the South (red and blue areas), a positive anomaly was observed during May, while Northern regions showed a negative anomaly in this month.

BIOMSS showed a radial pattern with higher-than-average conditions in the center of the region (Chaco, North Pampas and Paraguay) and lower-than-average conditions in the extreme North, South and East. A high portion of the region was planted according to the CALF index, with the exception of sites in the Center and South West Pampas.

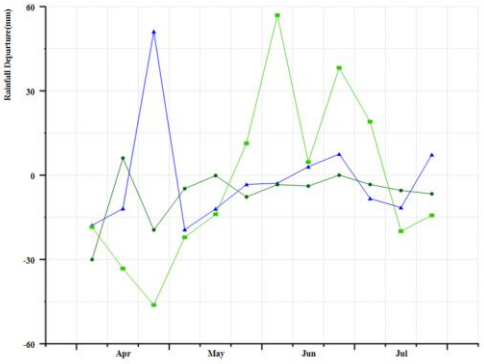
Maximum VCI showed a mixed pattern along the region and particularly in the Pampas, showing high variability in crop growing conditions with average VCIx at 0.86. High VCIx values were observed in the North and Center of the Brazilian agricultural area, Subtropical Highlands and part of Argentina's Pampas. Lowest VCIx values were observed in the Center of the Pampas and East Chaco in Argentina and in Rio Grande do Sul in Brazil which coincided with the uncropped fields in Figure f.

In summary, several indices showed near-average conditions with some positive anomalies in rain and temperature at specific times. Drought conditions were eased starting mid-May thanks to the above or near average rainfall.

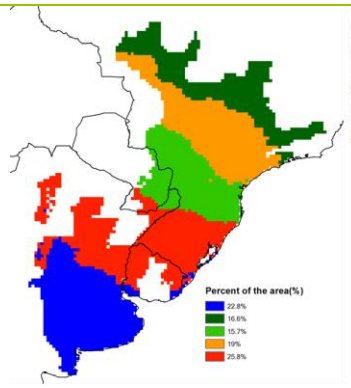
Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, April to July 2020



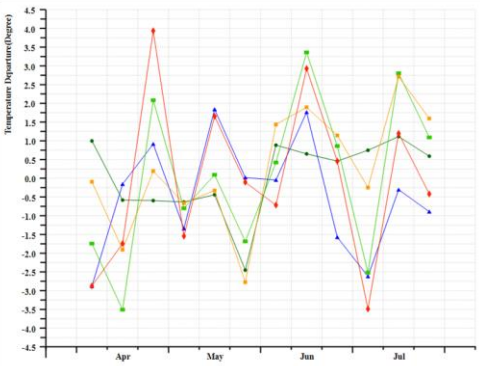
a. Spatial distribution of rainfall profiles



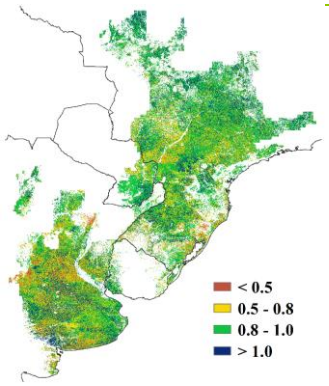
b. Profiles of rainfall departure from average (mm)



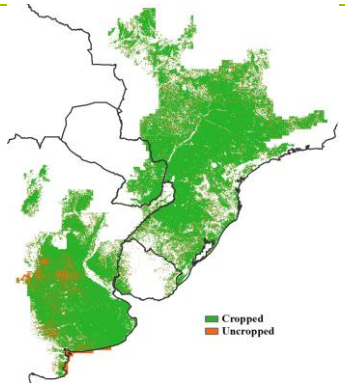
c. Spatial distribution of temperature profiles



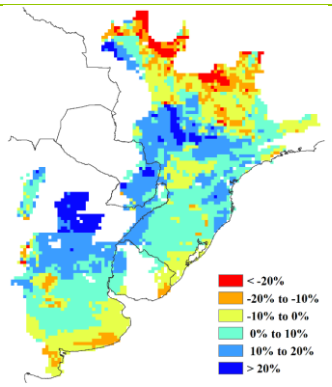
d. Profiles of temperature departure from average (mm)



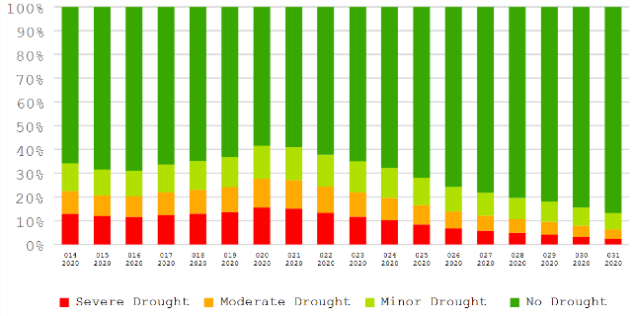
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. The proportions of different drought categories

Note: For more information about the indicators, see Annex B.

2.5 South and Southeast Asia

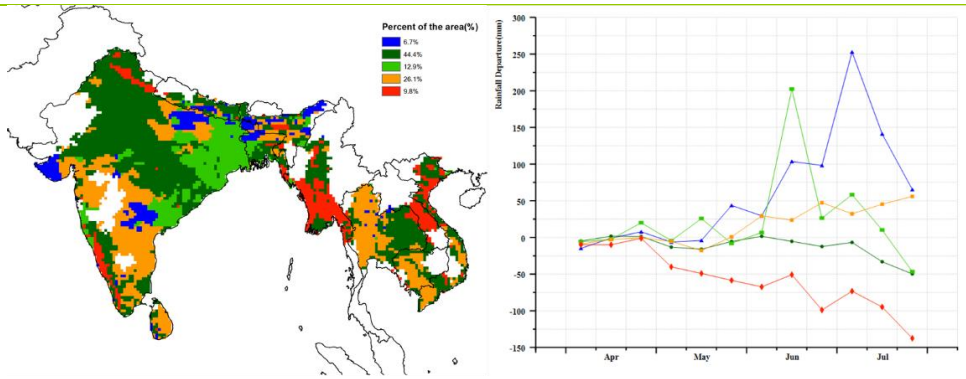
The South and Southeast Asia MPZ spans a large geographic area, including India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand, Laos and Vietnam. Rice is the main crop in most countries, and wheat, maize, soybean and other crops are also grown. During this monitoring period, this MPZ experienced close to average agroclimatic conditions (RAIN-1%, TEMP-0.2°C, RADPAR+1%), while BIOMSS was higher than the average by 7%, and CALF was increased by 8%. Meanwhile, the MPZ had a high value for VCIx (1.02). The growth conditions of crops in the main production areas vary greatly in space. Conditions were generally more favorable for most of India and less favorable in some Southeast Asian countries. This monitoring period covers the harvest of the winter crops, mainly wheat in India and Bangladesh, boro/dry season rice, as well as the planting of the main rice crop in the entire MPZ.

During the monitoring period, 70.5% of the region received close-to-average rainfall, including much of India, Thailand and western Cambodia. Heavy rainfall occurred in June and July in eastern India and a small part of southwest India. Southern Myanmar and southern Laos received below-average rainfall in June and July. This has led to drought conditions in southern Myanmar and Laos, as can be seen from the minimum vegetation health index map. Temperature in 22.4% of cultivated areas was close to average, mainly in eastern India and Bangladesh. Temperatures for most of the Indochina Peninsula countries were above average. Most parts of northern India had low temperatures and high fluctuations. CALF reached 83% in this MPZ, 8% above the average of this stage and VCIx was at 1.02. CALF and VCIx are high over India, Vietnam, Thailand, Bangladesh, and Sri Lanka. Uncropped areas mainly occur in a small part of south and central India and Myanmar, where they are associated with Low VCIx values below 0.8.

BIOMASS performance was better in most of northern India. Below-average BIOMSS mainly occurred in the western coast of India, Assam and Nepal. Severe drought in most south-east Asian countries can be seen from the VHI minimum map.

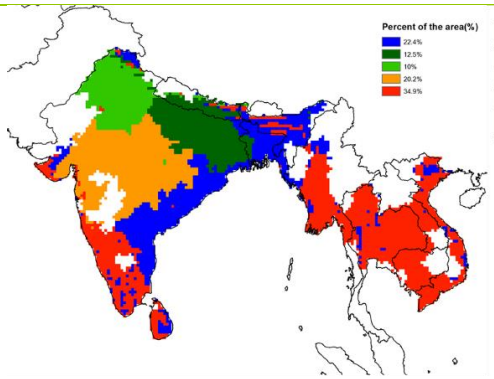
In summary, the crop condition of the MPZ is expected to be above average. However, due to the high temperature, record-low water levels of the Mekong River in the early part of this monitoring period and low rainfall in parts of Southeast Asian countries, crop growth needs further analysis in the future mouths.

Figure 2.4 South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, April to July 2020

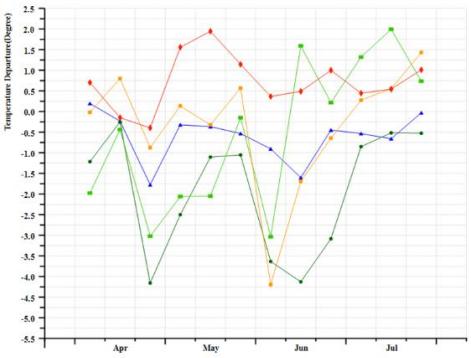


a. Spatial distribution of rainfall profiles

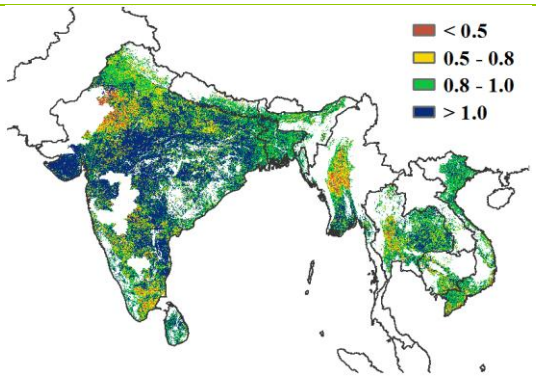
b. Profiles of rainfall departure from average (mm)



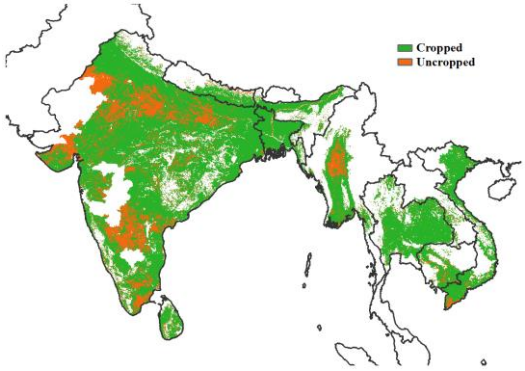
c. Spatial distribution of temperature profiles



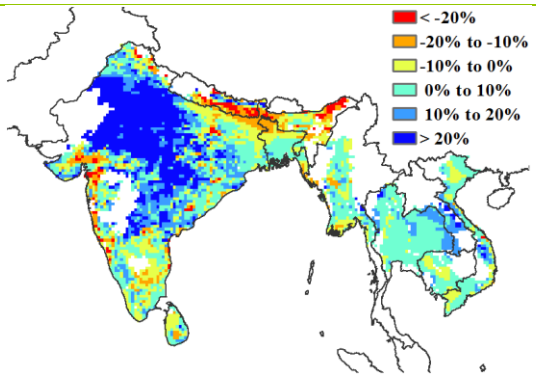
d. Profiles of temperature departure from average (mm)



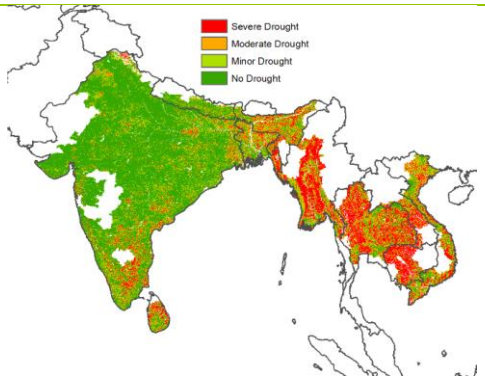
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.6 Western Europe

This monitoring period covers the vegetative growth of winter wheat and summer crops in the Western European Major Production Zone (MPZ). Overall, crop conditions were below average in most parts of the Western European MPZ based on the integration of agroclimatic and agronomic indicators (Figure 2.5).

The whole MPZ showed a drop in RAIN (7% below average), and significant spatio-temporal differences in precipitation between the countries were observed. They can be characterized as follows: (1) the precipitation in April in almost the entire MPZ was below average; (2) during the whole monitoring period, 42.1percent of MPZ areas experienced below-average precipitation with the exception of early June and early July. The affected regions include western Spain, Franche Comté region, Provence-Alpes-Côte d'Azur, the central part of the Rhone-Alpes region, and the

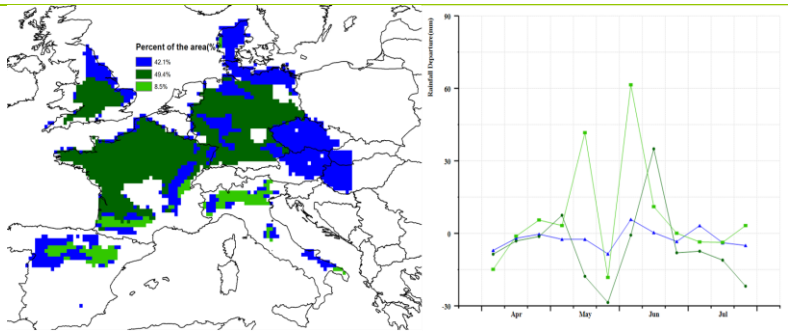
southern part of the Midi-Pyrénées region in France, Piedmont region and Umbria region, Puglia in Italy, the east coast and the north of England, Southeast of Bavaria, Hesse, North of Lower Saxony, Schleswig-Holstein and Mecklenburg-Western Pomerania in Germany, Denmark, Czech Republic, Slovakia, Austria and Hungary; (3) during the entire monitoring period, precipitation for 49.4% percent of the MPZ areas (Central and Western England, most of France and most of Germany) showed a bimodal trend of drastic changes around the average, and above-average rain was observed only in early May and mid-June, whereas precipitation was below average by about 29% in late May. In mid-June, 33% of the area was above average; (4) after early May, with the exception of late May and late June to mid-July, the precipitation in 8.5 percent of MPZ areas was above average, and the above-average rate reached about 38% in mid-May, and about 60% in early June, respectively. Countries with the most severe precipitation deficit included Germany (RAIN -22%), UK (RAIN -18%), Italy (RAIN -10%) and France (RAIN -10%), while only Spain experienced significant above-average precipitation (RAIN +40%). Due to the rainfall deficit, flowering and grain filling for the winter crops were negatively impacted. More rain will be needed in the coming weeks to raise soil moisture to favorable levels in order to ensure good yields for the summer crops.

Temperature (TEMP) for the MPZ as a whole was slightly below average (TEMP -0.1°C), and sunshine was well above average with RADPAR up by 1%. Temperature in Denmark, northern England, and northern Germany was significantly above average in mid-June and late June, and the temperature in most areas of France, Spain, Czech Republic, Slovakia, Austria, Hungary and UK was significantly above average in early and late May. High temperature shortened the grain filling stage of crops and accelerated the maturity, which may have reduced crop yields. TEMP in the MPZ was significantly below average in early June, early July and mid-July.

Despite of the rainfall deficit, the potential BIOMSS was near average due to sunnier conditions for the MPZ. The lowest BIOMSS values (-10% and below) occurred in parts of Spain, eastern and southeastern Germany, northern and central Italy. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) over northern and southwestern France, central and southern Spain, and southern UK. The average maximum VCI for the MPZ reached 0.92. More than 98% of arable lands were cropped, which is 2% above the recent five-year average. Most uncropped arable land is concentrated in eastern and southeastern Spain, with patchy distribution in other countries. The VHI minimum map shows that most of France, the eastern part of the UK and Germany were most affected by severe drought conditions.

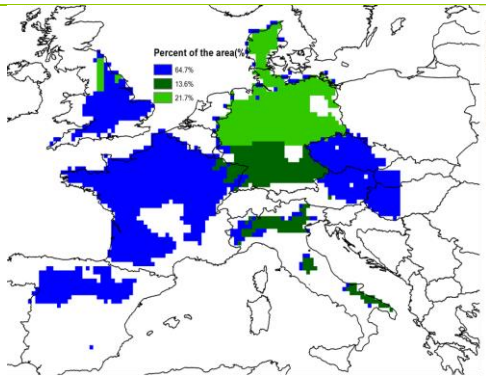
Generally, crop conditions in the Western Europe MPZ were below average due to rainfall deficits. More rain will be needed in several important crop production areas to ensure an adequate soil moisture supply for the growth of the summer crops.

Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, April to July 2020

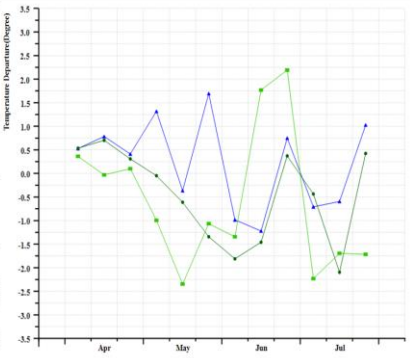


a. Spatial distribution of rainfall profiles

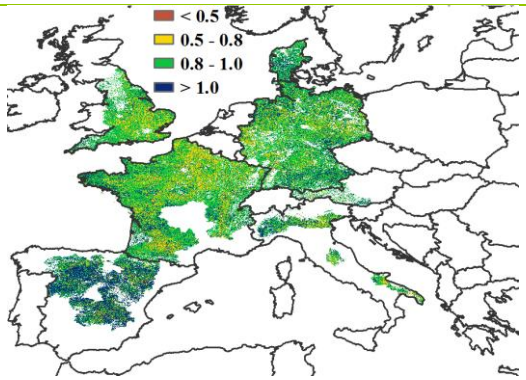
b. Profiles of rainfall departure from average (mm)



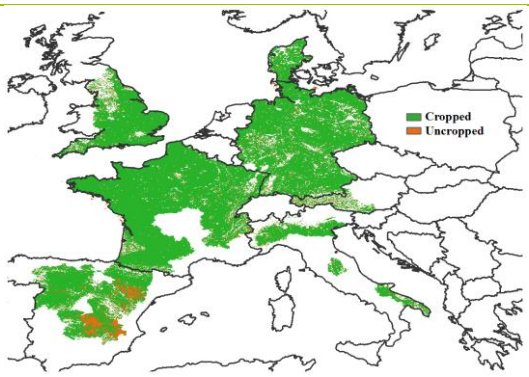
c. Spatial distribution of temperature profiles



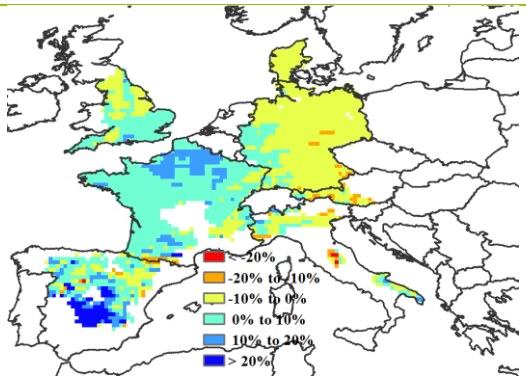
d. Profiles of temperature departure from average (mm)



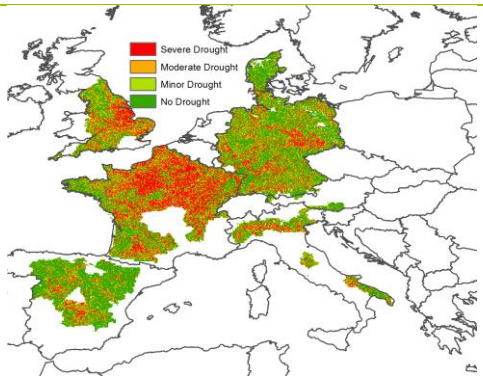
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.7 Central Europe to Western Russia

In this monitoring period, the growth condition of summer crops of the MPZ was below the average, with a 6% decrease in BIOMASS. As a whole, rainfall significantly increased 18%, while temperature and RADPAR decreased 0.9° C and 2% respectively, compared with the average of the past 15 years.

Based on rainfall departure map, the rainfall changed significantly in the MPZ, with the highest rainfall in mid-June (+90 mm).The specific spatial and temporal distribution characteristics are as follows: (1) From April to May, the precipitation was below average in eastern Romania, northern Moldova, southern Ukraine and Russia (9.9% of the MPZ). However, these regions increased significantly in mid-June. (2) From late-May to early-June, the precipitation in southern Russia and southwestern Ukraine (24.5% of the MPZ) was higher than average from late May to early June.

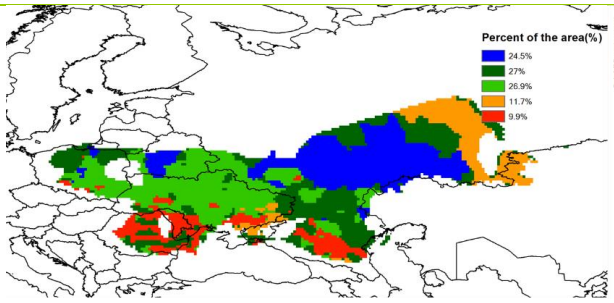
(3) In late June, the precipitation in most central Europe and western Russia (51.4% of the MPZ) sharply decreased and was lower than average.

According to its departure map, the temperature in the MPZ fluctuated dramatically. The lowest temperature (-6.1°C) in late-June affected the most eastern part of the MPZ, accounting for 30.9% of the total area, while the highest temperature occurred in mid-July (+3.9°C), mainly in western Russia. Meanwhile, in mid-June, the temperature rose(+2.4°C) in southern Belarus, eastern Poland and most of Ukraine (36.6% of the MPZ).

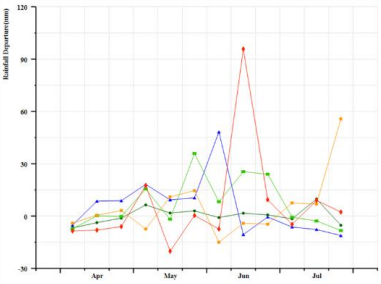
The CropWatch indicators show that except for southeastern Russia, almost all the arable land was cultivated in the MPZ, its CALF at 98%. However, BIOMASS decreased 6% compared with the average of the past 15 years, which might be attributable to the impact of lowest temperature in mid-May and late June. Based on the spatial distribution map of BIOMASS departure, the lowest BIOMSS (-10% and below) occurred in western Russia, Northern Ukraine, northern Romania, Belarus, Poland, Czech Republic, Slovakia, Hungary, Moldova. In contrast, the highest BIOMSS (about +10%) was concentrated in southeast Russia, southern Ukraine and southern Romania. The average value of VCIx was 0.92, and values higher than 0.8 were observed in western MPZ.

In summary, the results of CropWatch agroclimatic and agronomic indicators during the monitoring period demonstrated that, though there was abundant precipitation in the MPZ, the decreased temperature and RADPAR cumulatively affected the crops in the critical growth period, resulting in the low BIOMASS. In conclusion, the growth condition of summer crops of the MPZ is below the average, and the crop yields are likely to be lower than average.

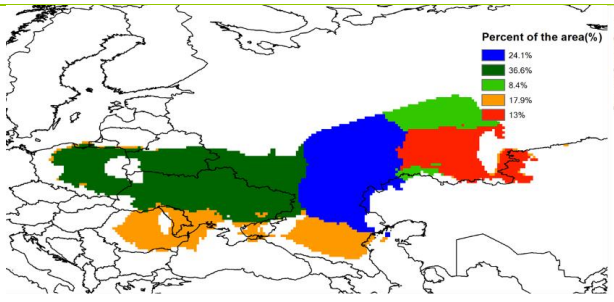
Figure 2.6 Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, April to July 2020



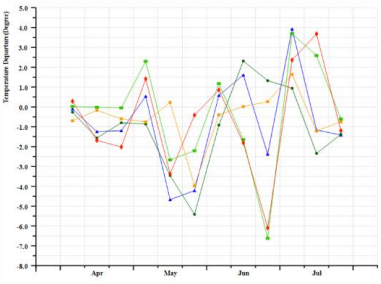
a. Spatial distribution of rainfall profiles



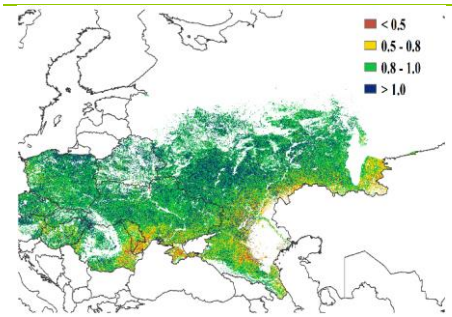
b. Profiles of rainfall departure from average (mm)



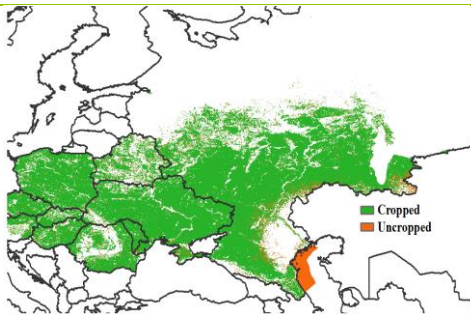
c. Spatial distribution of temperature profiles



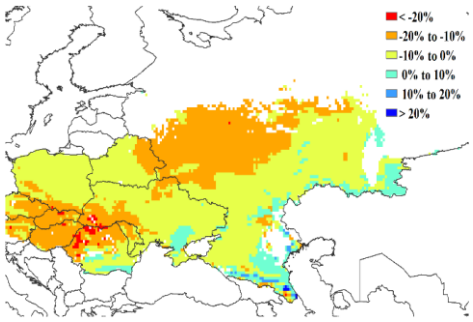
d. Profiles of temperature departure from average (mm)



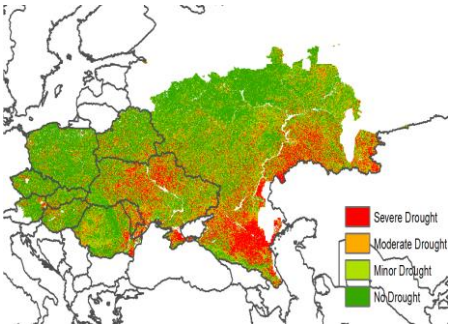
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.