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 C 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 and five-year averages, respectively. The text mostly refers simply to "average" with the averaging period implied.

Table2.1 Agroclimatic indicators by Major Production Zone, current value and departure from 15YA (January to April 2021)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
West Africa	93	-28	27.3	0.0	1308	-1	341	-20
North America	333	-3	4.6	-0.1	742	-3	504	2
South America	418	-52	22.9	0.3	1158	0	904	-23
S. and SE Asia	125	-11	23.7	0.2	1207	0	333	-19
Western Europe	296	-8	4.5	-0.3	606	4	509	-6
C. Europe and W. Russia	281	11	-1.2	-0.3	456	-7	353	-7

*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 (January-April) for 2006-2020.*

Table2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (January to April 2021)

	CALF (Cropped arable land fraction)		Maximum VCI
	Current (%)	5A Departure (%)	Current
West Africa	50	-7	0.85
North America	44	-3	0.76
South America	99	0	0.92
S. and SE Asia	80	8	0.87

Western Europe	94	-1	0.82
Central Europe and W Russia	55	-18	0.77

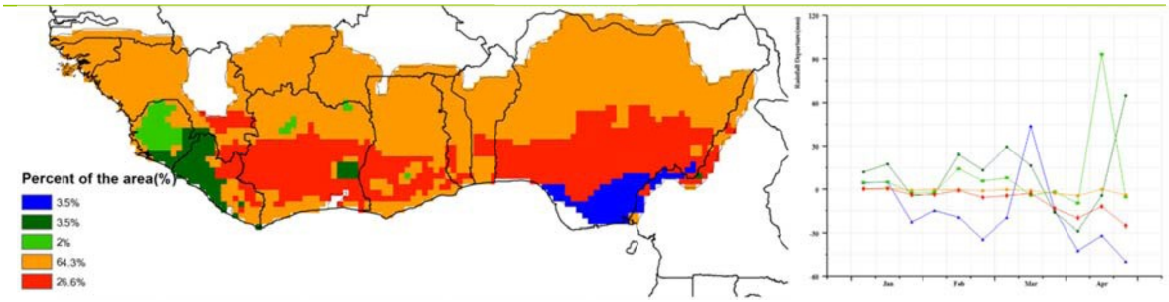
Note: See note for Table 2.1, with reference value R defined as the five-year average (5YA) for the same period (January-April) for 2016-2020.

2.2 West Africa

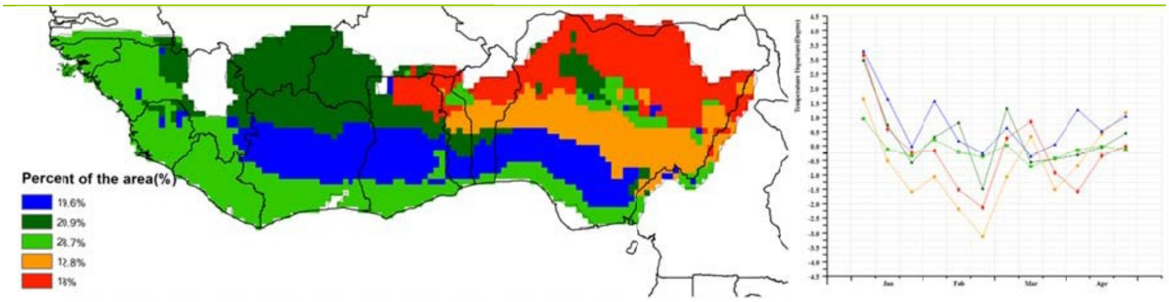
This report covers the end of the harvest of main season crops and of second season rice and maize crops. The period from January to April is the dry season in this region. Cropping activities were mainly limited to the coastal areas of the MPZ while the northern parts remain uncropped. The main farming activities in the coastal areas were mainly related to maize, yams and rice. In Nigeria, harvesting activities of millet, sorghum, rainfed rice and main season maize crops were finalized resulting in an estimated cereal production slightly above the 5-year average. In Nigeria, early and extended rainfall in March favored abundant quality pasture and water resources for livestock in the main grazing areas of the country.

Based on the climatic indicators, the MPZ as a whole received a below-average rainfall (93 mm, -28%) with the highest rainfall amounts received in Gabon (1066 mm, -3.3%), followed by Equatorial Guinea (1031 mm, -10.9%), Liberia (464 mm, +18.3%) and Sierra Leon (226 mm, +72%) while the rest of the region remained relatively dry with less than 200 mm of aggregated rainfall estimates. The rainfall pattern showed the severity of water stress throughout the region as reflected by the VHI map of the region. The regional average temperature was 27.3℃ (0° C) and regional radiation of 1308 MJ/m2 (-0.8%). CALF was below the 5YA (at 50%, -7.4%) with a VCIx of 0.8. The observed potential biomass production for the region was 341 gDM/m2 (-20%) predominantly attributed to the coastal areas. These conditions are normal for the dry season.

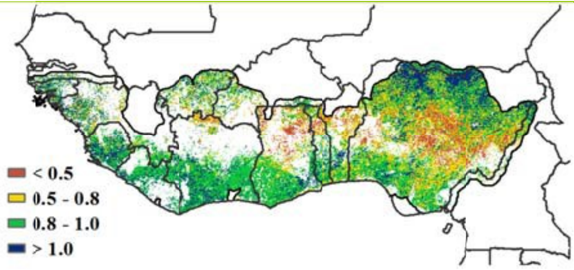
Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, January to April 2021.



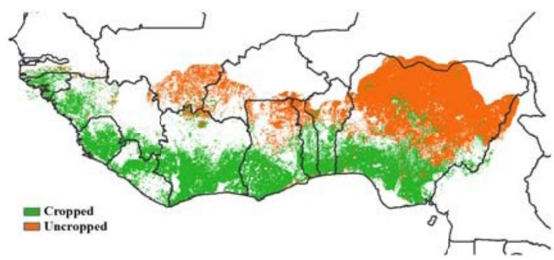
a. Spatial distribution of rainfall profiles b. Profiles of rainfall departure from average (mm)



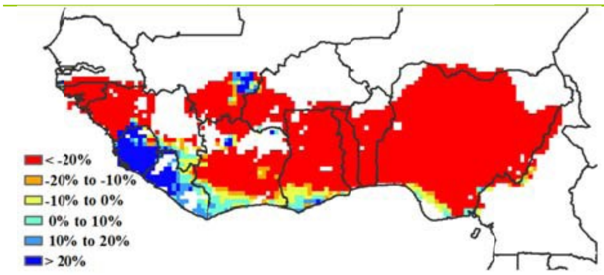
c. Spatial distribution of temperature profiles d. Profiles of temperature departure from average (mm)



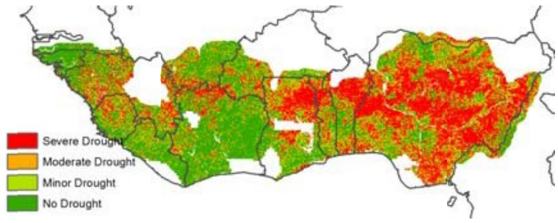
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

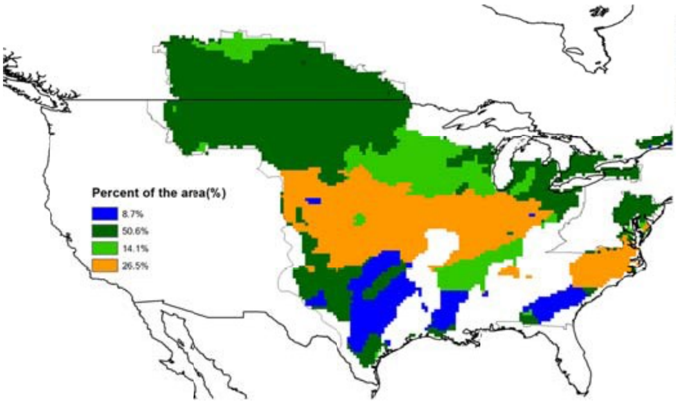
2.3 North America

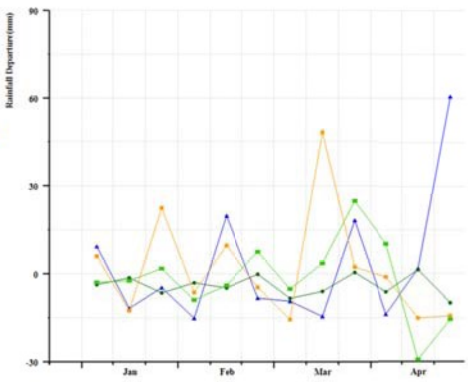
By the end of this monitoring period, winter wheat reached the jointing to heading stages. The sowing of spring crops (wheat, maize, soybeans and rice) started in late-March and will last till the end of May. In general, the crop conditions were around average.

For North America, agro-climatic conditions were average during this period with close-to-average precipitation (-3%), temperature (-0.1℃) and radiation (-3%). Temperatures fluctuated dramatically during the monitoring period. After warmer-than-usual weather in January, temperatures dropped 10℃ to 13℃ below average in mid-February, affecting the winter wheat production regions as far south as Texas. Subsequently, temperatures recovered to 2-6℃ above average in early March. It seems that the unusually cold temperatures did not cause much damage to wheat, but they slowed its growth and development. Precipitation was quite stable and evenly distributed. After receiving average to above-average precipitation until March, precipitation in the Corn Belt and Central Plains decreased to below average. Precipitation in the Southern Plains was overall heavier compared to the 15YA. It was 60 mm above average in late April, which was favorable for winter wheat growth. The VCIx value of 0.76 indicates average crop conditions. Regions with low VCIx values (<0.5) were mainly located in the western part of the main winter wheat production area, coinciding with drought conditions indicated by the Minimum VHI map. CALF was 3% lower than the average of the last 5 years.

Prospects for crop production are generally favorable in North America. Weather conditions in May are crucial for the establishment of the summer crops and the grain filling stage of winter wheat.

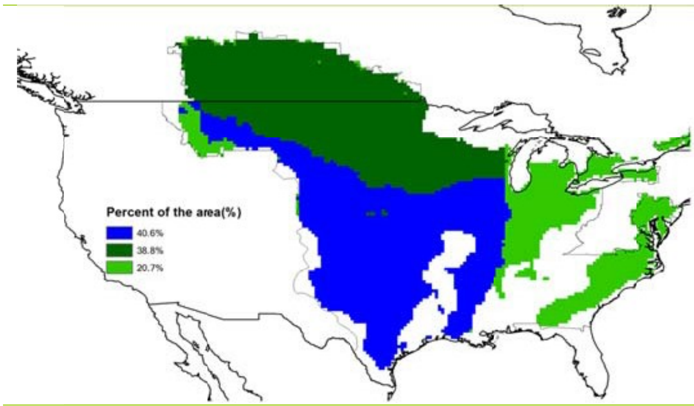
Figure 2.2 North America MPZ: Agroclimatic and agronomic indicators, January to April 2021

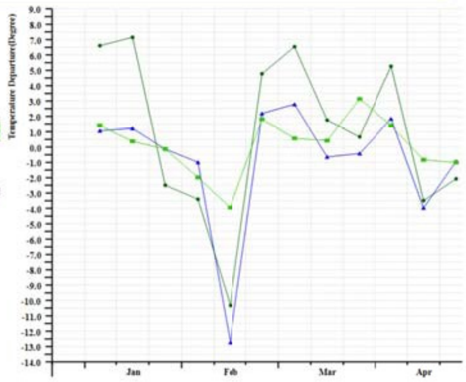




a. Spatial distribution of rainfall profiles

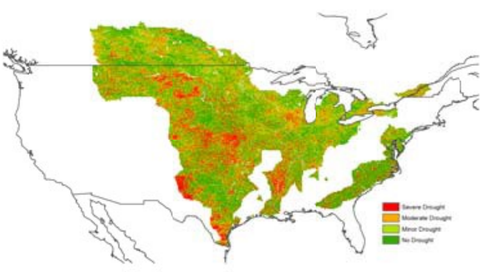
b. Profiles of rainfall departure from average (mm)

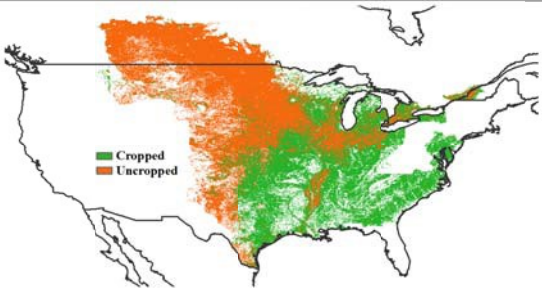




c. Spatial distribution of temperature profiles

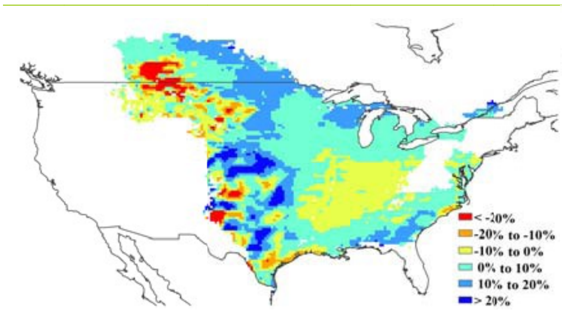
d. Profiles of temperature departure from average (°C)

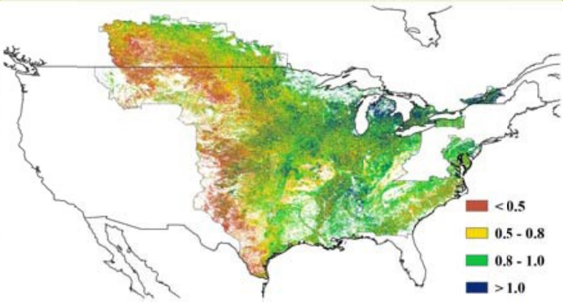




e. VHI Minimum

f. Cropped and uncropped arable land





g. Biomass accumulation potential departure

h. Maximum VCI

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

2.4 South America

This report covers the main growing period of summer crops, as well as the harvest of early planted summer crops. The overall situation for South America is poor to regular. Negative anomalies in RAIN and TEMP, as well as predominantly negative BIOMSS anomalies, poor Minimum VHI and the presence of areas with low Maximum VCI values were observed.

Spatial distribution of rainfall profiles showed four homogeneous patterns mostly distributed along a North- South direction. Northeast of Brazilian agricultural area was dominated by a situation with below average RAIN conditions all along the reporting period, with stronger anomalies during January. South of Brazil, Paraguay, Mesopotamia in Argentina and North of Uruguay (light green area) showed positive anomalies at the beginning, and a tendency to reduced, yet negative anomalies for the rest of the period. North of Pampas and South of Uruguay showed a highly variable profile with positive anomalies at the beginning and the end of the reporting period and no anomalies in the middle of the period. In contrast, South Pampas, Chaco and Subtropical Highlands in Argentina showed a stable temporal profile with almost no anomalies.

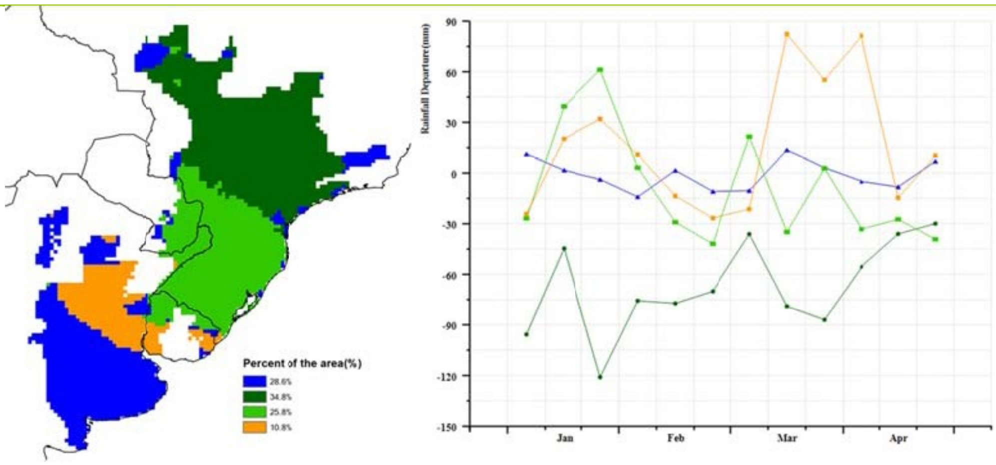
Temperature profiles showed for North of Brazil two different patterns with positive anomalies along the period, but with different intensity. An area with stronger positive anomalies (light green area) was surrounded by an area with moderate positive anomalies (dark green area). South of Brazil, Paraguay, Mesopotamia in Argentina, and East Uruguay showed a profile with strong negative TEMP anomalies at the beginning of February, and near average conditions during the rest of the period. Almost all Argentina and West Uruguay showed a highly variable pattern with strong negative anomalies in January, beginning of February and March, as well as positive anomalies during end February and April.

BIOMSS departure map showed a higher frequency of more negative than positive anomalies for this MPZ. Stronger negative anomalies were observed in most of Brazilian agricultural area. Slight positive anomalies were observed in Argentina and Uruguay.

Maximum VCI showed for most of the MPZ values higher than 0.92. Values lower than 0.8 were observed in South West Pampas and in other isolated cases along the Pampas. Minimum VHI showed a generalized pattern of severe and moderate drought conditions, in particular in Center and South of Brazilian agricultural areas, Paraguay, Pampas, Subtropical Highlands and part of Chaco in Argentina. Crop Arable Land Fraction was almost complete, except for a small portion in South West Pampas that remained uncropped.

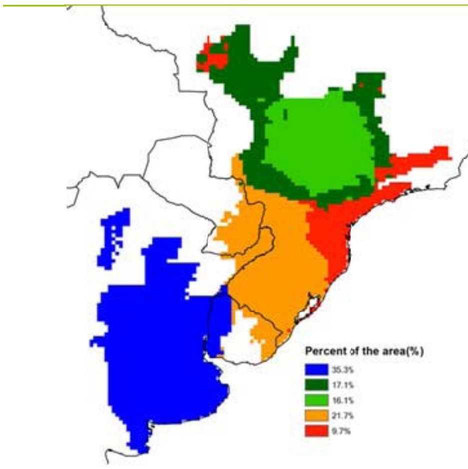
In general, South America showed regular conditions for crop production.

Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, January to April 2021

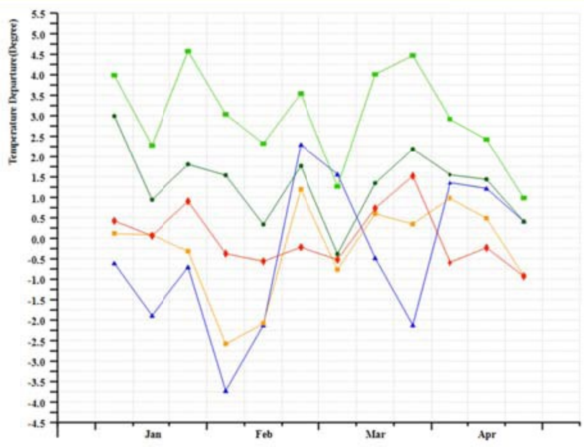


a. Spatial distribution of rainfall profiles

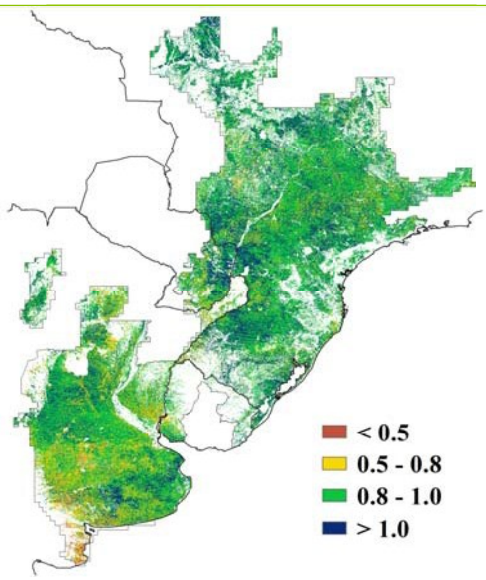
b. Profiles of rainfall departure from average (mm)



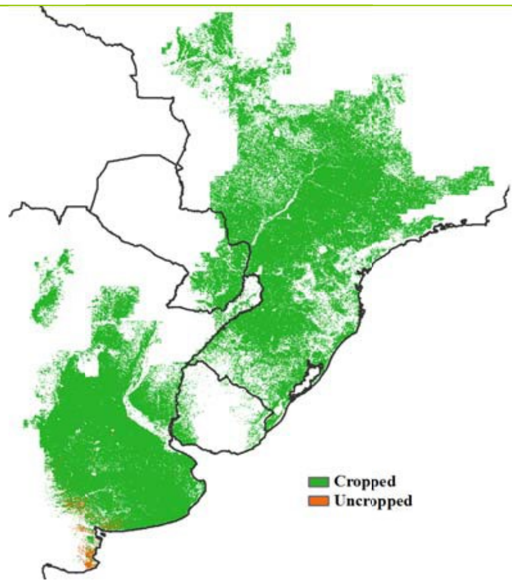
c. Spatial distribution of temperature profiles



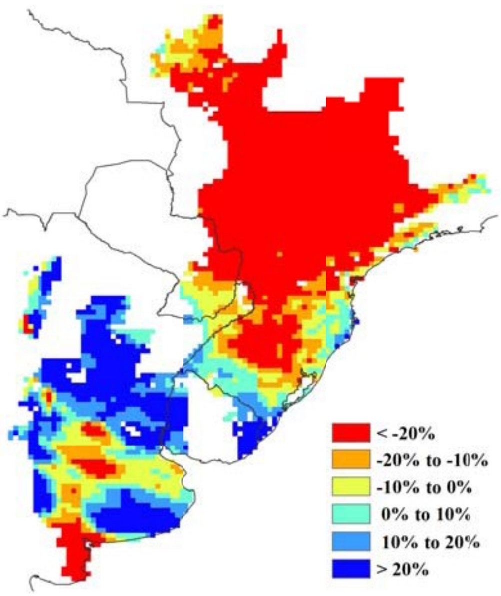
d. Profiles of temperature departure from average (mm)



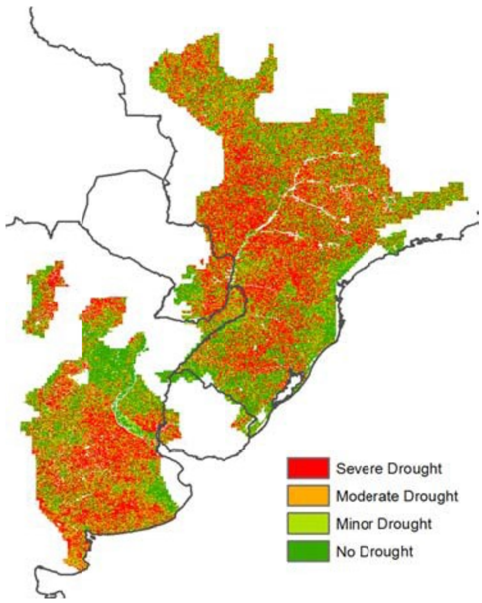
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.5 South and Southeast Asia

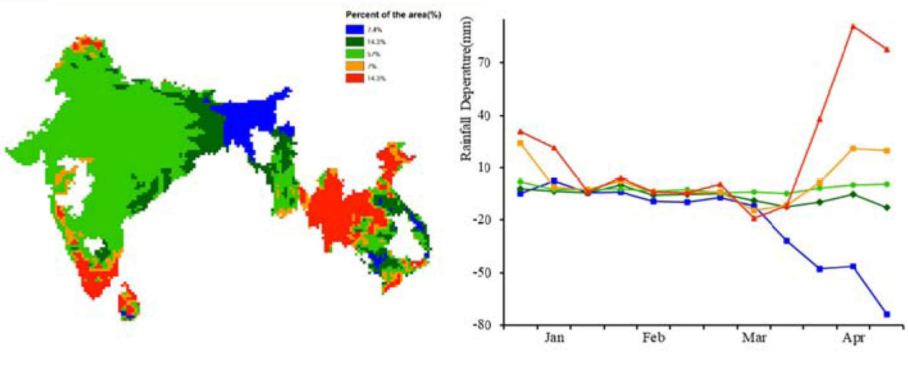
South and Southeast Asia includes India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand and Vietnam. The reporting period covers the main growing period of winter crops, as well as the harvest of earlier planted crops. The main crops grown in South and Southeast Asia are maize, rice, wheat and soybean. Agro-climatic indicators showed that precipitation decreased by 11%, temperature rose by 0.2% and RADPAR was slightly higher by 0.5% compared to the 15YA, which led to a 19% drop in BIOMSS. CALF exceeded the 5YA by 8%, reaching 80%. The VCIx was at 0.86. Most crops grown in the winter season are irrigated. In India, ground water is a main source of irrigation water, and the drought conditions had limited impact on wheat production. However, in South-East Asia, surface water abstracted from rivers, dams and lakes is the main source of irrigation water. Thus the drought conditions had more of a negative impact on rice production in South-East Asia.

The spatial distribution of rainfall profiles showed slightly below-average conditions for 71.3% of the MPZ. These areas are located in India, Myanmar, Central Vietnam, and Bangladesh. Precipitation for 21.3% of the region, located in Myanmar and southern India, fluctuated slightly above and below the average value from January to mid-March. After mid March, a positive departure was observed. The precipitation in 7.4% of the main production area in eastern India and Bangladesh was below average with the exception of mid-January, reaching the strongest negative anomalies in April. Spatial distribution of temperature profiles showed above-average conditions for 20.6% of the MPZ, mainly in western and eastern India, Bangladesh and parts of Myanmar. Other areas showed an alternating pattern with positive and negative anomalies during the reporting period, with the strongest positive anomalies in early January (northern and mid India) and negative anomalies in mid-January (Thailand, Cambodia, Vietnam and Laos).

Most BIOMSS anomalies were in the negative range (0 to -20%), located mostly in India (eastern India and southeastern India), Nepal, Bangladesh, central Myanmar, , Cambodia and Vietnam. Maximum VCIx showed low values for central Myanmar, scattered areas in eastern and western India with values below 0.5. CALF indicates that a high portion of the region was planted, with the exception of areas in northern Rajasthan, eastern Bangladesh and southern Vietnam. The VHI minimum map shows that northern India, regions in central Myanmar and the west of Cambodia were most affected by periods of severe drought conditions.

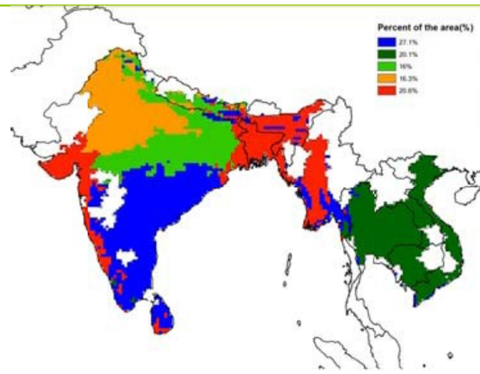
In general, the growth conditions of winter crops in this MPZ were close to normal in India, and below average in South-East Asia due to drought.

Figure 2.4 South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, January to April 2021

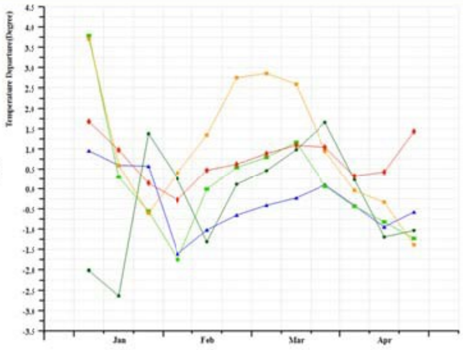


a. Spatial distribution of rainfall profiles

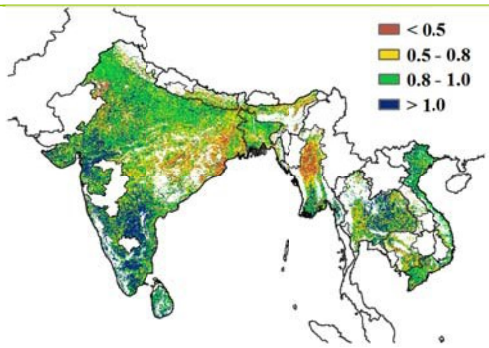
b. Profiles of rainfall departure from average (mm)



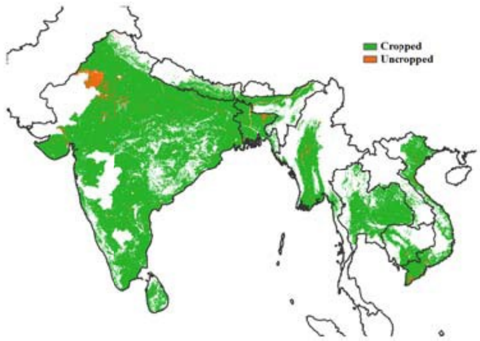
c. Spatial distribution of temperature profiles



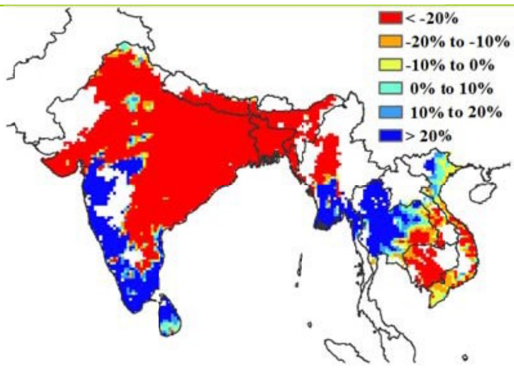
d. Profiles of temperature departure from average (℃)



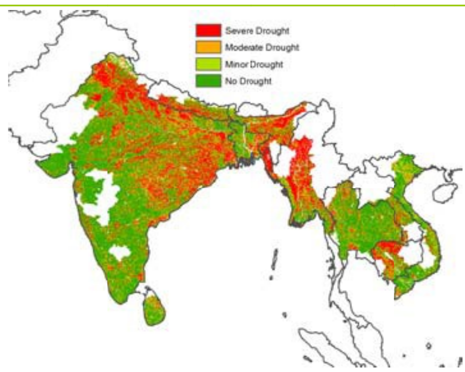
e. Maximum VCI



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 period of winter wheat in the Western European Major Production Zone (MPZ). The sowing of summer crops started in March. Overall, crop conditions were near average in most parts of the MPZ based on the interpretation of agroclimatic and agronomic indicators (figure 2.5).

The whole MPZ showed a drop in RAIN (-8% below average). Almost all the main agricultural production areas of Western European countries had lower-than-average precipitation during this monitoring period except for Germany and the Czech Republic. The temporal and spatial distribution characteristics of precipitation are as follows: (1) RAIN was below average in early-January and April in western Spain, most of France, Germany and UK, accounting for 59.8% of the entire MPZ areas; However, the precipitation in these areas was significantly higher than average from mid-January to early February, and in mid-March. (2) The precipitation in almost the entire MPZ areas was lower than the average level during the period from mid-February to early March, and in late March. Countries with the most severe precipitation deficit included Denmark (RAIN -22%), France (RAIN -19%), Italy (RAIN -17%), Hungary (RAIN -11%) and Austria (RAIN -8%), while Germany had normal and the Czech Republic above average precipitation (RAIN +4%).

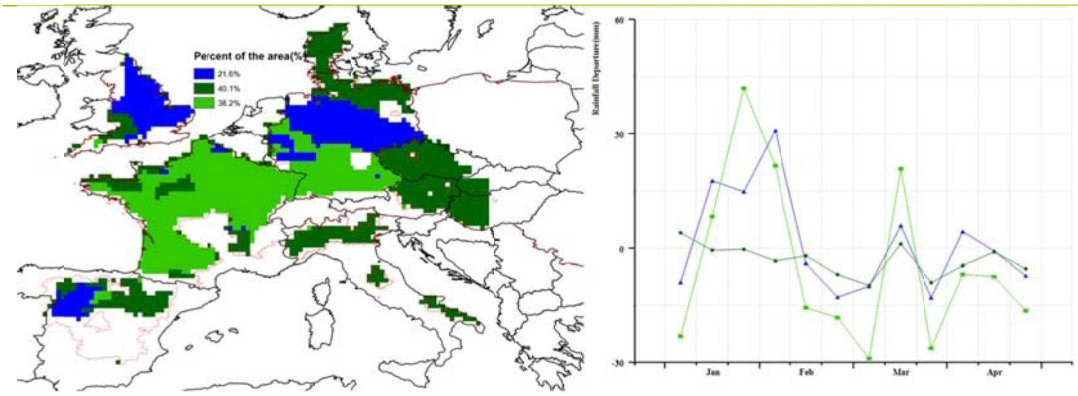
Temperature for the MPZ was sighltly below average (TEMP -0.3°C) while radiation was above average (RADPAR +4%). During the entire monitoring period, the characteristics of temporal and spatial distribution of temperature were as follows: (1) Temperature in most parts of southern Germany, France, Italy and Spain was above average from late-January to early-March, and in late March; (2) Temperature in northwestern France, UK, north-central Germany and Denmark was above average in late February and late March, while the temperature in those area was below average at other times during this monitoring period; (3) the entire MPZ had normal or below-average temperature during the remaining periods, especially in April, when temperature in 81.5% of the MPZ areas was significantly below average. This in turn slowed growth and development of the crops.

Despite of sunnier conditions, the potential BIOMSS was 6% below average due to the rainfall deficit and lower-than-usual temperatures. The lowest BIOMSS values (-20% and less) occurred in the central north of Spain, the west of France, and northwest of Italy . In contrast, BIOMSS was above average (10% and more) mainly in cenral Spain.

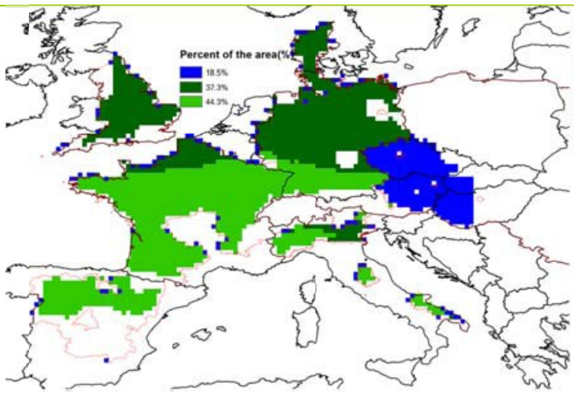
The average maximum VCI for the MPZ reached a value of 0.82 during this reporting period, and more than 94% of arable land was cropped (i.e. 1% below the recent five-year average) in the whole MPZ. The uncropped areas of arable land were mainly located in Spain, south-eastern France, south-western Austria and northern Italy, with also discrete distributions in parts of southern Germany, northern France and the UK. The VHI minimum map shows that some pockets of France, Germany, the eastern part of the UK and Spain were affected by short spells of drought conditions.

Generally, the conditions of winter crops in the MPZ were near average. However, more rain will be needed in several important crop production areas to ensure an adequate soil moisture supply for a proper yield of winter wheat in the grain filling phase.

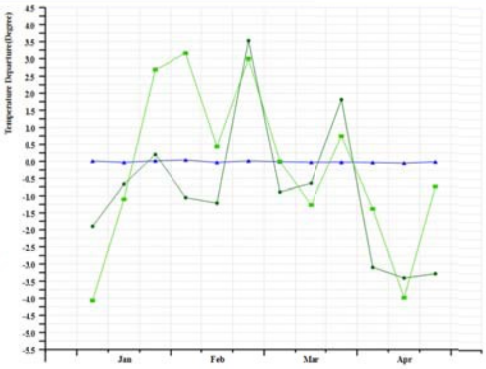
Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, January-April 2021



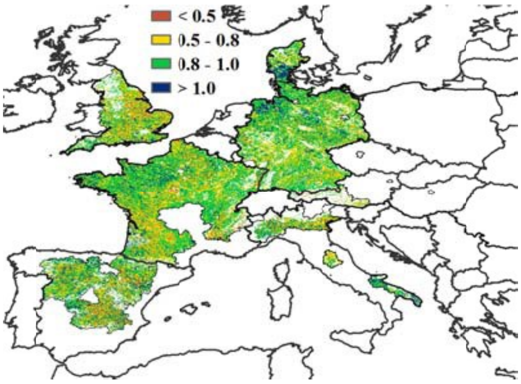
a. Spatial distribution of rainfall profiles | b. Profiles of rainfall departure from average (mm)



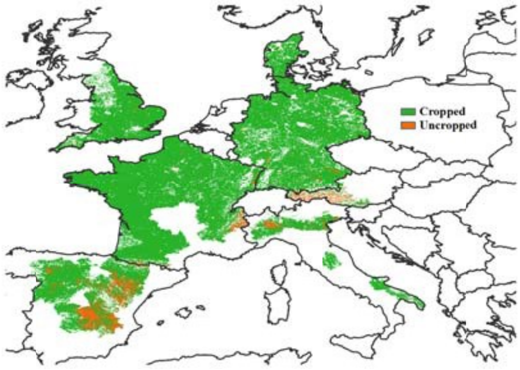
c. Spatial distribution of temperature profiles



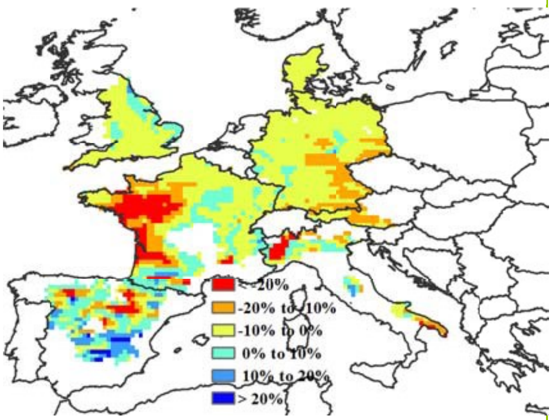
d. Profiles of temperature departure from average (mm)



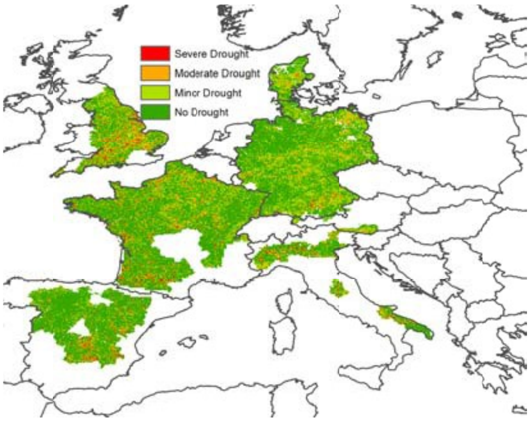
e. Maximum VCI



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

This monitoring period covers the dormant winter season and the spring green-up of winter cereals in Central Europe and western Russia. The sowing of summer crops was underway, starting in the west and south of the MPZ. In general, the rainfall was higher than average (+11%), with lower TEMP (-0.3℃), and RADPAR (-7%).

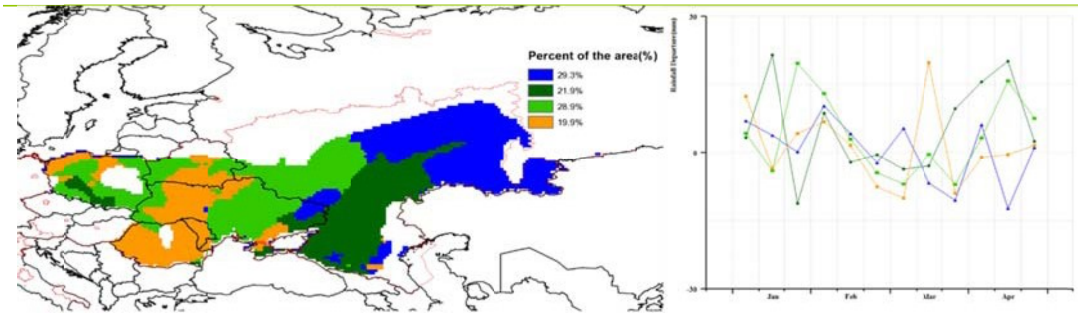
As shown on the spatial distribution map of rainfall departure, the precipitation in most areas of the MPZ fluctuated around the mean during the monitoring period. The spatial and temporal distribution characteristics were as follows: (1) From January to mid-February and from late March to April in 2021, the precipitation in southeastern Russia and some parts of Ukraine (51.2% of the MPZ) was above average. (2) From January to early March, the precipitation in most of the western MPZ (70.7% of the MPZ) continued to decline. (3) Between late February and early March, the precipitation was below average in all regions except parts of western Russia (29.3% of the MPZ).

The temperature departure distribution map shows that for most of the MPZ the temperature fluctuated strongly from January to April. On average, temperatures in the MPZ were lower than the 15YA (-0.3℃). From January to February 2021, the west of Russia, the south of Belarus, Ukraine and most of Moldova (79.3% of the MPZ) had a large temperature variation, with a biggest negative departure of nearly 8.0℃. The temperature began to rise in March. Parts of western Russia and eastern Ukraine (51.8 % of the MPZ) were warmer than average, while most of southern Belarus, Poland, Moldova, Romania and Ukraine (48.2% of the MPZ) remained below average.

The potential biomass in the MPZ was 7% lower than the 15YA.The areas with a 10% or more negative departure were mainly found in the west of MPZ . A higher-than 0.8 VCIx value was observed in the south-west of Ukraine, Moldova and the north-east of Romania, while areas with a VCIx value below 0.5 included most of the western part of Russia and the north-west of Ukraine, mainly due to uncultivated land. As a whole, CALF is 18% lower than the average level in the past five years, which may be due to abnormal phenology.

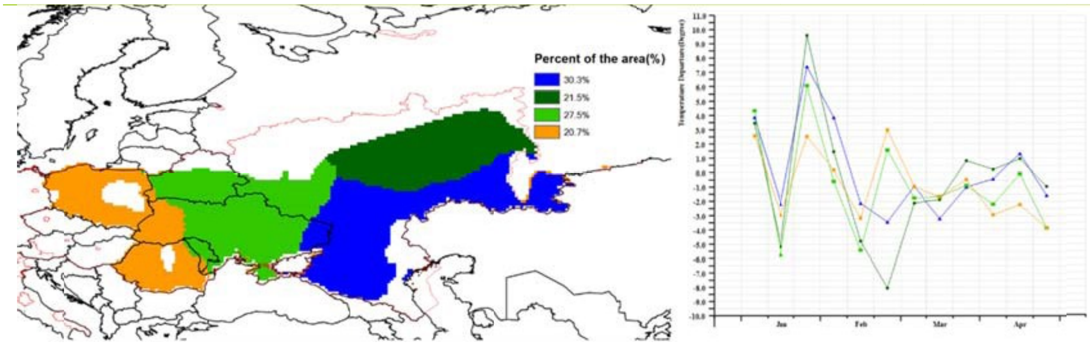
In summary, CropWatch agroclimatic and agronomic indicators for the monitoring period demonstrated that, though there was abundant precipitation in the MPZ, the decreased temperature and RADPAR cumulatively affected the crops in the growth period, resulting in a lower BIOMSS. In conclusion, the growth condition of crops of the MPZ was unfavorable during this period, and the crop yields are likely to be lower than average.

Figure 2.6 Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, January to April 2021



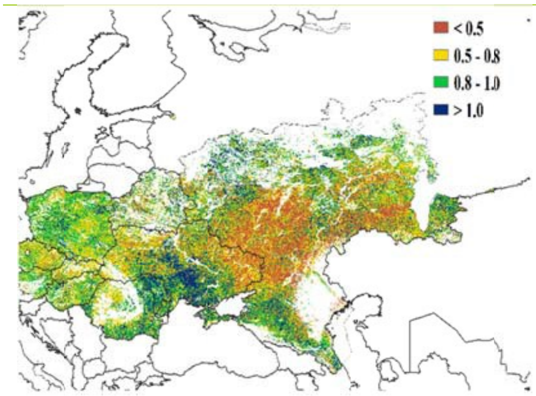
a.

Spatial distribution of rainfall profiles b. Profiles of rainfall departure from average (mm)

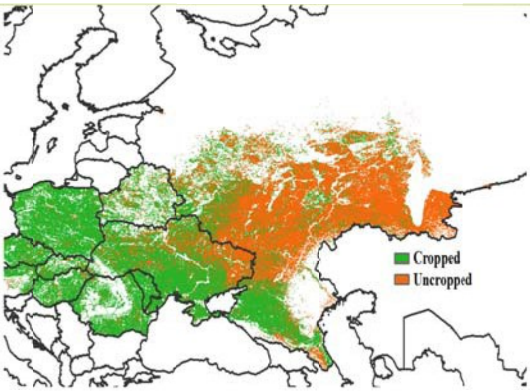


c.

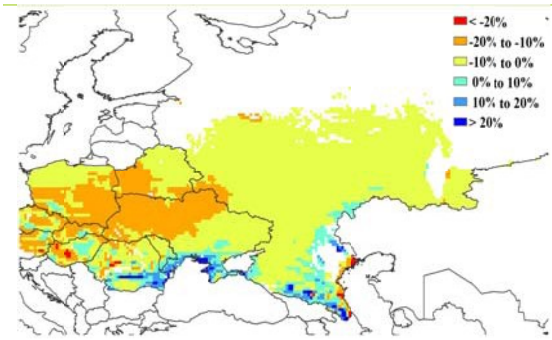
Spatial distribution of temperature profiles d. Profiles of temperature departure from average (℃)



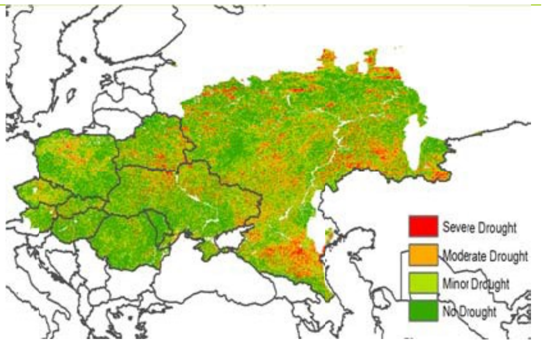
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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