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 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 (October 2021-January 2022)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
West Africa	145	-31	25.6	0.6	1256	2	615	-9
North America	264	-15	6.3	1.1	555	4	453	-1
South America	529	-41	23.7	0.5	1348	3	1108	-12
S. and SE Asia	325	13	20.3	-0.3	1017	0	664	10
Western Europe	316	-13	5.6	-0.1	333	9	505	-7
Central Europe and W. Russia	259	0	0.7	0.6	243	7	371	1

*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 (October of the previous year to January) for 2007-2021.*

Table 2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (October 2021-January 2022)

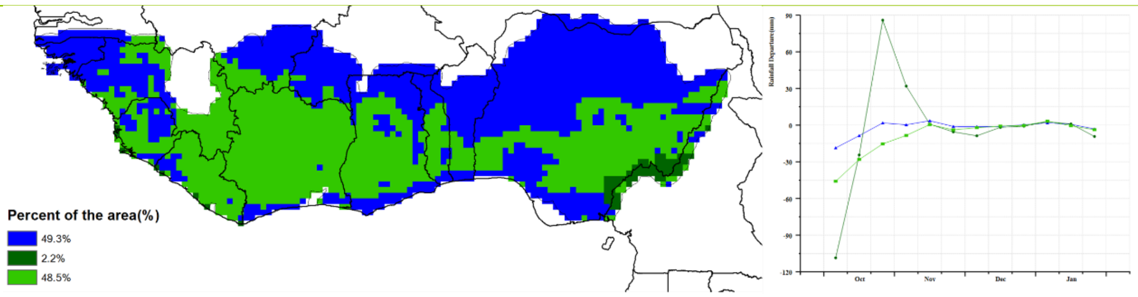
	CALF (Cropped arable land fraction)		Maximum VCI
	Current	5A Departure (%)	Current
West Africa	94	0	0.92
North America	66	-2	0.78
South America	98	0	0.85
S. and SE Asia	98	2	0.93
Western Europe	91	1	0.93
Central Europe and W Russia	78	4	0.83

Note: See note for Table 2.1, with reference value R defined as the five-year average (5YA) for the same period (October of the previous year to January) for 2007-2021.

2.2 West Africa

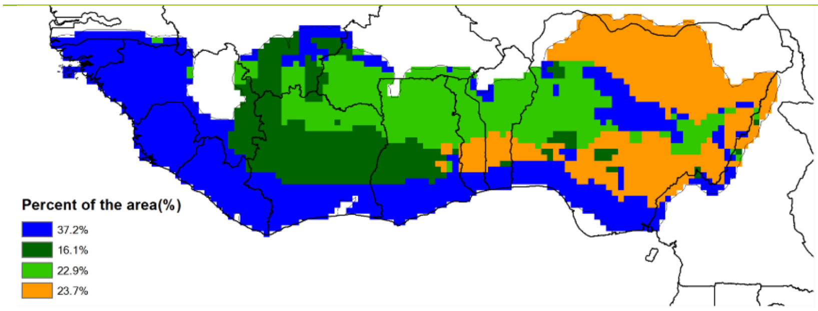
This reporting period covers the harvesting period of the major food crops. For Nigeria and the other countries in this region, these are millet, sorghum, rainfed rice and the main season maize. For the coastal regions, harvest of second season cassava crops started in January while the one-year-old cassava crop was still growing. According to the climatic indicators for the region, the average rainfall was 145 mm (-31%). A rainfall deficit was observed for all countries: Liberia (416 mm -21%), Sierra Leone (347 mm -15%), Equatorial Guinea (1,235 mm -5%), Togo (37 mm -64%), Burkina Faso (2 mm -91%), Nigeria (140 mm -25%), Ghana (110 mm -41%), Côte d'Ivoire (144 mm -45%) and Guinea (124 mm -37%). Due to the low rainfall, localized severe to moderate drought incidences were observed. The average temperature of the MPZ varied from 23.4°C (Equitoria Guinea) to 28.1°C (Gambia) with a regional average of 25.6°C (+0.6°C) and potential solar radiation was 1,256 MJ/m^2 (-2%). The accumulated biomass production potential of the region decreased by 9%. The cultivated arable cropped area (CALF) for the region was above 90% (+2%) except for Nigeria, where it was at 87% (+1%). The regional vegetative health index (VCIx) was at 0.92, indicating good crop conditions in most parts of the region except for Nigeria (0.89) and Burkina Faso (0.83). These CropWatch indicators showed stable, yet drier-than-usual climatic conditions for crop production. The early start of the lean (dry) season will make it more challenging for livestock production, as less biomass will be available for grazing. This MPZ continues to face challenges in production, distribution and widespread use of certified seeds, fertilizers and pesticides for optimal production systems, exacerbated by the devastating effects Covid-19 had on the economies.

Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, October 2021 - January 2022.

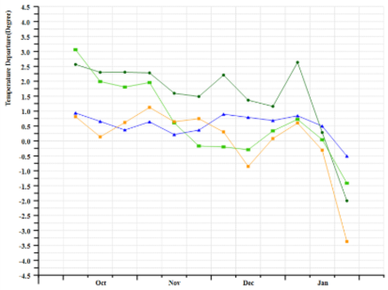


a. Spatial distribution of rainfall profiles

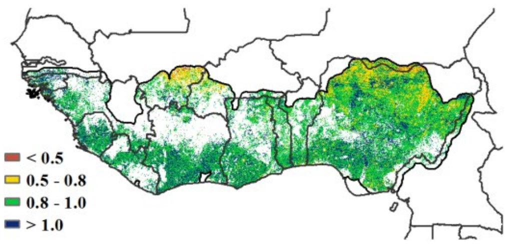
b. Profiles of rainfall departure from average (mm)



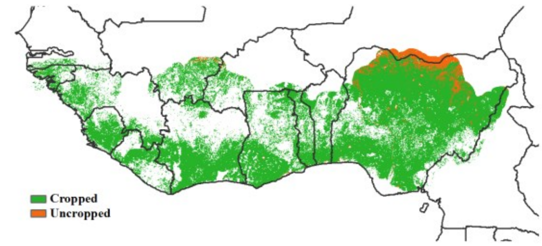
c. Spatial distribution of temperature profiles



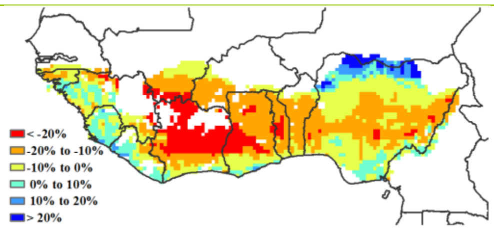
d. Profiles of temperature departure from average (mm)



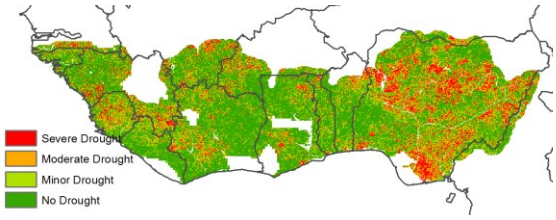
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

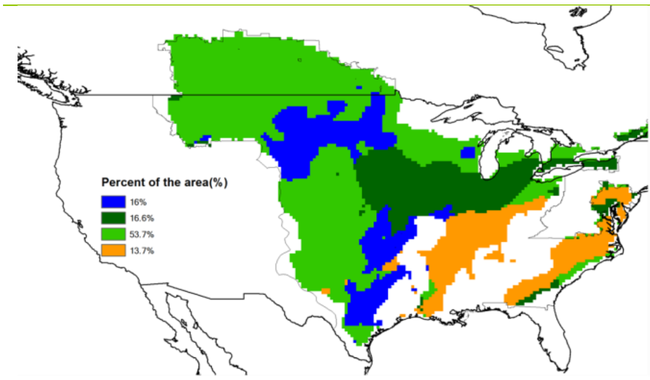
Note: For more information about the indicators, see Annex B.

2.3 North America

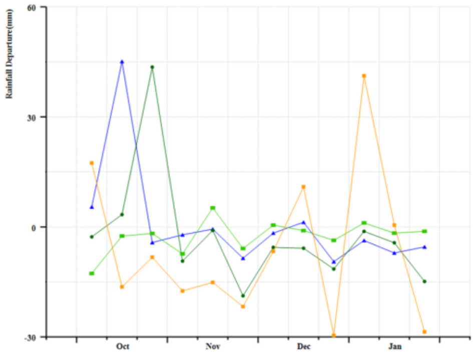
This reporting period begins in October 2021 and ends in January 2022. The winter wheat is the dominant crop, and this reporting period covers the sowing, tillering, and overwintering periods of winter wheat. Overall, crop conditions for the winter wheat were below average due to a lack of precipitation, especially in the Southern Plains.

Precipitation was below average (RAIN: 264 mm; -15%), whereas temperatures (TEMP: 6.3℃; +1.1ºC) and radiation (555 MJ/㎡; +4%) were above the 15YA. The Southern Plains, the main winter crop growing area, received below-average rainfall. At the same time, the region also experienced significantly warmer temperatures. The rainfall deficit was most severe in December, leading to the onset and development of drought, as indicated by the minimum vegetation health index (VHIn). Dry and warming weather has little influence on winter wheat sowing but harmed winter wheat tillering. The negative deviation in potential biomass (<-20%) also confirms the unfavorable conditions in this region. For the other regions, conditions were close to normal.

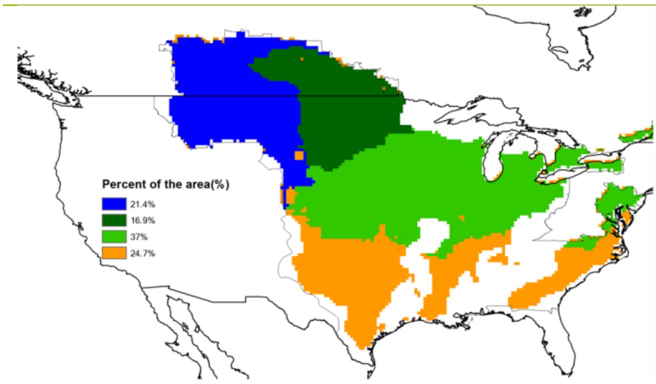
Figure 2.2 West Africa MPZ: Agroclimatic and agronomic indicators, October 2021-January 2022.



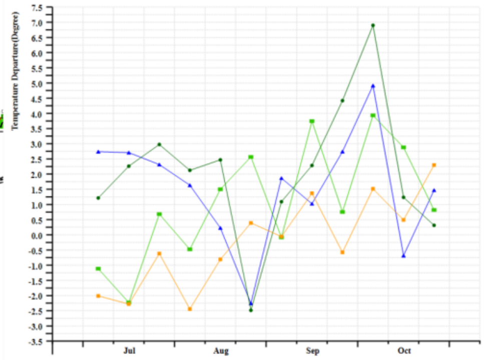
a. Spatial distribution of rainfall profiles



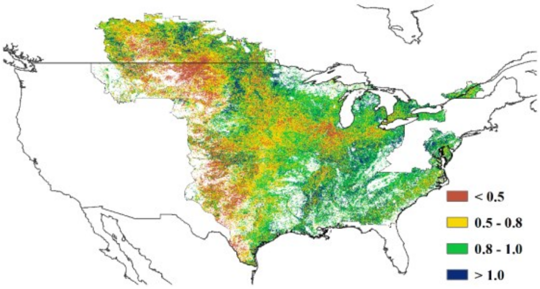
b. Profiles of rainfall departure from average (mm)



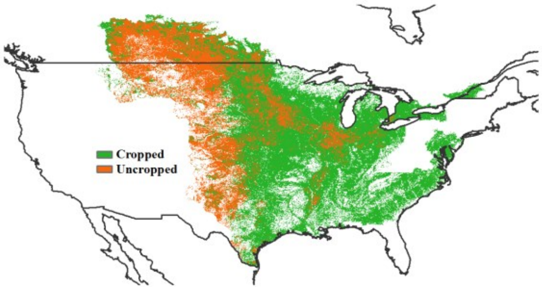
c. Spatial distribution of temperature profiles



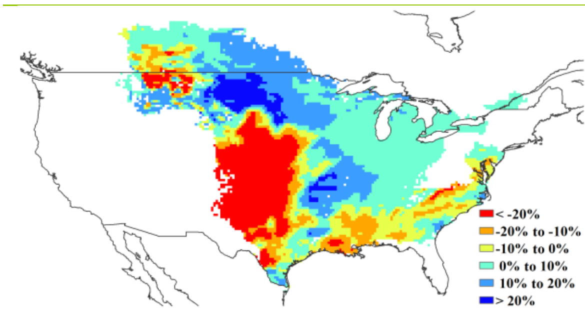
d. Profiles of temperature departure from average (mm)



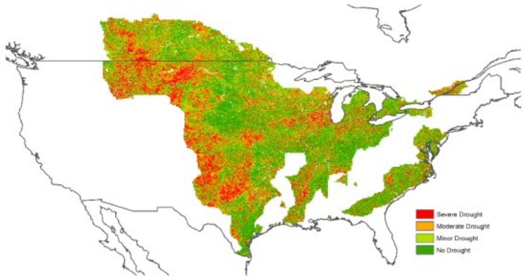
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.4 South America

This reporting period covers the main growing stages for early maize and early soybean and rice, the planting of late maize and late soybean and the harvesting of wheat.

Spatial distribution of rainfall profiles showed five clustering profiles. The north east of the zone (light green areas) showed strong negative anomalies during November and beginning of

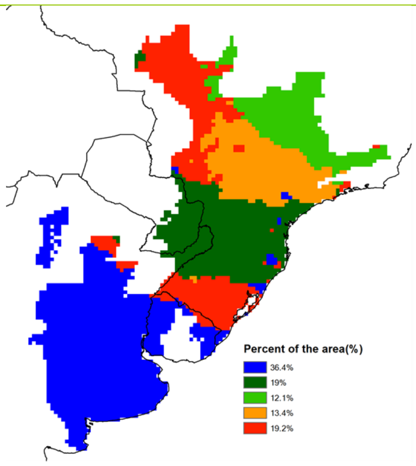
December, and a high positive anomaly at the beginning of January. The red areas in the north west of the zone, southern Brazil, and North Chaco in Argentina showed moderate negative anomalies during almost the entire study period, except for a slight positive anomaly in mid-December. The orange region in the center north showed quite strong negative anomalies during the entire period. The negative departures increased over time. The dark green areas in the center south of Brazil, Paraguay and North Mesopotamia in Argentina showed high variability, moving from positive to negative anomalies all along the study period. The highest positive anomalies were observed at the beginning and at the end. The blue areas, covering the Pampas and Subtropical Highlands in Argentina and most of Uruguay showed reduced anomalies during most of the study period, except for high positive anomalies during January.

Temperature showed five clustering profiles following a North East - South West pattern. North of the zone (light green areas) showed high temperature anomalies with a tendency to reduce in time. More to the South (dark green areas) lower positive anomalies were observed than for the light green profile. It showed a tendency to reduce in time too. The red areas located in Brazil, Paraguay and North Mesopotamia in Argentina started with negative anomalies and finished the period with positive anomalies. Orange areas (South of Brazil, Uruguay and North East Argentina) showed a similar tendency as the red profile, except for a stronger positive anomaly during January. The rest of Argentina (blue areas) showed a highly variable profile, with positive anomalies at the end of October, November, and December and beginning of January, and negative anomalies at the beginning of October, November and December, and end of January.

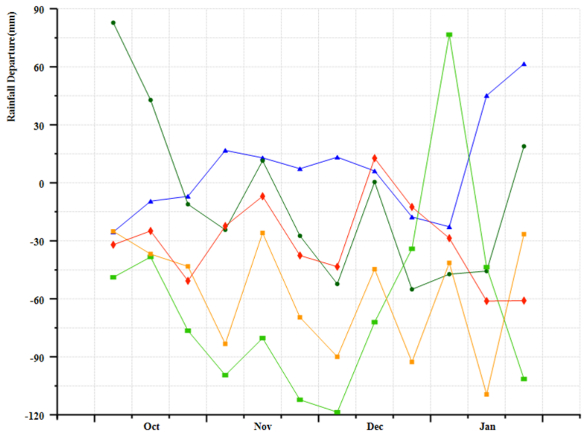
BIOMSS showed almost a North East-South West pattern. Poorest conditions (more than 20 % negative departure) were found in the North of Brazilian agricultural area, as well as in the south of Brazil. Less negative values were observed in the rest of Brazil, Paraguay, Uruguay and North East Argentina. Positive anomalies were observed in the rest of Argentina, indicating overall favorable weather conditions in the country. CALF was almost complete, with the exception of sites in South Buenos Aires and North Subtropical Highlands in Argentina that remained uncropped. High VCIx values (higher than 0.8) were observed in the north of the zone, and South Argentina (with the exception of areas located in the southern extreme of Buenos Aires province with values lower than 0.5). The center of the MPZ was dominated by intermediate values (between 0.5 and 0.8).

The region showed variable conditions during the reporting period. The north of the zone in Brazil showed poor conditions, with quite high temperature anomalies and strong negative anomalies in BIOMSS. Other regions like most of Argentina showed good conditions with positive BIOMSS departure values and less precipitation and temperature anomalies. In addition, the center of the MPZ and part of Argentina showed low VCIx, with below-average crop conditions.

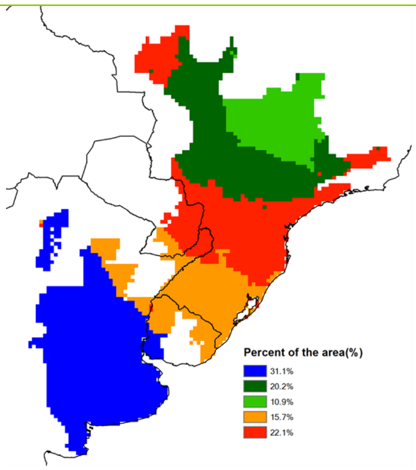
Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, October 2021 to January 2022.



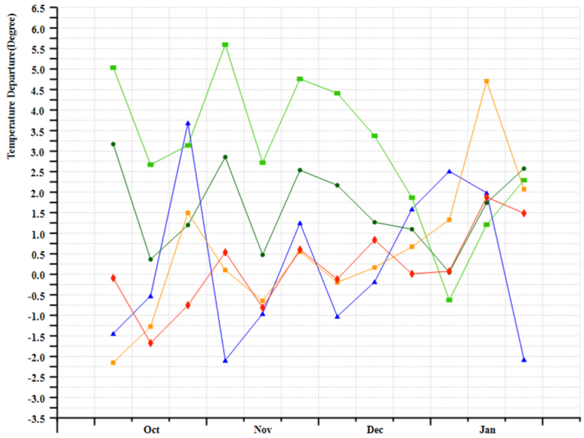
a. Spatial distribution of rainfall profiles



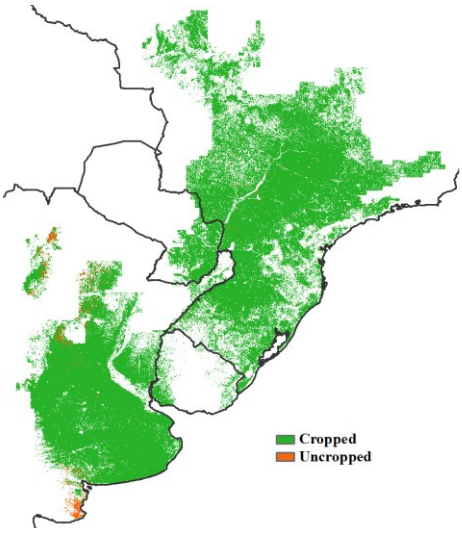
b. Profiles of rainfall departure from average (mm)



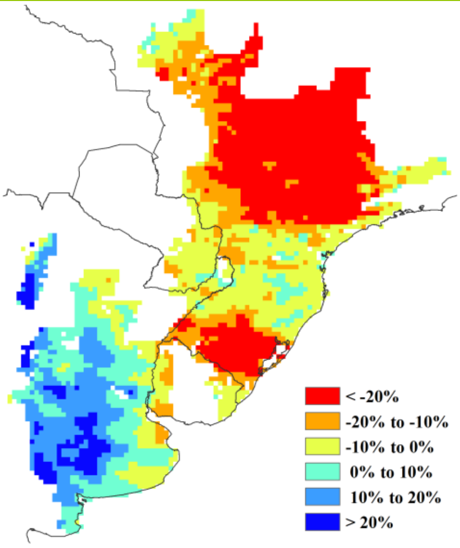
c. Spatial distribution of temperature profiles



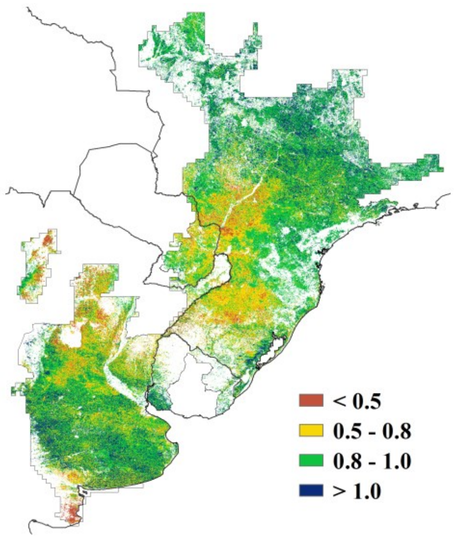
d. Profiles of temperature departure from average (mm)



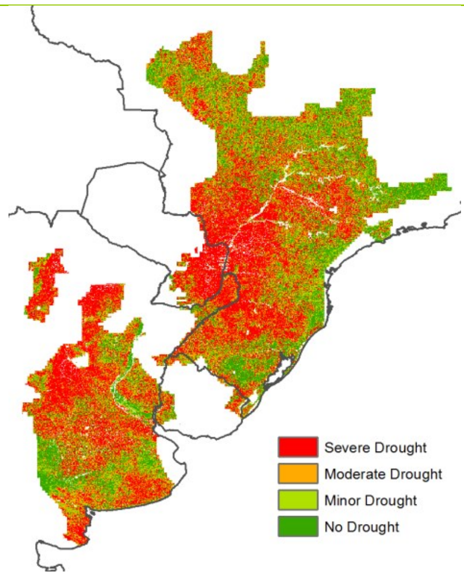
e. Cropped arable land



f. Biomass accumulation potential departure



g. Maximum VCI



h. VHI minimum

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

2.5 South and Southeast Asia

The South and Southeast Asia MPZ includes India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand, Laos and Vietnam. In this period, the monsoon rice was harvested and some winter crops, such as wheat and maize were sown in India and Bangladesh. In the other countries, mainly rice and maize were sown as well.

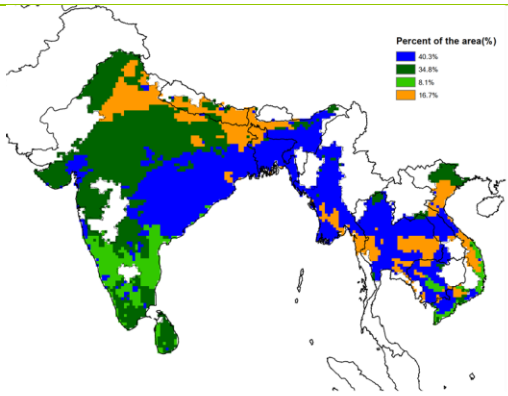
According to the CropWatch agroclimatic indicators, the RADPAR was unchanged compared with the 15YA, the temperature was slightly below the 15YA (TEMP -0.3℃). However, the accumulated precipitation was significantly above average (RAIN +13%), which led to an increase in the potential biomass production (BIOMSS +10%). CALF increased by 2% compared with the 5YA, reaching 98% and the VCIx of the MPZ was 0.93. In general, higher rainfall helped with the establishment of winter crops.

According to the spatial distribution of rainfall profiles, the precipitation for 16.7% of the MPZ (northern India, northern Vietnam, Nepal, southern Myanmar and eastern Thailand) peaked in October and that for 8.1% of the MPZ (southern India and eastern Vietnam) in November. The precipitation in other regions was close to the average after late October. The spatial distribution temperature profiles show that temperature fluctuated greatly in the entire MPZ. The temperature departures in 6.2% of the MPZ fluctuated slightly above and below the average until early December, then gradually increased and reached a small peak in late January, mainly in northeast Thailand, central Laos and northern Vietnam. In other areas, the temperature slowly dropped after mid-January.

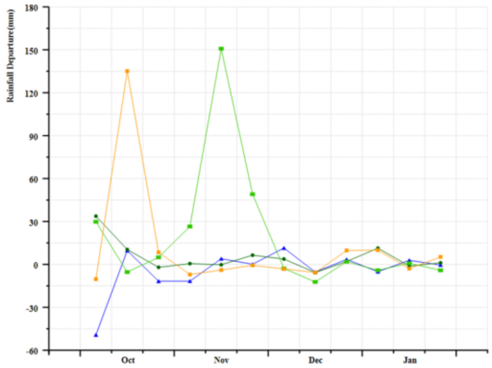
The BIOMASS departure map reveals that the potential biomass in northern and southern India was 20% higher than the average level while the potential biomass in central and eastern India, Myanmar and Thailand is estimated to be below average. The Maximum VCI shows that the index in northern, western and southern India and other scattered areas was higher than 1.0. CALF indicates that a high portion of the region was planted, with the exception of areas in northern India.

In summary, crops conditions are near the average level in India and Bangladesh, whereas for South East Asia, conditions were slightly below average.

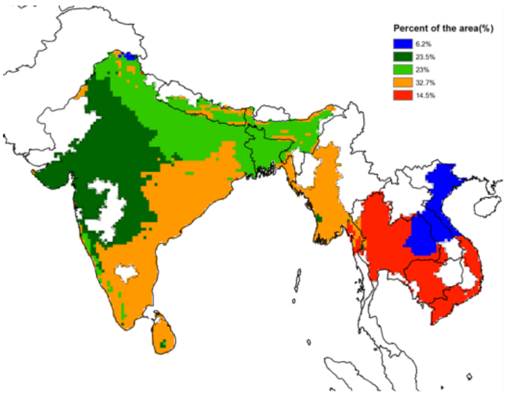
Figure 2.4 South And Southeast MPZ: Agroclimatic and agronomic indicators, October 2021-January 2022.



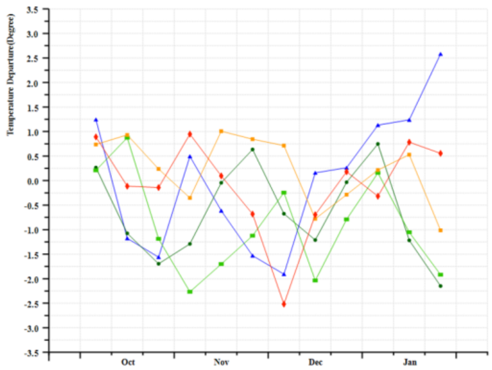
a.Spatial distribution of rainfall profiles



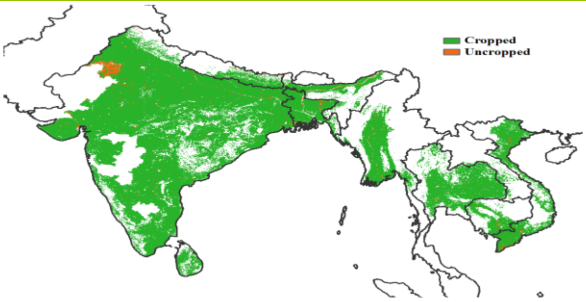
b.Profiles of rainfall departure from average (mm)



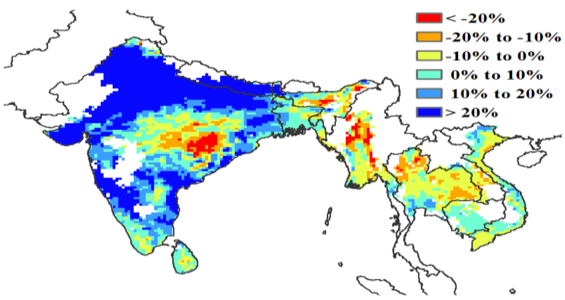
c.Spatial distribution of tempreature profiles



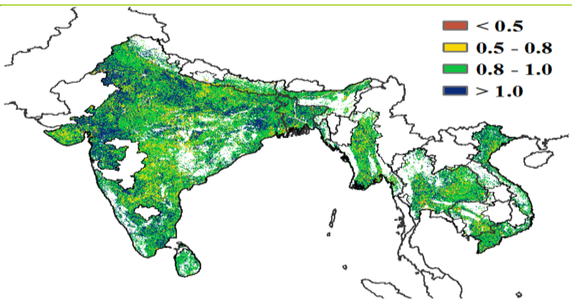
d.Profiles of temperature departure from average (℃)



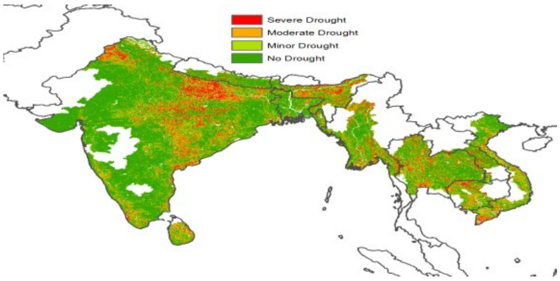
e.Cropped and uncropped arable land



f.Potential biomass departure from 5YA



g.Maximum VCI



h.VHI Minimum

N

2.6 Western Europe

The harvesting period of summer crops and the sowing as well as the growing period of winter crops were included in this monitoring period in the major production zone (MPZ) of Western Europe. Generally, crop conditions were close to average or above average in most parts of this MPZ based on the integration of agroclimatic and agronomic indicators (Figure 2.6)

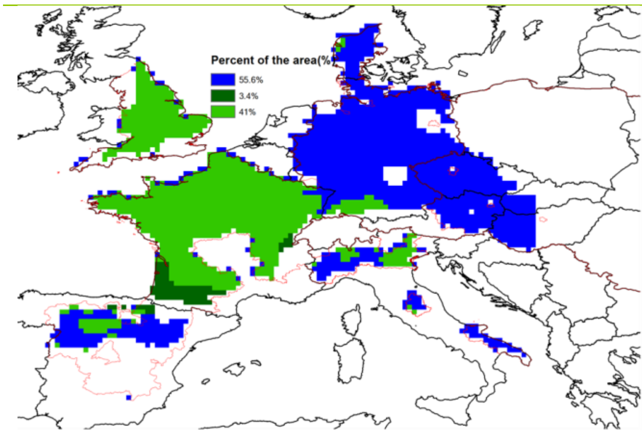
Precipitation was significantly below average over the whole MPZ (-13%) and significant spatio-temporal differences in precipitation were observed between different countries: (1) Precipitation was below average throughout the almost whole MPZ until late November; (2) From late-November to the end of the monitoring period, precipitation hovered around or slightly below average in 55.6 percent of the MPZ areas (most parts of Spain, North-west and south-east and central Italy, Denmark, most parts of Germany, the Czech Republic, south-western Slovakia, eastern Austria and western Hungary); (3) Precipitation was significant below average from late-November to late January, with the exception of early and later December and early January, 44.4% of the MPZ areas (UK, North-east Italy, most part of France and South-east Baden-Wurttemberg in Germany); (4) Precipitation in North central Spain, northeastern Rhône-Alpes, southern Nouvelle-Aquitaine and Midi-Pyrénées in France was significantly above average during the monitoring period, except between mid-December and mid to late January. Countries with the most severe precipitation departures included Spain (RAIN -29%), Slovakia (RAIN -25%), Czech Republic (RAIN -18%), Austria (RAIN -16%), France (RAIN -16%), Germany (RAIN -15%), UK (RAIN -15%) and Hungary (RAIN -11%). Persistent precipitation deficit in most areas in the early part of the monitoring period provided favorable conditions for the harvest of the summer crops and the sowing of winter crops. However, their germination and early development may have been delayed.

Temperature for the MPZ as a whole was slightly below average (TEMP, -0.1%), but radiation was significantly above average with RADPAR at +9%. As shown in the spatial distribution of Temperature profiles, 41.9 percent of the MPZ areas (Spain, most parts of France and South-west Germany) experienced colder-than-usual conditions throughout the monitoring period, except for late-December and early-January; 42.8 percent of the MPZ areas (UK, most parts of Italy, North-west France, Central Germany, the Czech Republic, south-western Slovakia, eastern Austria and western Hungary) experienced temperatures hovering around the average throughout the monitoring period; 15.3 percent of the MPZ areas (Denmark and North central Germany) experienced significant warmer-than-usual conditions during the monitoring period, except for the period in early-mid October, early November, late November-early December and late December.

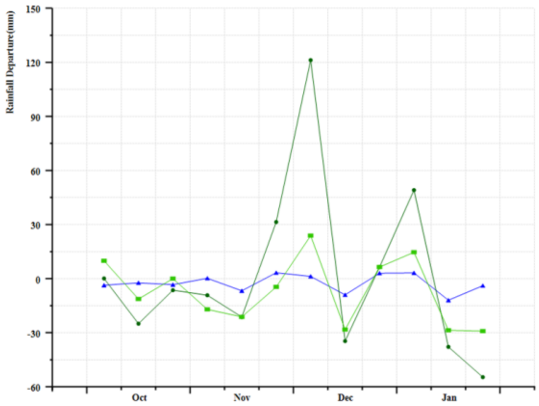
Due to precipitation deficit and overall colder-than-usual conditions, the biomass accumulation potential was 7% below average. Significant BIOMSS departures (-20% and less) was estimated for most parts of Spain and west-central France. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) for south-western France, southern UK and northern and south-eastern Italy. The average maximum VCI for the MPZ reached 0.93.

More than 91% of arable land was cropped, which is 1% above the recent five-year average. Most uncropped arable land was concentrated in Spain, northern and southeastern Italy, with patchy distribution in central, southeastern and southwestern France, central Germany, central UK and western Austria. The VHI minimum map shows that most parts of the Western European MPZ were mostly under normal (no drought) conditions. Only small areas, mainly in southern Spain and the Po Valley, had large pockets with severe drought. Overall, crop conditions were close to average or above average in most parts of this MPZ.

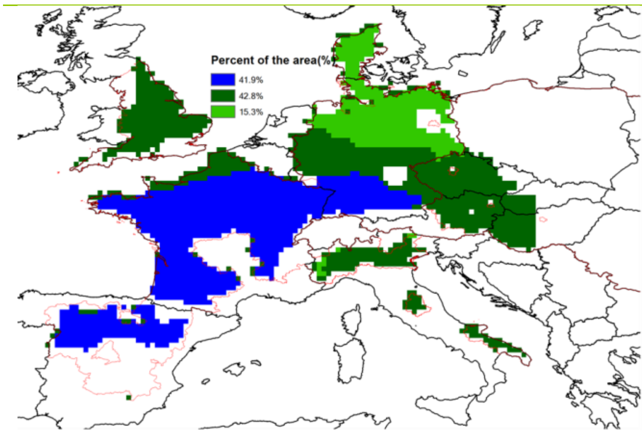
Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, October 2021-January 2022.



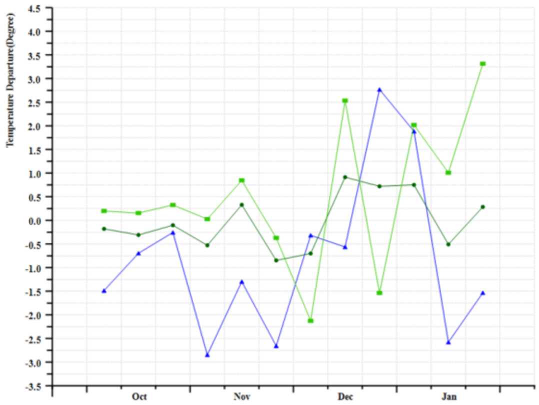
a. Spatial distribution of rainfall profiles



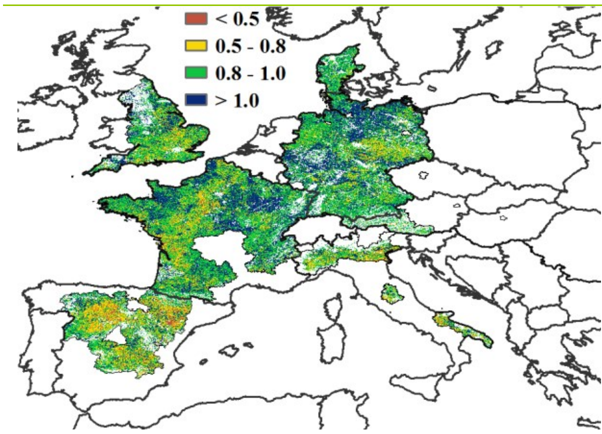
b. Profiles of rainfall departure from average (mm)



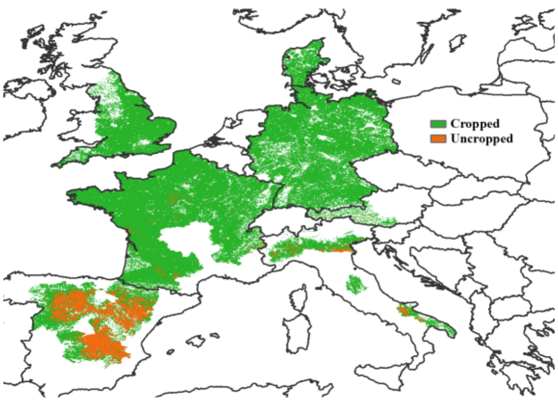
c. Spatial distribution of temperature profiles



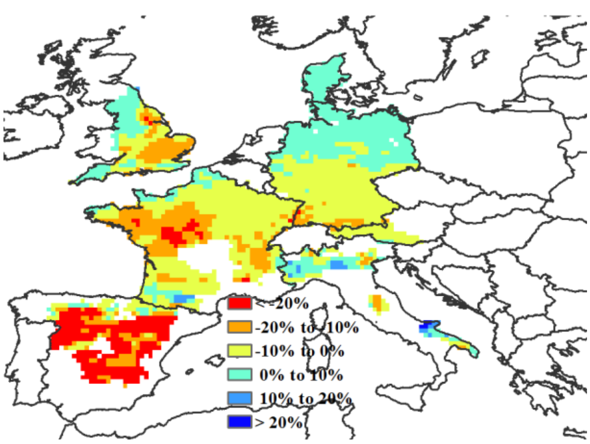
d. Profiles of temperature departure from average (mm)



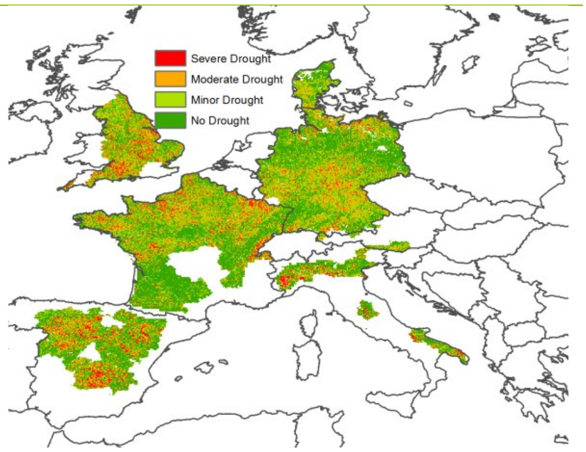
e. Maximum VCI



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 harvesting period of summer crops and the sowing as well as the growing period of winter crops. In general, the agroclimatic indicators in this MPZ were close to average, including near-average precipitation, 0.6 ℃ higher temperature, and 3% higher photosynthetic active radiation.

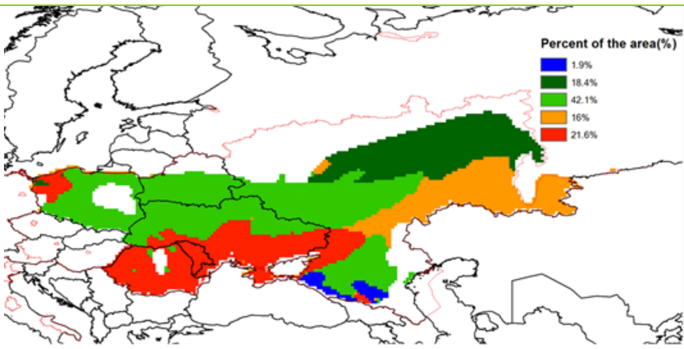
According to the spatial distribution map of rainfall departure, the rainfall in most areas was above the average from October 2021 to January 2022. The specific spatial and temporal distribution characteristics were as follows: (1) In October, 79.7% of the regions received below-average precipitation, which may have delayed germination of winter wheat in those regions. However, in early October the precipitation in the regions accounting for 1.9% of the MPZ was above average and reached the highest positive departure level. That region was mainly located in southern Russia. (2) From late November to mid-December, 98.1% of the regions received above-average precipitation, which was distributed in other regions except for parts of southern Russia. High precipitation during this period helped mitigate the negative impact due to the reduced precipitation in October. (3) In January 2022, 21.6% of the region received below-average precipitation, mainly in southern Ukraine, Moldova, Romania, and northwestern Poland.

The temperature departure distribution map shows that the temperature change trend was the same for the entire MPZ. The specific spatial and temporal distribution characteristics were as follows: (1) In October, temperatures were below average in 30.8% of the MPZ. (2) In mid-November, temperatures were below average for 17.6% of the MPZ, mainly in southwestern Belarus and Poland. (3) From late November to mid-December, the temperature in the whole MPZ was above average, and in late December, the temperature in the whole MPZ was below average.

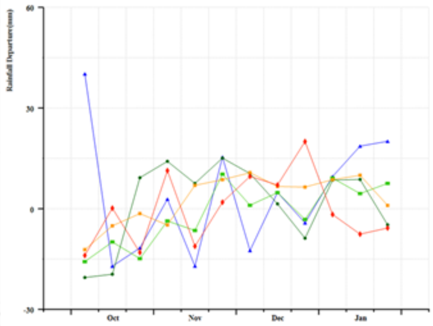
The biomass accumulation potential (BIOMASS) was 10% below average in south-eastern Russia, southwestern Poland, parts of Slovakia and Hungary, and a small part of Romania, whereas the potential cumulative biomass in the remaining regions was essentially on par with the average.

During this monitoring period, most of the arable land in MPZ was cultivated, with a CALF value of 77% (+4%), and the uncultivated arable land was mainly distributed in the southwest of the Ural and eastern regions of Ukraine. The VCIx showed a significant spatial variation, with an average value of 0.83. The regions below 0.8 were mainly in southeastern Russia, eastern Ukraine, Moldova, and eastern Hungary. The minimum health vegetation index is similar to the distribution of the best vegetation condition, with severe drought areas mainly in the southeast of Ukraine and southwest of the Ural. Overall, CropWatch agroclimatic and agronomic indicators show that crop growth was expected to be above average during this monitoring period.

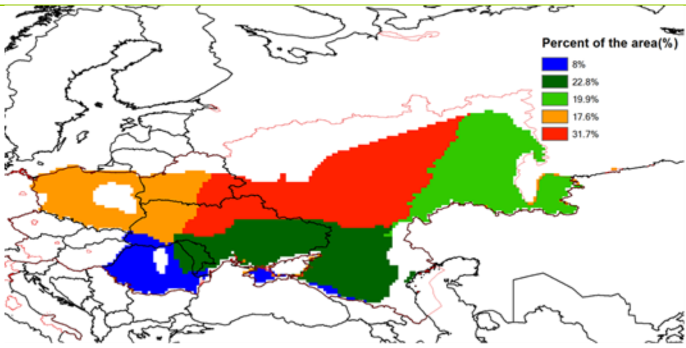
Figure 2.6 Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, October 2021-January 2022.



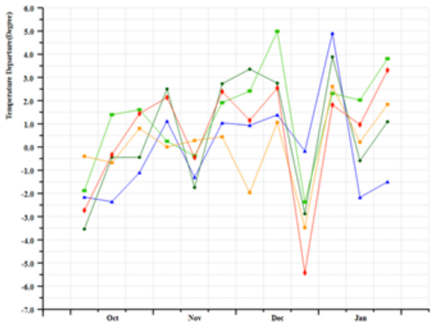
a. Spatial distribution of rainfall profiles



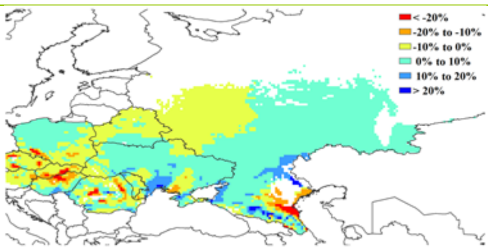
b. Profiles of rainfall departure from average (mm)



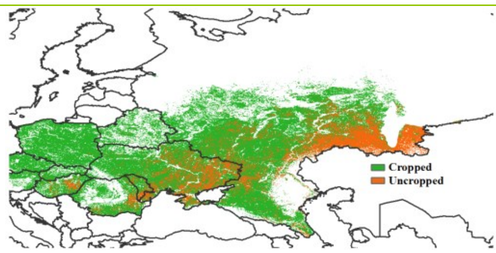
c. Spatial distribution of temperature profiles



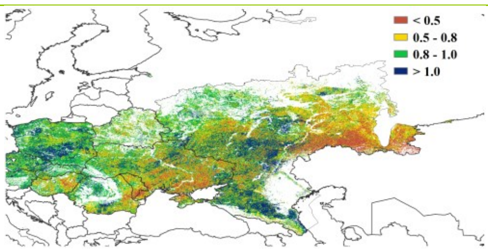
d. Profiles of temperature departure from average (mm)



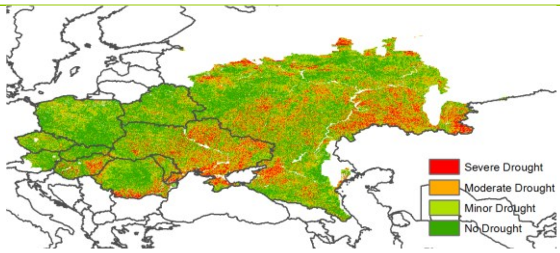
e. Biomass accumulation potential departure



f. Cropped arable land



g. Maximum VCI



h. VHI minimum

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