Chapter 4. China

After a brief overview of the agro-climatic and agronomic conditions in China over the reporting period (section 4.1), Chapter 4 then presents China's crop prospects (section 4.2), describes the situation by region, focusing on the seven most productive agro-ecological regions of the east and south: Northeast China, Inner Mongolia, Huanghuaihai, Loess region, Lower Yangtze, Southwest China, and Southern China (section 4.3). Section 4.4 describes trade prospects of major cereals and soybean. Additional information on the agro-climatic indicators for agriculturally important Chinese provinces is listed in table A.11 in Annex A.

4.1 Overview

Most of the summer crops, such as semi-late rice, maize and soybean, were in the field during the reporting period. This period also covers the harvest of early rice and winter wheat. The sowing of late rice was completed in July. The agro-climatic conditions were quite favorable, with temperature slightly above average (+0.1°C), rainfall and RADPAR near average. This was beneficial for crop growth and VCIx reached a high value of 0.94 at the national scale.

According to the time series rainfall profile, above-average rainfall was observed nationwide in mid-May and late July. Nearly all of the main agricultural regions of China recorded above-average rainfall, with the largest positive departure occurring in Huanghuaihai (+50%). The only exception was Southern China (-12%). Excessive rainfall (positive departures by more than 20%) occured mainly in the provinces in Huanghuaihai (Hebei, Henan and Shandong), Lower Yangtze region (Jiangsu, Anhui and Zhejiang), Inner Mongolia (Inner Mongolia) and Northeast China (Heilongjiang and Liaoning). The largest positive departure was observed in Hebei province (+62%). In late July, typhoon In-Fa in connection with monsoon rains, exacerbated by climate change, affected large areas in Henan, Hebei, Shanxi and Beijing. The record-setting precipitation caused regional floods which affected both urban and rural areas. The floods damaged maize and peanuts, the two dominant crops grown in the region. At the country level, rainfall anomalies fluctuated largely over time and space. As can be seen from the spatial distribution of rainfall profiles, 64.1% of the cropped areas recorded slightly below-average precipitation, with the rainfall departure within -25mm/dekad. 25.6% of the cropped areas, mainly located in Huanghuaihai and some parts in Northeast China (western Heilongjiang) and Southwest China (eastern Sichuan), received significantly above-average rainfall (more than +90mm/dekad) during middle July. 10.4% of crop areas experienced the largest positive departure of rainfall (more than +120mm/dekad) during middle May and the largest negative rainfall departure (more than -60mm/dekad) during middle July, occurred mainly in some parts of Anhui, Jiangsu, Zhejiang, Fujian, Jiangxi, Hunan and Guangdong provinces.

Three of the main agricultural regions in China recorded above-average temperature (Northeast China, +0.1℃; Lower Yangtze region, +0.3℃; Southern China, +0.7℃), Southwest China recorded average temperature, and the other regions all recorded below-average temperatures with departures ranging from -0.1°C to -0.3°C. Temperatures fluctuated during the monitoring period as follows: 50.1% of the cultivated regions in Loess region, southern Huanghuaihai, northern Lower Yangtze region and northern Southwest China had negative temperature anomalies by more than -1.5℃ in early April. 25.8% of the cropped areas in northern Huanghuaihai, Inner Mongolia and Northeast China had negative temperature anomalies by more than -1.5℃ in early May, late May and early June, and had positive temperature anomalies exceeding +1.5℃ in middle July. The remaining 24.1% of the cultivated regions in Southern China and southern parts of Lower Yangtze region and Southwest China had almost all positive

temperature anomalies throughout the monitoring period. RADPAR had the largest negative anomalies in Huanghuaihai and Southwest China (-4%), and the biggest positive anomalies in Southern China (+9%).

As for BIOMSS, the situation was quite different among all the main producing regions, with the departures between -3% (Huanghuaihai, Inner Mongolia) and +12% (Southern China). CALF increased in the Loess region (+2%) and Inner Mongolia (+1%) as compared to the 5YA, indicating that the cultivated areas in these two regions are quite promising. The remaining regions all showed average CALF. The VCIx values were higher than 0.9 in almost all the main producing regions of China, with values between 0.92 and 0.98, except for the Loess region (0.88).

In terms of the proportion of NDVI anomaly categories compared with the 5-year average, the 16-day phases from April to Mid-June shared almost the same pattern, while the last three phases had slightly below to below average anomalies in around 20% of the cropped areas. According to the proportion of different drought categories compared with the 5-year average, less than 10% of the cropped areas had moderate to severe drought conditions throughout the monitoring period.

Table 4.1 CropWatch agroclimatic and agronomic indicators for China, April to July 2021, departure from 5YA and 15YA

Region	Agroclimatic indicators				Agronomic indicators	
	Departure from 15YA (2006-2020)				Departure from 5YA (2016-2020)	Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF(%)	Maximum VCI
Huanghuaihai	50	-0.3	-4	-3	0	0.93
Inner Mongolia	32	-0.3	-3	-3	1	0.96
Loess region	7	-0.1	-1	2	2	0.88
Lower Yangtze	0	0.3	0	3	0	0.94
North-east China	30	0.1	1	2	0	0.98
Southern China	-12	0.7	9	12	0	0.92
Soutwest China	1	0.0	-4	-1	0	0.96

Figure 4.1 China crop calendar

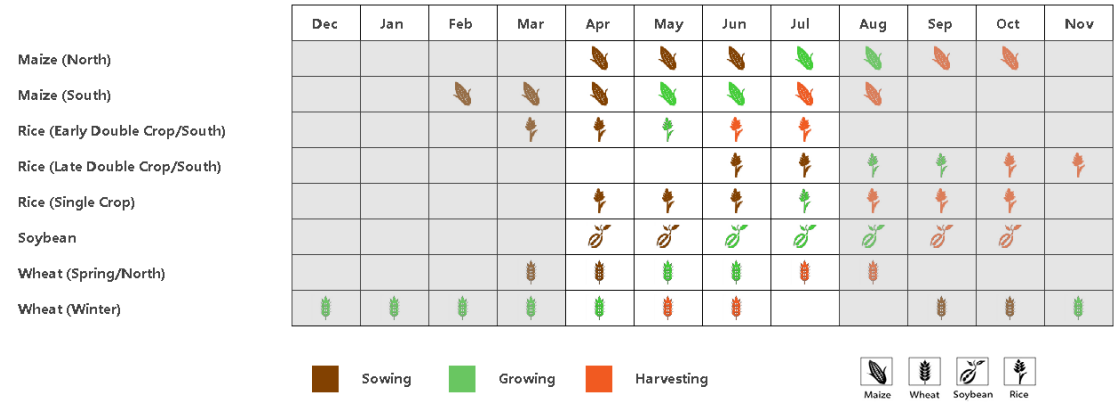


Figure 4.2 China spatial distribution of rainfall profiles, April - July 2021

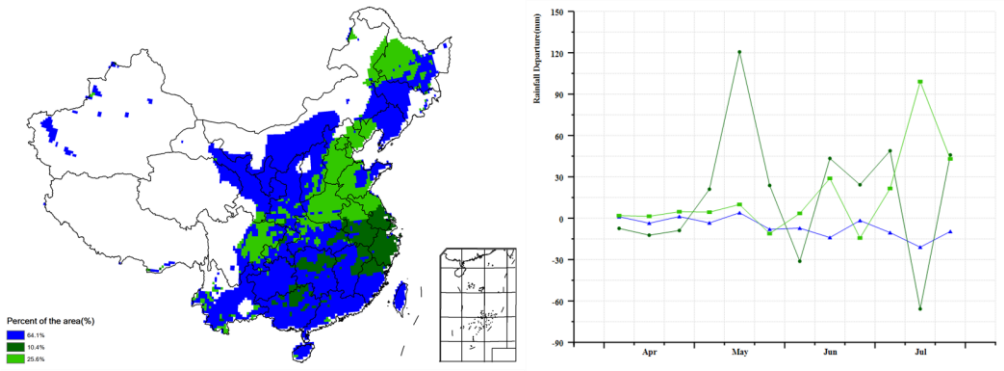


Figure 4.3 China spatial distribution of temperature profiles, April - July 2021

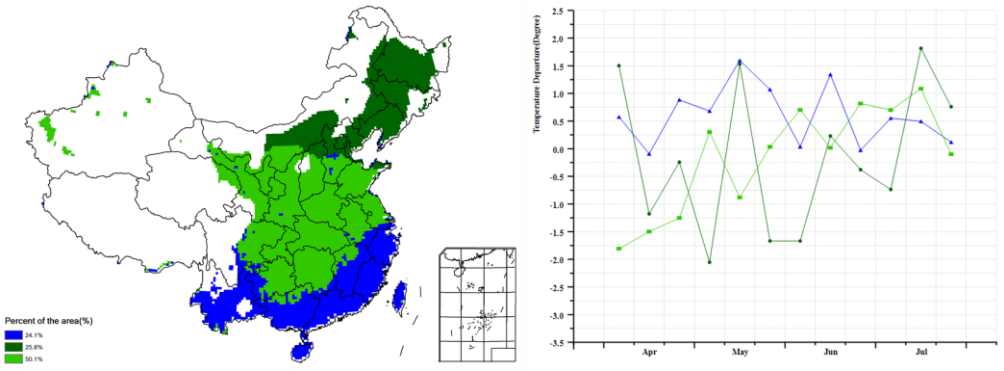


Figure 4.4 China spatial distribution of NDVI profiles, April-July 2021

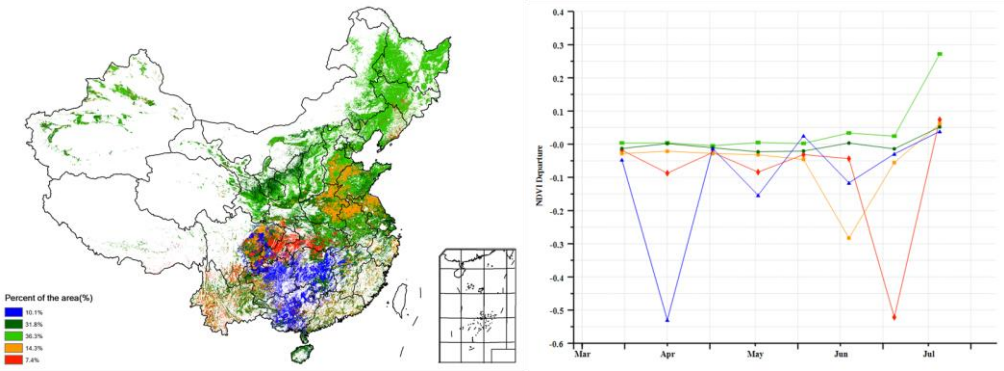


Figure 4.5 Cropped and uncropped arable land by pixel, April - July 2021

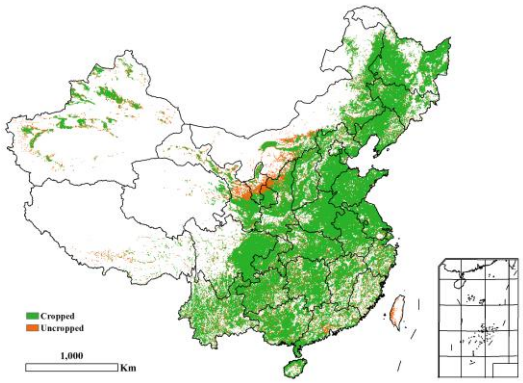


Figure 4.6 China maximum Vegetation Condition Index (VCIx), by pixel, April - July 2021

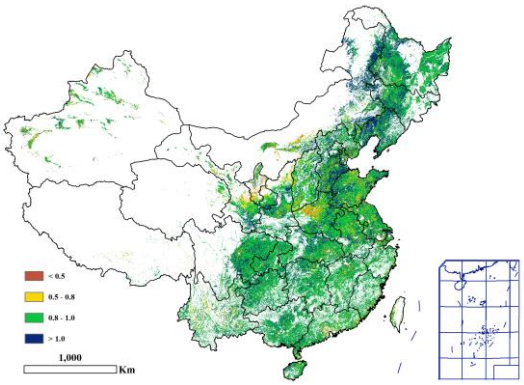


Figure 4.7 China biomass departure map from 15YA, by pixel, April-July 2021

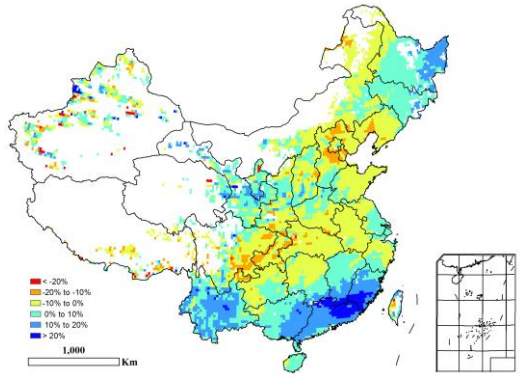


Figure 4.8 Time series rainfall profile for China

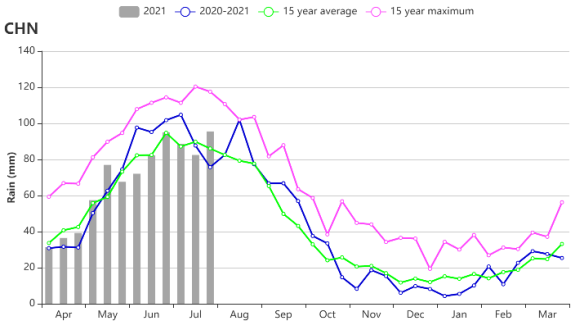


Figure 4.9 Proportion of NDVI anomaly categories from April to July 2021

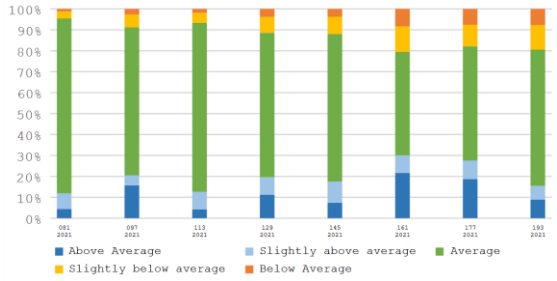
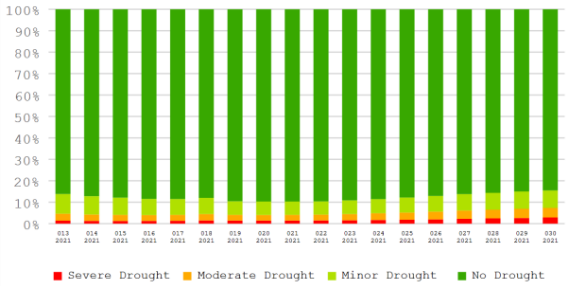


Figure 4.10 Proportion of different drought categories from April to July 2021



4.2 China's winter crops production

The multi-source remote sensing data such as Sentinel 1/2, Landsat 8 and Chinese satellite data such as Gaofen-1 were combined with the latest meteorological information, the yield of China's staple grain and oil crops (mainly including maize, rice, wheat and soybean) in 2021 was quantitatively predicted by integration of remote sensing index model, agro-meteorological yield estimation model. Based on GVG APP, 142,379 ground-based actual measurement samples covering 145 counties (or districts) in Northeast, North China Plain, Northwest, Southwest and other major agricultural production areas were collected. Combined with the latest national 10 m resolution cropland data, crop area was estimated using Big Data analysis method.

Total crop production in 2021 is expected to be 638.87 million tonnes, an increase of 7.44 million tonnes or 1.2% up from last year. Among them, the total output of summer crops (including maize, semi-late rice, late rice, spring wheat, soybeans, tuber crops and other minor crops) is expected to be 472.7 million tonnes, an increase of 6.379 million tonnes or 1.4% over 2020; the total output of winter crops in 2021 is estimated to be 132.48 million tonnes using the latest remote sensing data, an increase of about 982 thousand tonnes or 0.7% year-on-year. Planted area and yield of summer cropsincreased by 0.5% and 0.3%, respectively (Table 4.2).

Table 4.2 Review results of winter wheat production in China's major summer grain-producing provinces and cities in 2021

	2020	2021			
	Production (thousand tonnes)	Area variation(%)	Yield variation(%)	Production variation(%)	Production (thousand tonnes)
Hebei	12336	1.7	0.9	2.6	12653
Shanxi	2352	-2.3	-1.3	-3.5	2270
Jiangsu	10216	-1.1	-0.2	-1.2	10089
Anhui	12042	0.3	0.8	1.1	12179
Shandong	25638	2.8	1.7	4.5	26793
Henan	28081	-0.4	-0.5	-0.9	27824
Hubei	5492	-1.4	0.4	-1.1	5432
Chongqing	2318	-0.8	1.3	0.5	2329
Sichuan	5785	-1.2	1.8	0.6	5820
Shaanxi	4223	-3.5	1.5	-2.1	4135
Gansu	3605	-4.3	1.9	-2.4	3517
Subtotal	112087			0.9	113041
Other provinces	19415			0.1	19443
National*	131502	0.5	0.3	0.7	132484

Maize

Due to market factors such as the continued rise in maize prices, China's maize planted area increases by 1.8% to 41,463 thousand ha in 2021, an increase of 724 thousand ha. Although floods and other disasters occurred in some areas during the maize reproductive period, sufficient precipitation was generally favorable to maize yield formation, and national maize yields are expected to increase by 0.7%. Total maize production will reach 231.62 million tonnes, an increase of 5.52 million tonnes (Table 4.3). As the largest maize-producing region in China, the Northeastreceived abundant rainfall, creating good agro-meteorological conditions for maize production. Together with the year-on-year increase in maize planted area in Heilongjiang, Jilin, Liaoning and Inner Mongolia, maize production is expected to increase by 5.1%, 3.1%, 3.8% and 4.6%, respectively; Shandong, Hebei and Shanxi have good agro-meteorological conditions during the maize reproductive period, and maize yields are expected to increase by 3.9%, 4.8% and 1.0% from last year, respectively. In Gansu and Shaanxi, the temporary low precipitation during the fertility period of maize, resulted in poor growth condition, and maize production is expected to decrease by 5.2% and 2.2%, respectively;

Table 4.3 China's maize, rice, wheat and soybean production (thousand tonnes) and variation (%), 2021

Province	Maize		Rice		Wheat		Soybeans	
	2021	variation	2021	variation	2021	variation	2021	variation
Anhui	3571	-0.9	17396	0.2	11679	1.3	1081	1.4
Chongqing	2119	-0.4	4771	1.6	1146	0.3		
Fujian			2803	-0.7				

Gansu	5430	-5.2			3077	-1.7		
Guangdong			11329	-1				
Guangxi			10636	-0.3				
Guizhou	5185	0.2	5542	5.3				
Hebei	19635	4.8			12341	2.6	200	6.5
Heilongjiang	43057	5.1	22337	2.9	451	3.4	4849	-5.3
Henan	15713	-1.1	3776	-1.6	27694	-1	824	0.6
Hubei			16304	4.9	3904	-1		
Hunan			25070	-0.8				
Inner Mongolia	24139	4.6			1938	2.1	1200	1.3
Jiangsu	2193	0.4	16252	1.1	9867	-1.2	769	2.9
Jiangxi			16349	-0.5				
Jilin	30677	3.1	5794	0.7			814	2.2
Liaoning	18817	3.8	4592	4.3			439	4.9
Ningxia	1786	3.2	449	1.8	752	-0.8		
Shaanxi	3886	-2.2	1012	-3.1	4053	-2.1		
Shandong	19746	3.9			26554	4.5	737	5.5
Shanxi	9355	1			2197	-3.5	161	2.1
Sichuan	7057	-1.4	15196	2.8	5004	1.3		
Xinjiang	7013	4.8			5052	-1.6		
Yunnan	6547	3.1	5890	2.8				
Zhejiang			6489	-0.5				
Subtotal	225924	2.9	191986	1.1	115711	0.9	11074	-1.1
China*	231602	2.4	202798	0.8	127981	0.7	14371	-1.4

Affected by the flooding in July, the production of maize in Henan Province in 2021, was 15.713 million tonnes, a decrease of 182 thousand tonnes, or 1.1%. Nearly 1/4 of the maize in Hebi, and 15.1 thousand hectares and 14.5 thousand hectares of maize in Xinxiang and Anyang was damaged by floods, with maize production in Hebi, Xinxiang, and Anyang decreasing by 24.7%, 3.5%, and 2.2%, respectively; Zhoukou, the largest maize-producing city in Henan, was observed with a 1.3% decrease in maize production; Pingdingshan, Xuchang, and Kaifeng also had a small reduction in maize production. Strong precipitation at the same time brought sufficient water for maize in Nanyang and Zhumadian in southern Henan, Shangqiu in the east, Puyang in the northeast which is favorable for maize, production increased by 1.1%, 1.1%, 0.8% and 3.2% respectively, which narrowed the maize production drop caused by flooding.

Rice

The total national rice production is expected to be 202.80 million tonnes, an increase of 0.8% and 1.62 million tonnes; of which early rice production is 33.52 million tonnes, an increase of 0.2%, semi-late rice/single rice production is expected to be 134.14 million tonnes, an increase of 1.3%, and late rice production is expected to be 35.14 million tonnes, a decrease of 0.4%.

The national early rice planting area was 5,029.9 thousand hectares, a decrease of 1.4%, and the area shrank by 71.5 thousand hectares, but still higher than in 2019. Except for Fujian Province, where early rice yields declined, early rice yields increased in the remaining major producing provinces. Early rice yields in Hubei Province recovered by 4.7%, the largest increase in early rice producing provinces. The increase in national early rice yields offset the impact of shrinking planted area, with a slight increase of 0.2% production. Early rice production in four provinces including Anhui, Guangxi, Hunan and Hubei increased from 2020.

Since the sowing of the semi-late/single rice, the agro-meteorological conditions in the main rice producing areas are generally normal, and the average yield increased by 0.9% and the total output increased by 1.69

million tonnes from 2020. Semi-late/single rice production in Guizhou, Hubei, Liaoning, Sichuan, and Yunnan is expected to increase by 5.3%, 4.9%, 4.3%, 2.8% and 2.8%, respectively. Weather are more favorable compared with 2020 in Heilongjiang and Jilin, resulting in 2.9% and 0.7% increase of single rice production. The risk of flooding in the middle and lower reaches of the Yangtze River, and the rivers in the northeast still exists, and the local farmers should be prepared if disasters ocurr.

Soybeans

The national soybean area in 2021 is 7807.5 thousand hectares, a decrease of 132.3 thousand ha compared with 7939.8 thousand hectares in 2020. The national average soybean yield is expected to increase slightly by 0.3%, and the total output will reach 14.37 million tonnes, down 1.4%. In terms of the provinces, Heilongjiang and Inner Mongolia, the two major producing provinces, was observed with largest reduce ofsoybean planted area by 8.0% and 3.0%, mainly due to the agricultural policy and the high maize price. Farmers prefer maize rather than soybeans. More than average rainfall was observed in Heilongjiang and Inner Mongolia which provide sufficient water for soybean, although causing local Flooding. Favorable conditions benefitted soybean growth and yield formation, resulting in an increase of soybean yields. Soybean production in Heilongjiang Province is predicted to be 5.3% lower than 2020. Soybean yields in Inner Mongolia increased which compensate the impact of decreased planted areas, and soybean production is expected to increase by 1.3%. The remaining soybean-producing provinces and regions are all expected to close to 2020.

Wheat

The total winter wheat production in 2021 is estimated at 122.28 million tonnes, an increase of 1.13 million tonnes or 0.9%. The total planted area is 23,952.6 thousand hectares, up by 0.5%, and the average yield of winter wheat was 5,105.1 kg/ha, 0.5% higher than 2020 (Table 4.4). National wheat production is estimated at 127.98 million tonnes, an increase of 929 thousand tonnes compared with 2020; total spring wheat production is 5.7 million tonnes, a decrease of 0.20 million tonnes.

As for the provincial level, both planted area and yield of winter wheat in Hebei, Anhui and Shandong increased from 2020, and the output of winter wheat increased by 0.31 million tonnes, 0.15 million tonnes and 1.14 million tonnes respectively. Water deficit affected Shanxi's winter wheat, and both the yield and planted area decreased by 1.3% and 2.3%, resulting in a 3.5% decrease in winter wheat output. The winter wheat planted area in Jiangsu and Henan decreased slightly. The two provinces were also affected by strong winds and heavy rains in May which resulted in wheat lodging locally, leading to a slight decrease of wheat yield by 0.2% and 0.5%, respectively. As a result, winter wheat output dropped by 0.12 million tonnes and 0.27 million tonnes in Jiangsu and Henan, respectively. The area of winter wheat in Hubei, Chongqing, Sichuan, Shaanxi, and Gansu decreased, while the average winter wheat yield increased. The departure of winter wheat production from 2020 in those five provinces is less than 100 thousand tonnes.

Table 4.4 Winter wheat production in the main producing provinces in China,2021

	Planting area		Yield		Production	
	2021 (thousand hectares)	Variation (%)	2021(kg/ha)	Variation (%)	2021 (thousand tonnes)	Variation (%)
Hebei	1998	1.7	6176.5	0.9	12341	2.6
Shanxi	504.9	-2.3	4351	-1.3	2197	-3.5
Jiangsu	1956.4	-1.1	5043.2	-0.2	9867	-1.2
Anhui	2442.3	0.5	4782.1	0.8	11679	1.3
Shandong	4398.8	2.8	6036.5	1.7	26554	4.5

Henan	5349.9	-0.4	5176.6	-0.5	27694	-1
Hubei	971.4	-1.3	4019.2	0.3	3904	-1
Chongqing	340	-0.9	3372.3	1.2	1146	0.3
Sichuan	1283.7	-0.4	3898.6	1.7	5004	1.3
Shaanxi	1034.4	-3.5	3918.4	1.5	4053	-2.1
Gansu	433.1	-4.3	4057	1.9	1757	-2.4
Subtotal	20712.9	0.1	5127.1	0.8	106197	1
Other	3239.6	2.7	4964.7	-2	16084	0.6
National*	23952.6	0.5	5105.1	0.5	122281	0.9

4.3 Regional analysis

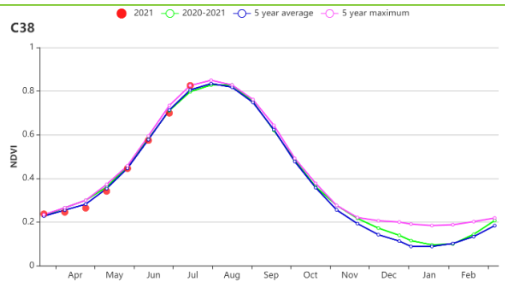
Figures 4.11 through 4.17 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to July 2021 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for April to July 2021 (compared to the (5YA)); (d) NDVI profiles associated with the spatial patterns under (c); (e) maximum VCI (over arable land mask); and (f) biomass for April to July 2021. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

Northeast region

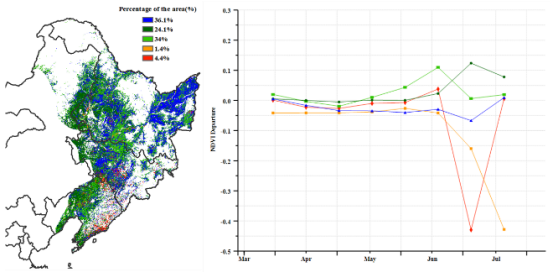
This current monitoring period covers the sowing and the first half of the growing season of main crops in the northeast of China (April to July 2021). CropWatch Agroclimatic Indicators (CWAIs) show that the precipitation greatly deviated from the average level. The total precipitation increased by 30%. It was above average level from late May to late July. The photosynthetically active radiation and the temperature were close to average. This resulted in a potential biomass estimate that was 2% above the fifteen-year average level.

The crop conditions during the monitoring period were in general slightly above average but spatial variations existed. The maximum VCI shows that all provinces of the Northeast of China were above 0.8, except for a small part of western Heilongjiang province near the riverside area. This was mainly due to the flooding caused by significant above average rainfall. The sowing dates in some low-lying areas in the eastern part of Heilongjiang province were delayed due to waterlogging in spring, this in return caused a delayed development of NDVI. In the eastern part of Heilongjiang province, soybean suffered from drought at the flowering stage, which negatively affected podding.

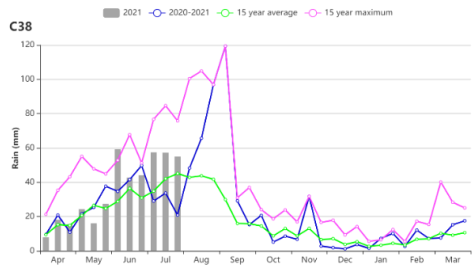
Figure 4.11 Crop condition China Northeast region, April - July 2021



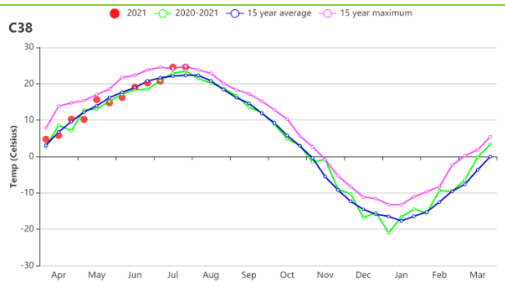
(a) Crop condition development graph based on NDVI



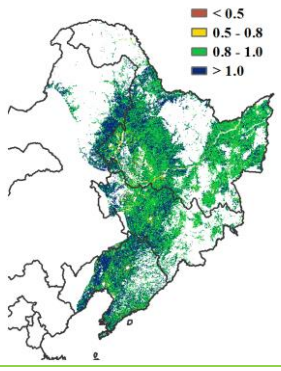
(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



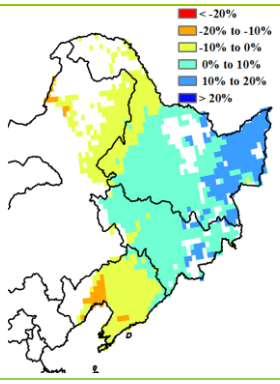
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



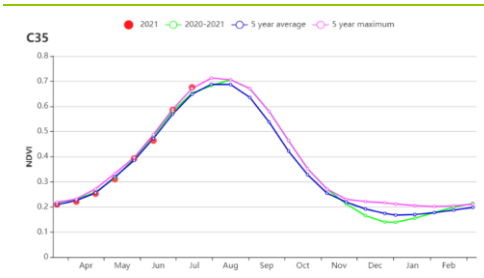
(g) Biomass departure

Inner Mongolia

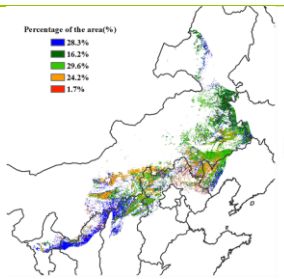
During the reporting period, the summer crops (maize, spring wheat and soybean) were grown in Inner Mongolia. Overall, the crop conditions were normal. Rainfall was greatly above average (+32%). TEMP (-0.3°C) and RADPAR (-3%) were both slightly below average, resulting in a below-average estimate for BIOMSS (-3%). The spatial and temporal distribution for these indicators was very uneven. Low temperatures dominated the early growing season from April to June, meanwhile a large increase in rainfall in July caused a below-average RADPAR in some region in Northern Hebei, where the biomass accumulation potential (BIOMSS) was significantly below average. Almost all cropped areas displayed consistently average NDVI during the reporting period.

The fraction of cropped arable land (CALF) reached 93%; VCIx was 0.96. According to the NDVI development graph, crop conditions were close to average during the reporting period. The final outcome of the season will depend on weather conditions in August and September.

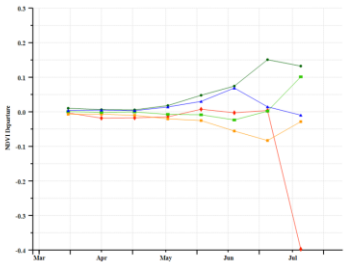
Figure 4.12 Crop condition China Inner Mongolia, April - July 2021



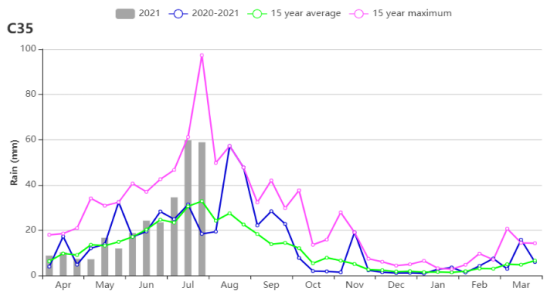
(a) Crop condition development graph based on NDVI



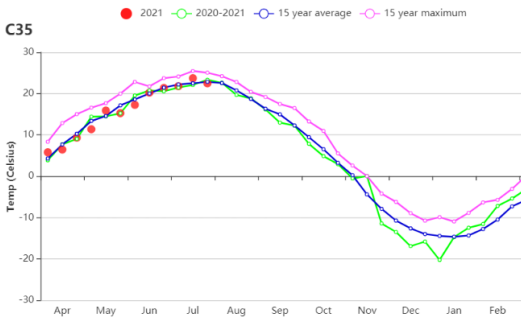
(b) Spatial NDVI patterns compared to 5YA



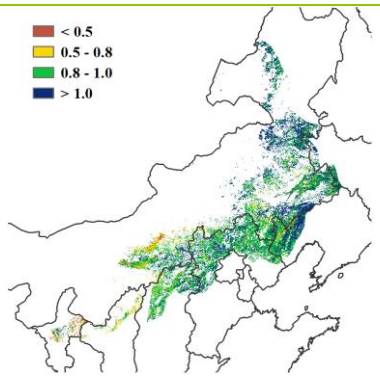
(c) NDVI profiles



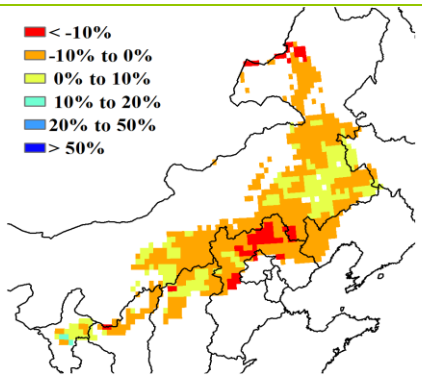
(d) Rainfall Index



(e) Temperature Index



(f) Maximum VCI



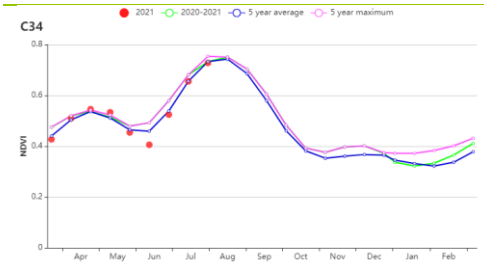
(g) Biomass departure

Huanghuaihai

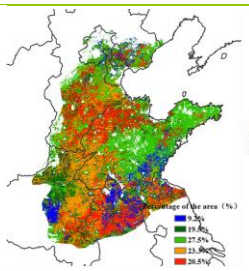
During the monitoring period, the main crops were winter wheat and summer maize in Huanghuaihai region. Winter wheat was sown in October last year and harvested in June this year. Summer maize was planted after the winter wheat had been harvested. Agroclimatic indicators show that precipitation increased by 50%, temperature and radiation decreased by 0.3 degree and 4% compared to the 15YA. Altogether, it led to a 3% decrease in BIOMSS compared to the 15YA. The potential biomass departure map shows that biomass in the most part of the region was higher than the average level except for Central Hebei. The VCIx value was 0.93.

The NDVI-based crop growth profile shows that the peak growing period of winter wheat in April and early May was higher than or equal to the 5-year maximum, and was at the 5YA in July. As shown by NDVI clusters and profiles, 27.5% of cropland over central and Eastern Shandong and a small part of Hebei presented positive NDVI departures. 20.5% of cropland in Northern Anhui and Shandong and Southern Hebei were above average before June, but fell to below average level in June, and began to turn better than average in early July. 9.2% of cropland in central Henan and some scattered area in Shandong and Anhui were negative NDVI departures in July because of the floods. The map of maximum VCI shows that except for the poor growth of crop in a small part of the area, the crop conditions in Southern Hebei and Eastern Henan were even better than the optimal condition in the past five years. Overall, the crop condition was favorable during the monitoring period.

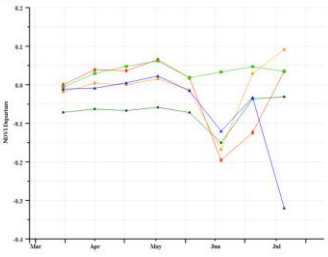
Figure 4.13 Crop condition China Huanghuaihai, April - July 2021



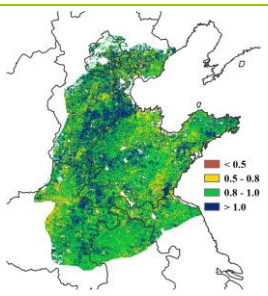
(a) Crop condition development graph based on NDVI



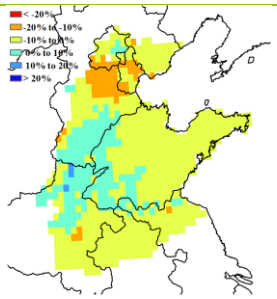
(b) Spatial NDVI patterns compared to 5YA



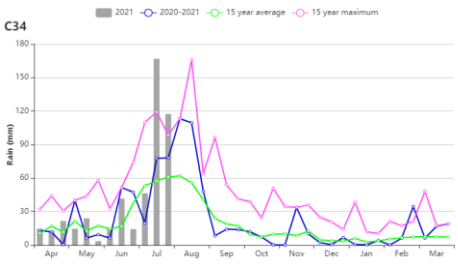
(c) NDVI profiles



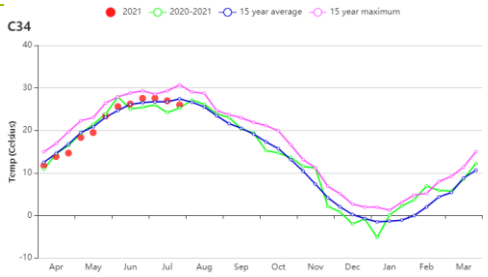
(d) Maximum VCI



(e) Biomass departure



(f) Time series rainfall profile

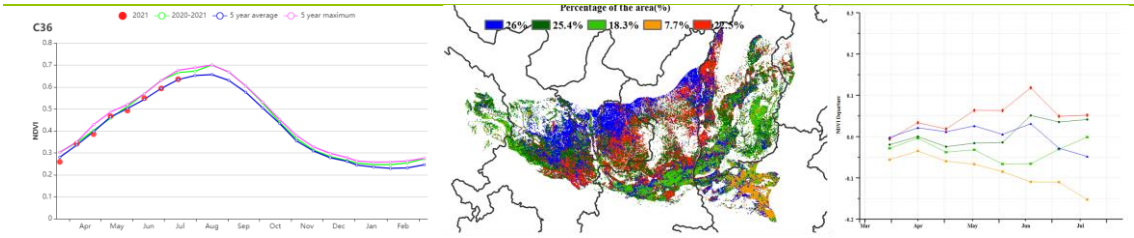


(g) Time series temperature profile

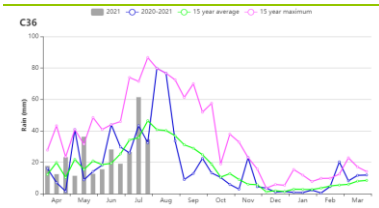
Loess region

During the reporting period, winter wheat was harvested from early to mid-June, while summer maize was planted in late June. Crop conditions in the Loess Region were close to average compared to the previous five years. The CropWatch Agroclimatic Indicators (CWAIs) in Loess Region show that the weather conditions were generally normal: Rainfall (RAIN) exceeded the average by 7%, temperature (TEMP) was below average by 0.1°C and radiation (RADPAR) dropped by 1%. The potential biomass (BIOMSS) was 2% above average. Temperatures were slightly below the 15-year average in April and then reverted to average in May and June, and were slightly above average in July. This may accelerate the loss of soil water, which is detrimental to the subsequent growth of autumn crops. As can be seen from the regional NDVI development graph, the crop conditions were generally close to the 5-year average in this reporting period. Precipitation was also generally close to average, and in late April, mid-May, and mid-July it was close to or above the 15-year maximum. NDVI clusters and profiles show that crop conditions were close to average in most parts of the region; about 7.7% was below the 5-year average from June to July, mainly in the northwest part of Henan Province. The Maximum VCI map shows high VCIx values in most cropped areas of the region, with an average value of 0.88. CALF was at 96% which is 2% above the 5YA.In conclusion, the current agroclimatic and agronomic conditions show normal crop production situation in this region.

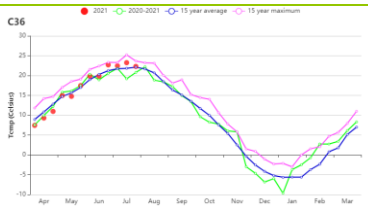
Figure 4.14 Crop condition China Loess region, April - July 2021



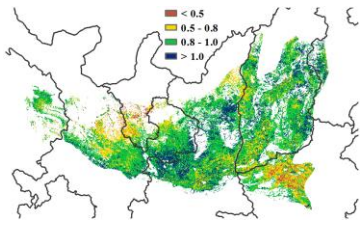
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



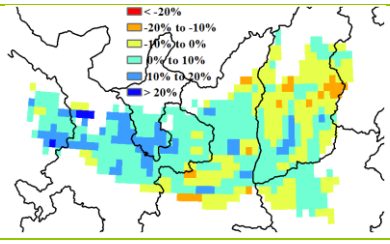
(d) Maximum VCI



(e) Biomass departure



(f) Maximum VCI



(g) Biomass departure

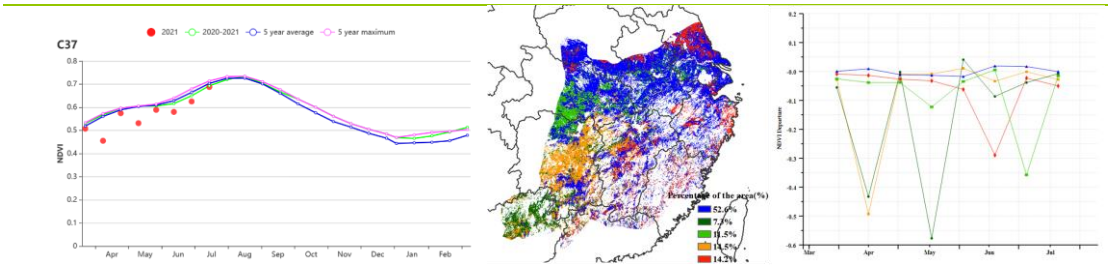
Lower Yangtze region

During this monitoring period, winter wheat and rapeseed had reached maturity and been harvested by June in Hubei, Henan, Anhui and Jiangsu provinces. The semi-late and late rice crops are still growing in the south and the center of the region including Jiangsu, Fujian, Jiangxi, Hunan, and Hubei provinces, while early rice has been harvested.

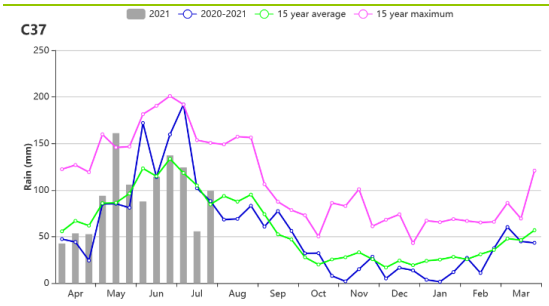
According to the CropWatch agro-climatic indicators, the accumulated precipitation and photosynthetically active radiation from April to July was close to the long-term average in this region. However, the precipitation changed greatly during the monitoring period. The rainfall profiles also indicate that the precipitation in mid-May exceeded the 15-year maximum, while the precipitation in mid-July was less. The temperature was slightly above average by 0.3℃. The overall normal agro-climatic conditions resulted in a 3% positive departure of the biomass production potential. The potential biomass departure map shows that in most places in this region, it varied between -10% and 20%. The potential biomass levels in Jiangsu, Fujian, Jiangxi and southern Hunan were up to 20% higher than 15YA. As shown in the NDVI development graph, crop conditions were slightly below the 5-year average. The crop growth in Jiangsu, Anhui, Henan and Hubei (accounting for 52.6% of the cropland in the region) was close to previous years from April to May. In June, the NDVI was below the 5YA, but improved to average levels in July. The average VCIx of this region is 0.94, and most of the area had VCIx values ranging from 0.8 to 1.

Overall, the crop conditions in the lower Yangtze region are normal.

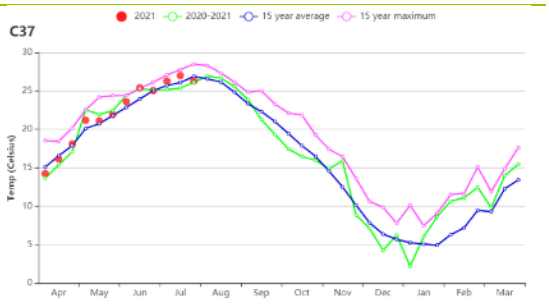
Figure 4.15 Crop condition China Lower Yangtze region, April - July 2021



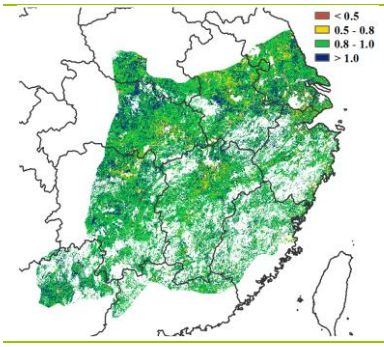
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



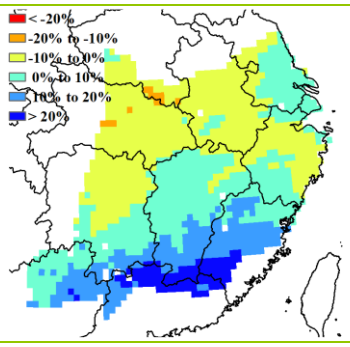
(d) Maximum VCI



(e) Biomass departure



(f) Maximum VCI



(g) Biomass departure

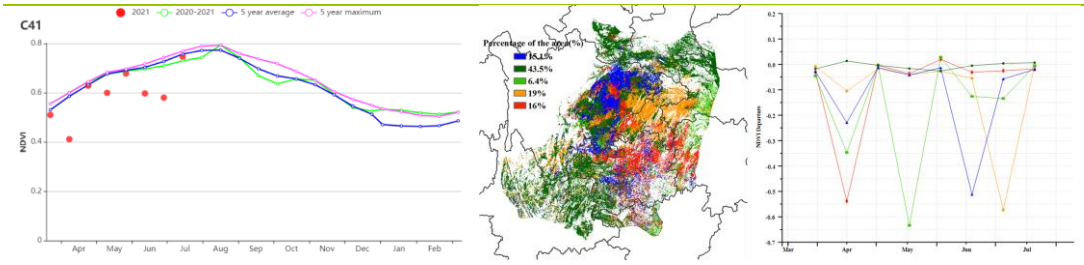
Southwest region

The reporting period covers the harvest of winter wheat in southwestern China, whose harvest was concluded by late April. Summer crops (including semi-late rice, late rice and maize) are still growing. Overall, crop conditions were slightly below the 5-year average.

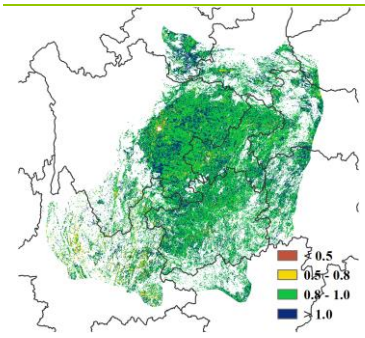
On average, rainfall was slightly above the 15-year average (RAIN +1%), whereas solar radiation was below average (RADPAR -4%). Temperature was close to average (TEMP +0.0°C). The resulting BIOMSS was 1% below average mainly due to lower radiation. The cropped arable land fraction remained at the same level as in the last five years, which indicated the crop planting conditions were generally normal for this period.

According to the NDVI departure clustering map and the profiles, crop condition was slightly below average in most areas of the whole region. Notably, rainfall and RADPAR were below average for Guizhou (-15% and -4% respectively), which hampered the crop photosynthesis and crop growth condition was unfavorable. However, average and higher NDVI throughout the monitoring period was observed in Yunnan, where radiation and precipitation were both above average (See Annex A.11). The maximum VCI reached 0.96, indicating that peak conditions were comparable to the last five years. The rainy and cloudy weather conditions persisted in this reporting period, and conditions were mixed but slightly below average.

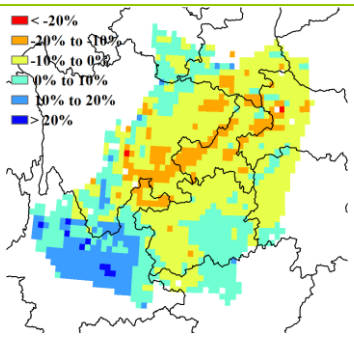
Figure 4.16 Crop condition China Southwest region, April - July 2021



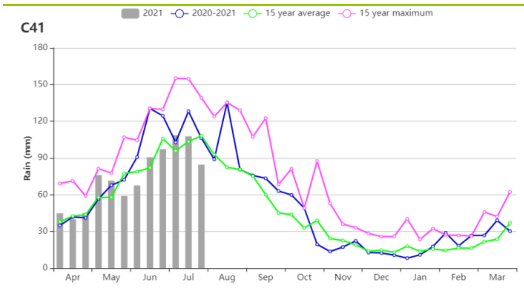
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



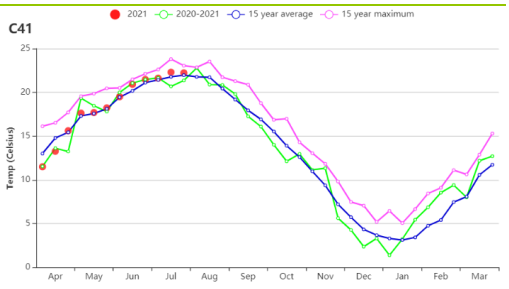
(d) Maximum VCI



(e) Biomass departure



(f) Time series rainfall profile



(g) Time series temperature profile

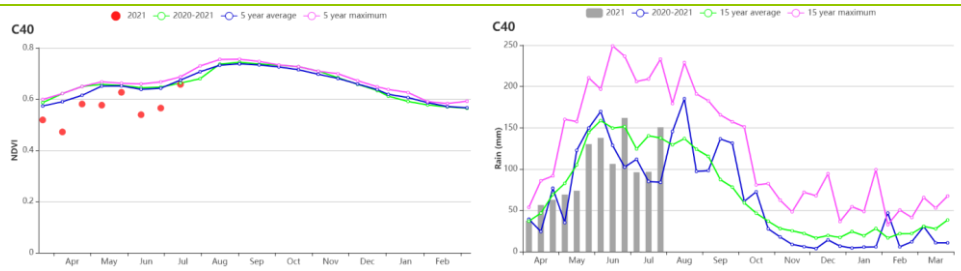
Southern China

During the monitoring period, the harvest of wheat and early rice was concluded. Spring maize reached maturity. In July, semi-late rice was in booting stage, and late rice was partially transplanted. According to the crop condition development graph based on NDVI, crop conditions were below the 5-year average in the early stage, but close to the average level at the end of the monitoring period.

For the whole region, although rainfall was below the 15YA (-12%), it still reached 1178mm, which is enough to meet the water requirement of crops. Radiation (+9%), temperature (+0.7°C), and BIOMSS (12%) were above average. As shown by the NDVI departure clustering map and the profiles, crop condition was below the 5-year average during most of the reporting period, especially in Guangxi and Guangdong due to the persistent drought. From April to early June, crop conditions were significantly lower than average. But at the end of the monitoring period, the overall NDVI in the region was close to the average level, probably due to the increased precipitation in late July after the harvest of early rice. Less rain and sufficient sunshine during the filling period were beneficial to the increase of rice yield, which led to an increase in BIOMSS. The average VCIx of the Southern China region was 0.92, and most of the area had VCIx values ranging from 0.80 to 1.00. Low VCIx values were mostly scattered in Yunnan and in central and southern parts of Guangdong. The cropped arable land fraction remained at the same level as in the last five years.

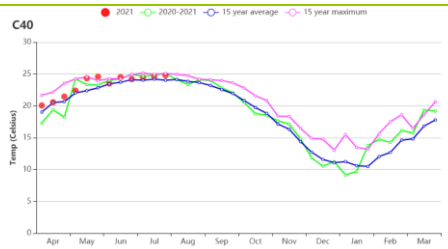
Overall, the crop conditions during the monitoring period tended to be normal.

Figure 4. 17 Crop condition Southern China region, April - July 2021

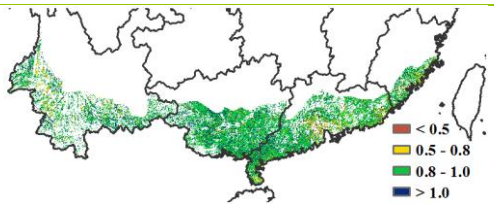


(a) Crop condition development graph based on NDVI

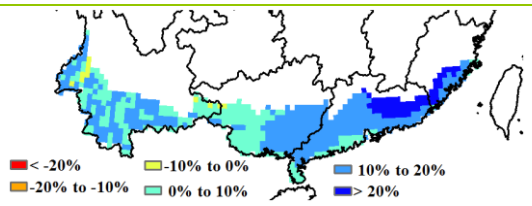
(b) Rainfall profiles



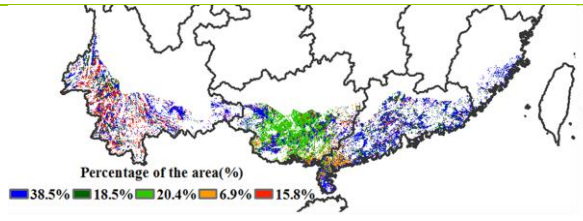
(c) Time series temperature profile



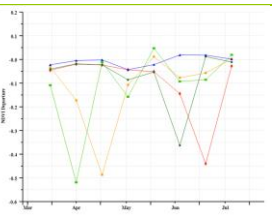
(d) Maximum VCI



(e) Biomass departure



(f) Crop condition development graph based on NDVI



(g) NDVI profiles

4.4 Major crops trade prospects

This section analyzes the import and export situation of the maize, rice, wheat, and soybean in China for 2021.

Maize

In the first half of the year, China imported 15.3037 million tonnes of maize, an increase of 3.2 times over the first half of last year. The main import sources were the United States and Ukraine, accounting for 57.8% and 41.7% of the total import respectively, with an import volume of US $4.048 billion. The export of maize was 3.9 thousand tonnes, an increase of 129% over the first half of last year, and the export volume was US $1.884 million.

Rice

In the first half of the year, China imported 2,554.9 thousand tonnes of rice, more than double the first half of last year. The main import sources were Pakistan, Vietnam, Myanmar, India and Thailand, accounting for 23.2%, 22.0%, 20.9%, 18.4% and 7.5% of the total import respectively, with an import volume of US $1.196 billion. The export of rice was 1,317.8 thousand tonnes, a decrease of 3.2% over the first half of last year. It was mainly exported to South Korea, Sierra Leone and Papua New Guinea, accounting for 10.5%, 9.5% and 7.0% of the total export respectively, with an export volume of US $556 million.

Wheat

In the first half of the year, China imported 5.3678 million tonnes of wheat, an increase of 60.1% over the first half of last year. The main import sources were Canada, the United States, Australia and France, accounting for 31.5%, 27.4%, 24.4% and 12.2% of the total import respectively, with an import volume of US $1.624 billion. The export of wheat was 35.7 thousand tonnes, a significant decrease over the first half of last year. It was mainly exported to Afghanistan and Ethiopia, accounting for 62.8% and 38.9% of the total export respectively, with an export volume of US $18.4128 million.

Soybean

In the first half of the year, China imported 48.9562 million tonnes of soybeans, an increase of 8.7% over the first half of last year. The main import sources were Brazil and the United States, accounting for 53.4% and 44.1% of the total import respectively, with an import volume of US $25.435 billion. Soybean exports were 40.1 thousand tonnes, a decrease of 20.8% over the first half of last year.

Trade prospects for major cereals and oil crop in China for 2021

On the basis of remote sensing-based production prediction in major agricultural producing countries in 2021 and the Major Agricultural Shocks and Policy Simulation Model, it is predicted that the import of major grain crop varieties will increase slightly in 2021. The details are as follows:

Maize

At present, the supply and demand of domestic maize is in a tight balance. China's demand for maize in the international market remains strong. Combined with the impact of the implementation of the Sino US economic and trade agreement, it is expected that China's maize import will increase significantly by 70.5% and export will decrease by 12.4% in 2021.

Rice

Novel coronavirus pneumonia is the main cause of the global rice market supply and demand. The price gap between China and abroad is persisting. The import of rice will keep growing in the light of the Covid-19 pandemic. The import of rice is expected to grow by 75.3% and export by 2.5% in 2021.

Wheat

Affected by drought and other natural disasters, the global wheat output has declined and the price difference at home and abroad has narrowed. It is expected that China's wheat import will increase by 20.5% and export will decrease by 10.7% in 2021.

Soybean

As the domestic soybean consumption demand remains stable and the domestic soybean output is limited, China's soybean import will maintain a steady growth. It is expected that China's soybean import will increase by 5.6% and export will decrease by 11.6% in 2021.

Figure 4.18 Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2021 compared to those for 2020(%).