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 presents an updated estimate of major cereals and soybean production at provincial and national level as well as summer crops production and total annual outputs (4.2) and 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 (4.3). Section 4.4 describes trade prospects (import/export) of major crops. Additional information on the agro-climatic indicators for agriculturally important Chinese provinces are 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 overall at average, with rainfall slightly below average (-4%), temperature (+0.2°C) and RADPAR (+3%) slightly above average. There are significant regional differences among agro-climatic indicators, showing a spatial pattern of persistent high temperature in the south and above average precipitation in the northeast.

According to the time series rainfall profile, above-average rainfall was observed nationwide in late April, late May, from early June to middle June, and early July. Three of the main agricultural regions of China recorded above-average rainfall, with the largest positive departure occurring in Northeast China (+35%), while three of the main agricultural regions of China recorded below-average rainfall, with the largest negative departure occurring in Southwest China (-9%). At the country level, rainfall anomalies fluctuated largely over time and space. As can be seen from the spatial distribution of rainfall profiles, 63.5% of the cropped areas (marked in light green) recorded near average precipitation. 10.1% of the cropped areas, mainly located in the eastern part of Southern China and southern part of Lower Yangtze region, received significantly above-average rainfall (more than +90 mm/dekad) during middle June and early July, which might cause difficult conditions for the harvest of early rice. The remaining 26.5% of cropped areas experienced the largest negative departure of rainfall (almost -60 mm/dekad) during middle July, occurred mainly in the province of Anhui, Jiangsu, Zhejiang, Jiangxi, Guizhou, and some parts of Sichuan, Yunnan, Guangxi and Fujian.

Five of the main agricultural regions in China recorded above-average temperatures, with the largest positive departure occurring in Huanghuaihai (+0.9°C), while only two region recorded below-average temperature (-0.1°C in Southern China, -0.3°C in Northeast). Temperatures fluctuated during the monitoring period as follows: 33.8% of the cultivated regions, marked in light green, had relatively small temperature fluctuations, with the largest positive temperature anomalies by approximately +2.0℃ in early April. 33.8% of the cropped areas in Southern China, southern part of Southwest China and Lower Yangtze region had negative temperature anomalies by more than -3.0℃ in middle May. The remaining 32.4% of the cultivated regions, marked in dark green, had positive temperature anomalies in early April and from early June to early July. Northeast China was the only region in which RADPAR was below average (-1%), whereas the largest positive departure was recorded for the Loess region (+6%).

As for BIOMSS, the situation was quite different among all the main producing regions, with the departures between -3% (Huanghuaihai, Loess region and Lower Yangtze region) and +10% (Northeast China). CALF increased slightly in the Loess region (+1%) and was near average in other main agricultural regions as compared to the 5YA.

The maximum vegetation condition index (VCIx) reached a high value of 0.92 at the national scale, indicating an overall favorable condition in China. The VCIx values were higher than 0.9 in almost all the main producing regions of China, with values between 0.90 and 0.95, except for the Loess region (0.89).

Table 4.1 CropWatch agroclimatic and agronomic indicators for China, April - July 2022, departure from 5YA and 15YA

Region	Agroclimatic indicators				Agronomic indicators	
	Departure from 15YA (2007-2021)				Departure from 5YA (2017-2021)	Current period
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	1	0.9	3	-3	0	0.90
Inner Mongolia	4	0.3	0	0	0	0.90
Loess region	-8	0.8	6	-3	1	0.89
Lower Yangtze	-6	0.2	5	-3	0	0.91
Northeast China	35	-0.3	-1	10	0	0.95
Southern China	0	-0.1	3	-2	0	0.93
Southwest China	-9	0.2	4	-1	0	0.94

Figure 4.1 China crop calendar

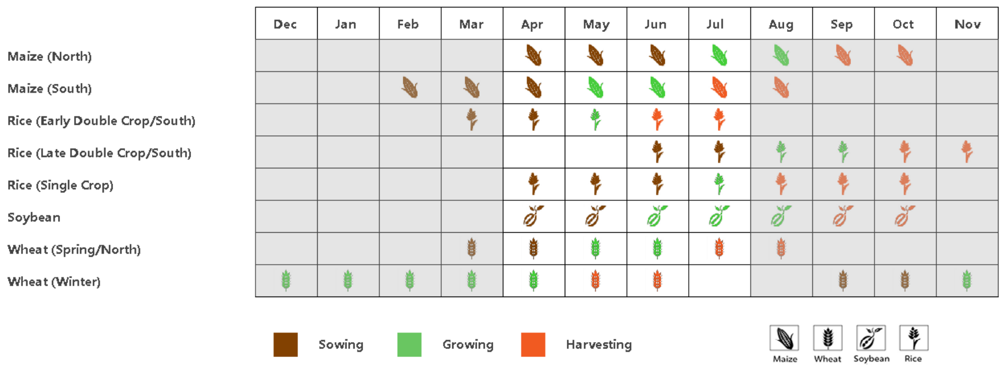


Figure 4.2 China spatial distribution of rainfall profiles, April to July 2022

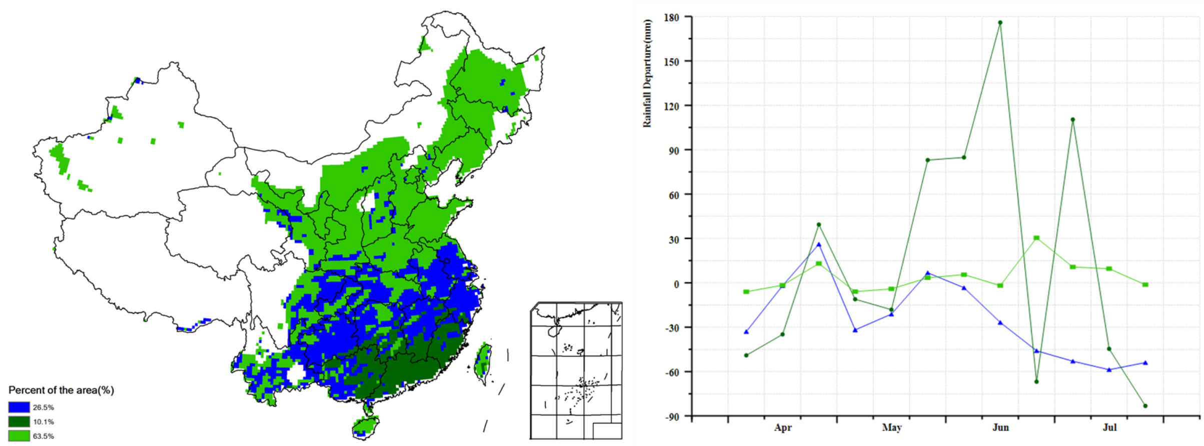


Figure 4.3 China spatial distribution of temperature profiles, April - July 2022

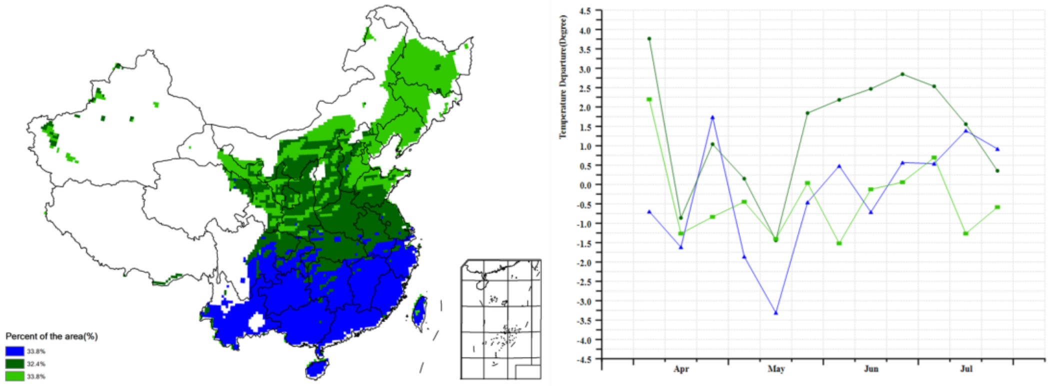


Figure 4.4 China cropped and uncropped arable land, by pixel, April - July 2022

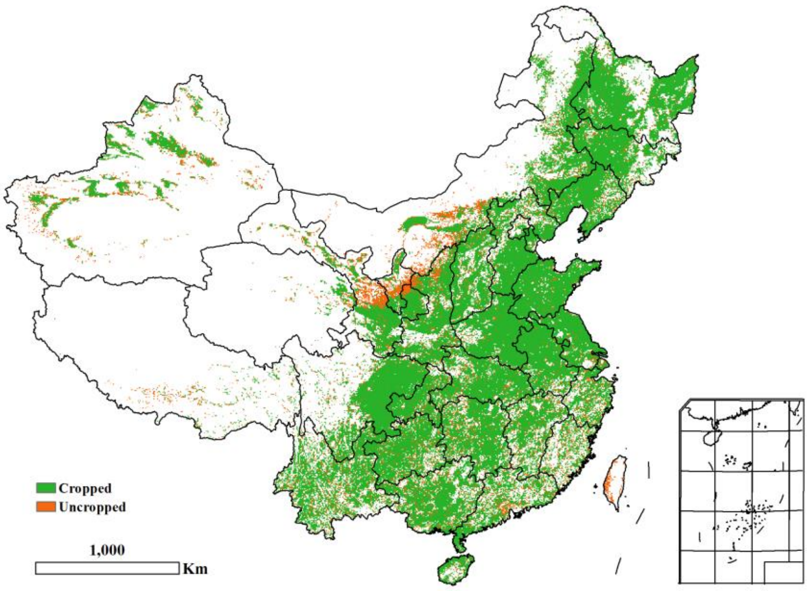


Figure 4.5 China maximum Vegetation Condition Index (VCIx), by pixel, April - July 2022

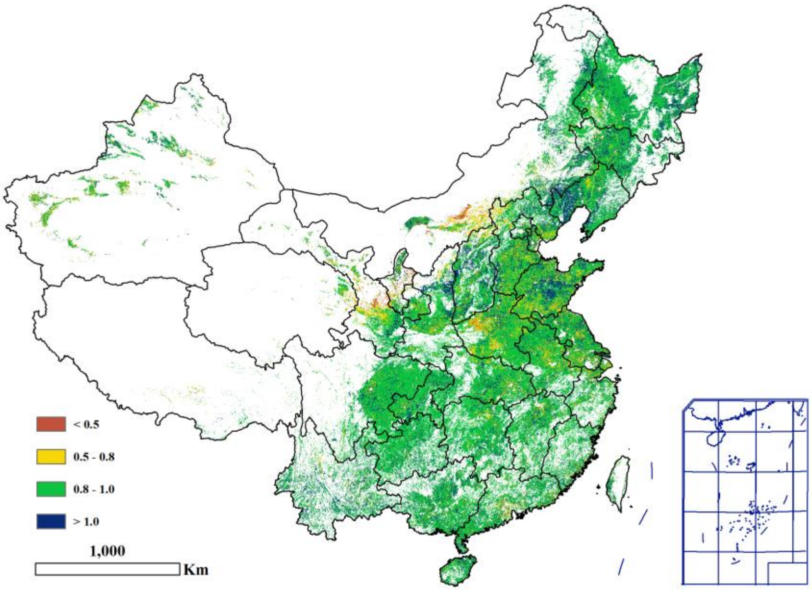


Figure 4.6 China biomass departure map from 15YA, by pixel, April - July 2022

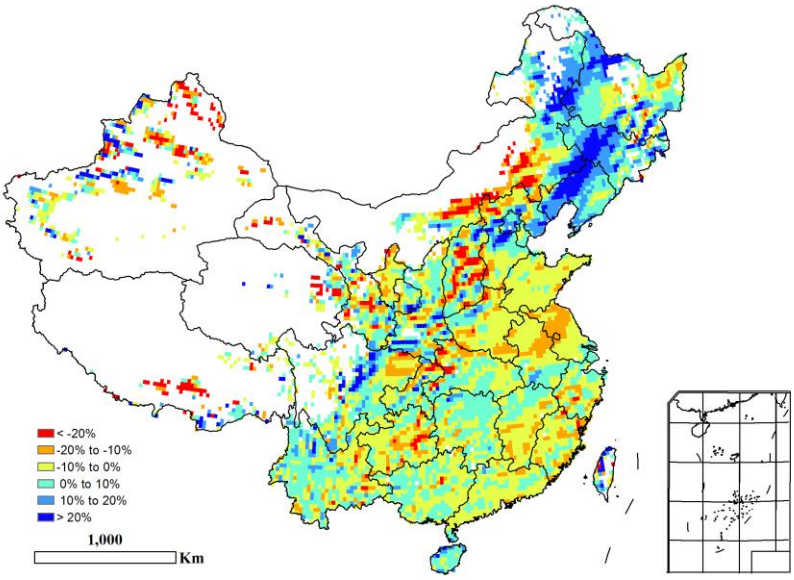
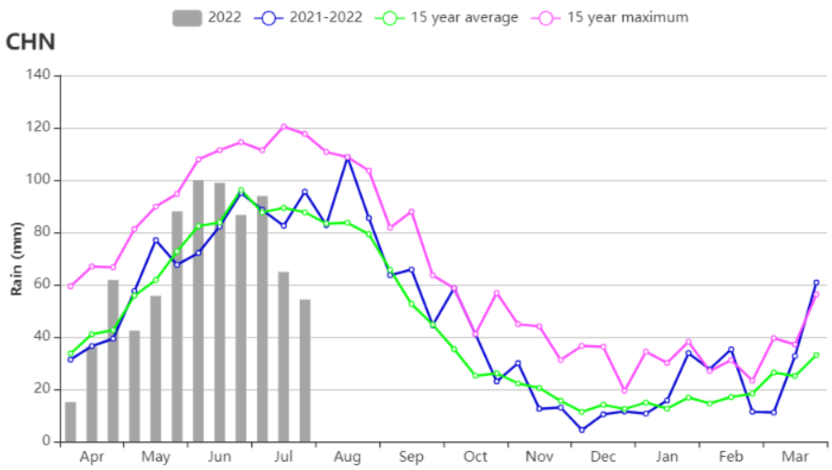


Figure 4.7 Time series rainfall profile for China



4.2 China's crop production

In order to estimate the production of crops in China, CropWatch used ESA Sentinel 1/2, Landsat 8 and Gaofen-1/2 domestic satellite and other multi-source remote sensing data, combined with the latest meteorological information on agriculture. Its survey data consist of nearly one million ground-based sample points in major agricultural production areas in the Northeast, North China Plain, Northwest, Southwest, Northwest and Southwest of China. In addition, CropWatch uses a nationwide 10 m resolution arable land map, the remote sensing index model, and a yield estimation model based on meteorological data to quantify and forecast the production of maize, rice and soybean as well as summer crops production in China in 2022. It also made a final estimate of summer crops and winter wheat production in China for the 2021/22 season.

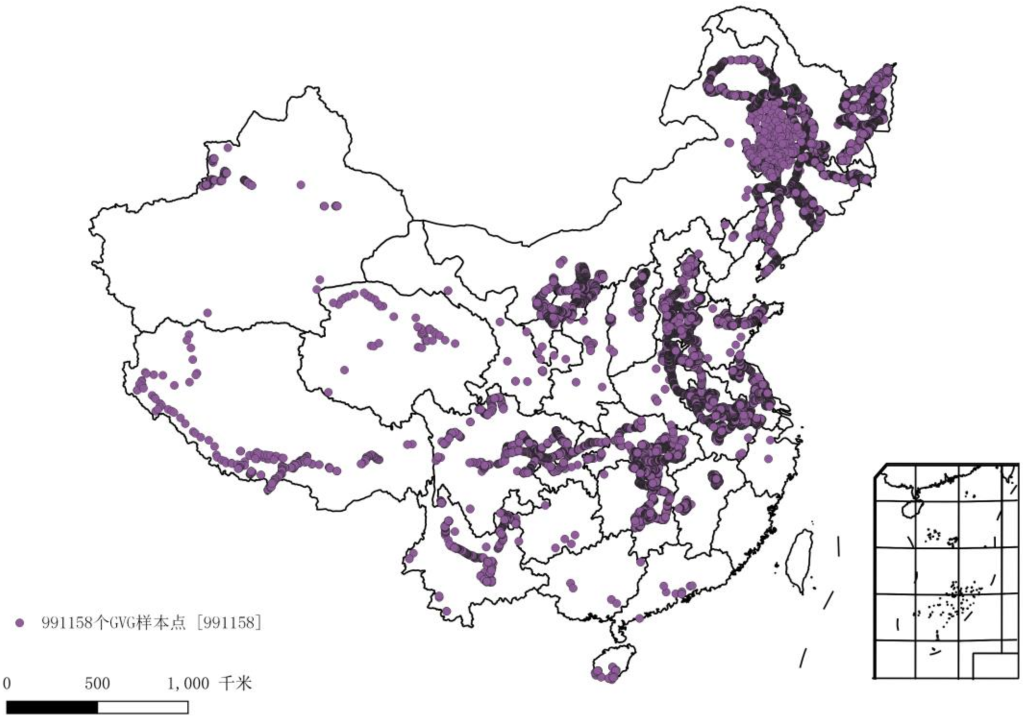


Figure 4.8 GVG field samples

Total annual grain production in 2022 is expected to be 643.6 million tons, a decrease of 8.62 million tons or 1.3% from the same period last year. Among them, the total staple crops (mainly wheat and rice) production remains close to 2021 at 331.24 million tons. The total output of summer crops (including maize, semi-late rice, late rice, spring wheat, soybeans, root and tuber crops and other minor crops) is expected to be 473.82 million tons, a decrease of 7.89 million tons or 1.6% from 2021. The latest remote sensing data were used to revise the total winter crops production at 142.23 million tons in 2022, a decrease of 980,000 tons or 0.7% year-on-year. The decrease was due to a reduction in total winter crop area by 1.9%, but good agro-meteorological conditions during the grainfilling period helped increase the yield per unit area by 1.2% (Table 4.2).

Table 4.2 Production per unit area and total output forecast of China's main summer crop producing provinces in 2022

	2021	2022			
	production (thousand tonnes)	Area change (%)	Yield change (%)	Production change (%)	Production (kiloton)
Hebei	12764	-3.5	1.6	-2.0	12508
Shanxi	2241	1.3	3.0	4.4	2339
Jiangsu	13964	-1.5	1.7	0.2	13988
Anhui	15096	-2.5	-0.4	-2.9	14661
Shandong	27249	-2.2	1.9	-0.4	27152
Henan	33188	-3.7	2.2	-1.6	32653
Hubei	6226	-2.1	1.5	-0.6	6185
Sichuan	5820	-0.6	2.9	2.3	5956
Shaanxi	4135	-0.9	-0.8	-1.7	4065

	2021	2022			
	production (thousand tonnes)	Area change (%)	Yield change (%)	Production change (%)	Production (kiloton)
Gansu	3517	0.9	0.4	1.3	3563
Xinjiang	5077	-1.3	2.1	0.8	5118
Sub total	129278			-0.8	128190
Other provinces	13925			0.8	14037
China	143203	-1.9	1.2	-0.7	142227

Maize: China's total maize production in 2022 is estimated at 222.76 million tons, down 11.08 million tons or 4.7% year-on-year, the largest reduction in the last 10 years. Remote sensing monitoring shows that China's maize planted area will be 40.862 million hectares in 2022, a decrease of 1.359 million hectares (about 20.39 million mu) or 3.2% year-on-year. Interviews with farmers showed that the main reason for the decrease in maize acreage in 2022 was the increase in soybean planting subsidies, which motivated farmers to plant more soybeans and reduce the area under maize, with the most significant areas of maize acreage reduction in Heilongjiang and Inner Mongolia.

During the growing season of maize, several major production areas were affected by unfavorable agrometeorological conditions such as extreme drought or local flooding, which adversely affected the yield, estimated to be 5,452 kg/ha nationwide, a decrease of 1.6% year-on-year. The northeast region is the largest maize producing area in China, and this year's significantly higher-than-usual precipitation in that region caused localized flooding in northwestern Heilongjiang Province, central Jilin Province and north-central Liaoning Province. Coupled with a significant reduction in maize acreage in Heilongjiang and northeastern Inner Mongolia, this resulted in a year-over-year decrease in maize production in the four provinces and regions of Heilongjiang, Jilin, Liaoning and Inner Mongolia by 14.0%, 1.6%, 3.4% and 7.7% respectively. The Yangtze River basin experienced higher than usual temperatures and less rainfall in July. This resulted in a serious meteorological drought in Anhui, Chongqing and Sichuan provinces. Irrigation in Anhui Province helped alleviate the drought. However, in Chongqing and Sichuan corn production is estimated to be reduced by 3.3% and 9.4% respectively.

Rice: The total national rice production is expected to be 197.01 million tons, an increase of 0.58 million tons or about 0.3% year-on-year. The estimate for early rice production is 27.55 million tons, an increase of 0.9% year-on-year, for semi-late rice / single rice it is 134.47 million tons, an increase of 0.2% year-on-year, and for late rice it is 34.99 million tons, the same as in 2021.

The national early rice planting area in the main producing provinces was 5.228 million hectares, an increase of 0.022 million hectares or 0.4% year-on-year, mainly due to the implementation of a new subsidy policy for double cropping rice planting. Another factor was the decrease in off-farm employment opportunities due to the pandemic. The national early rice yield was 5,269 kg/ha, an increase of 0.6% year-on-year. The increase in yield and area contributed to an increase of 0.25 million tons of early rice production to 27.55 million tons, an increase of 0.9%. Early rice production in Anhui, Hubei and Guangdong decreased by 2.2%, 3.7% and 1.3% year-on-year respectively, while the rest of the major early rice producing provinces achieved an increase in production.

The agro-meteorological conditions for production in the northern semi-late rice / single rice producing areas have been generally good. The single rice production in Heilongjiang Province increased by 2.5% year-on-year, while the continuous heavy precipitation in Jilin and Liaoning was unfavorable for the flowering of single rice, resulting in a year-on-year decrease of 0.9% and 1.2% in rice production in the two provinces, respectively. Persistent extreme heat in the main rice producing areas of the Yangtze River Basin is affecting grain filling, leading to a year-on-year decrease in rice production in Sichuan, Hubei and Jiangxi provinces, with rice production expected to decrease by 3.9%, 1.8% and 0.2% year-on-year, respectively. Persistent extreme heat is impacting single-season late rice production in the main producing provinces of late rice in the middle and lower reaches of the Yangtze River.

Soybeans: Total national soybean production in 2022 is expected to be 18.15 million tons, an increase of 3.81 million tons or 26.5% year-on-year, the largest increase in the past 10 years. The national soybean planted area is 9.851 million hectares, the largest planted area since the implementation of the soybean revitalization program, an increase by 2,043 million hectares (about 30.65 million mu), or about 26.2%, compared with 2021; the national soybean yield per unit area is 1,843 kg/ha, an increase of 0.3%.

The large increase in areas planted is due to an increase in various subsidies for specific planting methods, arable land rotation and use of improved seeds. They helped make soybean production more profitable. In Heilongjiang and Inner Mongolia, the two major soybean-producing provinces, planting area increased by 1.384 million hectares and 0.438 million hectares. It is estimate that this will lead to an increase in production by 1.93 million tons and 0.480 million tons, an increase of 40.3% and 39.6% respectively. Henan, Hebei, Jiangsu, Shaanxi and other provinces have also increased soybean production to varying degrees.

Wheat: Using remote sensing data and ground observation data for the full growth period of wheat, the national wheat production in 2022 was estimated at 134.23 million tons, a decrease of 0.64 million tons, or 0.5%, year-on-year. Among them, the total production of winter wheat is 128.52 million tons, a decrease of 0.65 million tons or 0.5%, and the total production of spring wheat is 5.71 million tons, basically the same as in 2021.

Table 4.3 China maize, rice, wheat and soybean production (thousand tonnes) and variation (%) in 2022

	Maize		Rice		Wheat		Soybeans	
Province	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)
Anhui	3545	-0.2	16523	0.6	14181	-2.0	1060	-1.3
Chongqing	2051	-3.3	4810	0.8				
Fujian			2233	1.0				
Gansu	5326	-4.2			2610	5.2		
Guangdong			10431	-0.6				
Guangxi			9983	0.4				
Guizhou	5147	-0.7	5480	-1.1				
Hebei	19297	0.4			12199	-2.0	201	2.4
Heilongjiang	43222	-14.0	22899	2.5			6721	40.3
Henan	15246	-0.7	3863	2.3	32508	-1.6	834	3.3
Hubei			14990	-1.8	4470	-0.1		
Hunan			25337	0.8				
Inner Mongolia	22734	-7.7			1975	0.2	1690	39.6
Jiangsu	2035	-7.2	16663	2.5	13574	-0.6	808	5.2
Jiangxi			14968	-0.2				
Jilin	30910	-1.6	5744	-0.9			709	-13.4
Liaoning	15791	-3.4	4537	-1.2			422	-3.4
Ningxia	1689	-0.3	488	8.8				
Shaanxi	3807	-0.1	983	-2.9	4003	-1.3		
Shandong	18933	-1.5			26909	-0.4	707	-1.1

	Maize		Rice		Wheat		Soybeans	
Province	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)	2022 (thousand tonnes)	Variation (%)
Shanxi	9474	3.2			2264	4.4	166	4.5
Sichuan	6535	-9.4	14610	-3.9	1972	2.7		
Xinjiang	7268	4.6			5017	1.1		
Yunnan	6629	3.2	6157	4.5				
Zhejiang			6241	-0.5				
Subtotal	219639	-4.6	186940	0.3	121683	-0.8	13316	21.3
other	3123	-10.9	10070	0.0	12546	2.8	4835	43.4
China	222762	-4.7	197010	0.3	134229	-0.5	18151	26.5

4.3 Regional analysis

Figures 4.10 through 4.16 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 October 2021 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for July to October 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 July to October 2021. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

Northeast region

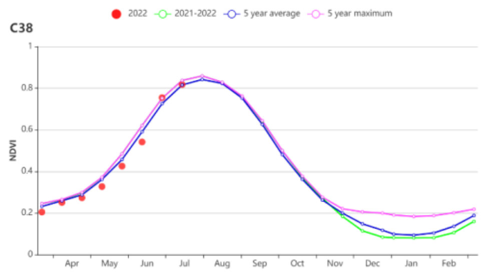
This report covers the period from the sowing to the peak of the growing season of main crops in the northeast of China (April to July 2022). CropWatch Agroclimatic Indicators (CWAIs) show that the precipitation greatly deviated from the average levels. The total precipitation increased by 35% from the 15YA. It was above average from late May to late July. The photosynthetically active radiation was below average (RADPAR -1%) and the temperature was below average (TEMP -0.3℃). The high precipitation is overall beneficial for crops, resulting in a potential biomass estimate that was 10% above the fifteen-year average level. However, great variability was observed within this region, with higher positive departures mostly in the western part and negative departures commonly distributed in the eastern part. Significantly below average BIOMSS was mostly located in central and northeastern Heilongjiang province.

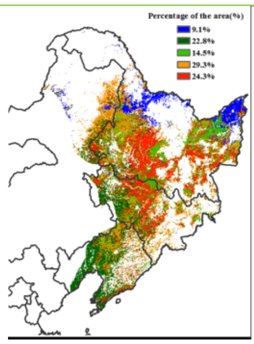
The crop conditions during the monitoring period in general were slightly below average from April to June and slightly above average in July, but spatial variations existed. As shown by NDVI clusters and profiles, 22.8% of cropland over Liaoning province and western Jilin province were positive. 9.1% of cropland over northeastern Heilongjiang province and Heihe were negative, indicating that crops in this area were in relatively poor condition. Most parts of Heilongjiang province and central and western Jilin were significantly below average in June and improved in July. In addition, as shown by the crop map of 2021 and 2022, soybean planting area in Heilongjiang and Inner Mongolia and other places has increased significantly, replacing maize.

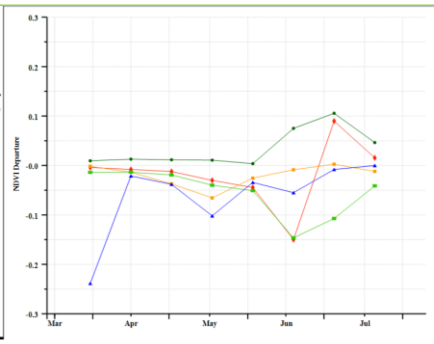
The maximum VCI shows that most parts of the Northeast of China were above 0.8, except for a small part in the waterlogged areas. This was mainly due to the flooding caused by significantly above average precipitation. During the field survey, it was confirmed that some fields in low lying areas were damaged by waterlogging and the flooding. NDVI departure maps at the end of July also presented below-average crop conditions, mostly along the rivers and in low land areas.

Overall, crop conditions were normal for this region.

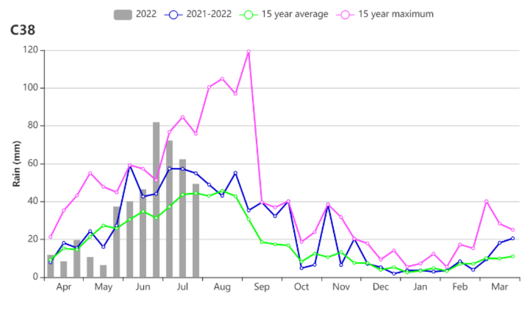
Figure 4.9 Crop condition China Northeast region, April - July 2022

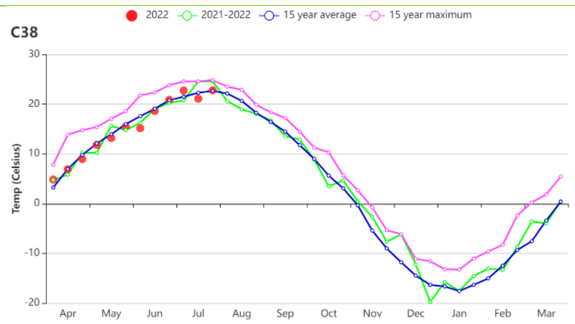




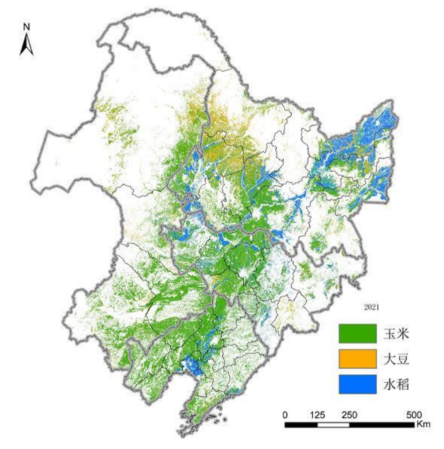


(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles

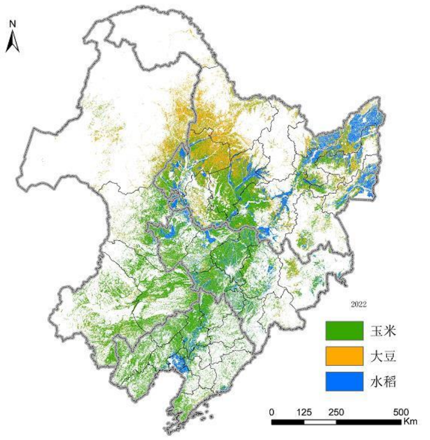




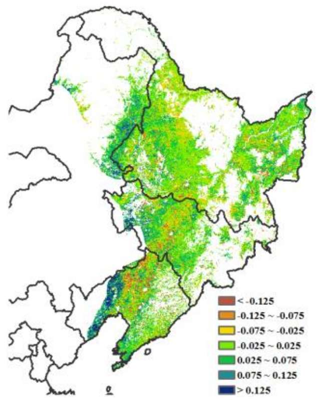
(d) Time series rainfall profile (e) Time series temperature profile



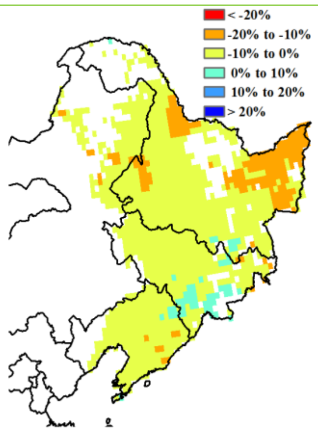
(f) Crop map in 2021



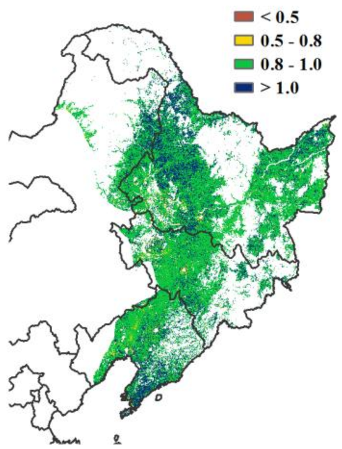
(g) Crop map in 2022



(h) NDVI departure from 5YA at end of July



(i) Biomass departure from 15YA



(j) Maximum VCI

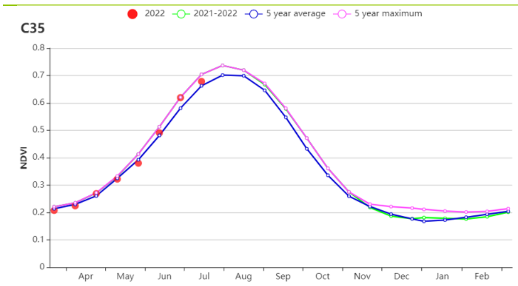
(k) Waterlogged areas in Heilongjiang province

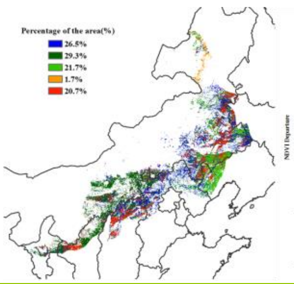
Inner Mongolia

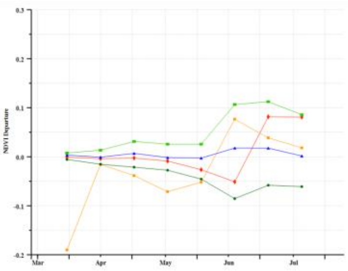
During the reporting period, single season crops (maize, wheat and soybean) were grown in Inner Mongolia. Overall, the crop conditions were normal. Both RAIN (+4%) and TEMP (+0.3°C) were slightly above average. RADPAR was close to average, resulting in an average estimate for BIOMSS. The spatial and temporal distribution for these indicators was very uneven. Precipitation was insufficient in some region in Northern Shaanxi, Central Ningxia and Central Inner Mongolia, which may have had a negative impact on the rain-fed crops. As illustrated in the crop development graph from May to July, 29.3% of the cropped areas displayed consistently below-average NDVI in the precipitation deficit affected areas mentioned above from May to July. This is confirmed by VCIx values being lower than 0.5 in these areas, where the biomass accumulation potential (BIOMSS) was also well below average. 26.5% of the cropped areas displayed consistently average NDVI during the reporting period, while the rest of the cropped areas improved in June and July.

The fraction of cropped arable land (CALF) reached 95%; VCIx was above average (0.90). Crop conditions were slightly above average during the reporting period, which is consistent with the agricultural production situation index (1.14). The final outcome of the season will depend on weather conditions in August and September.

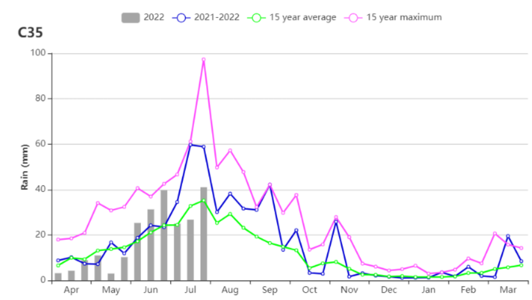
Figure 4.10 Crop condition China Inner Mongolia, April - July 2022

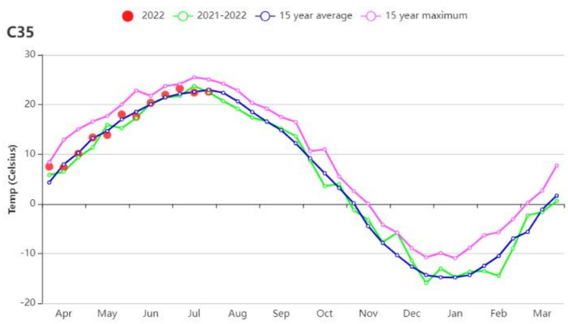






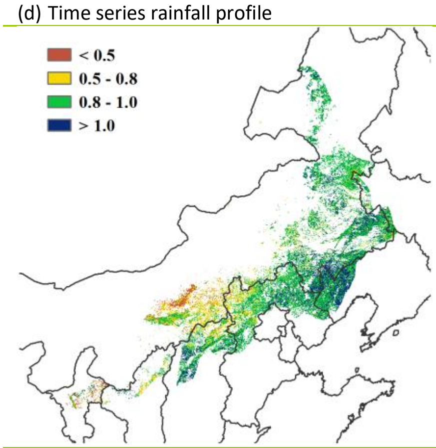
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles

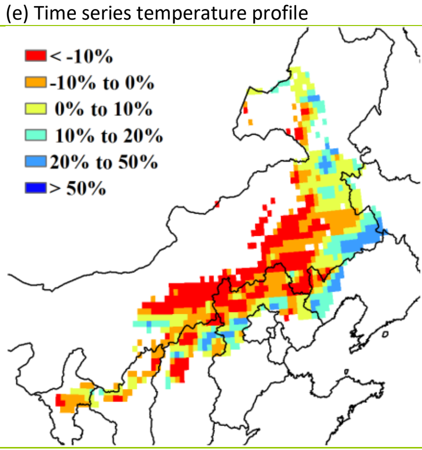




(d) Time series rainfall profile

(e) Time series temperature profile





(f) Maximum VCI

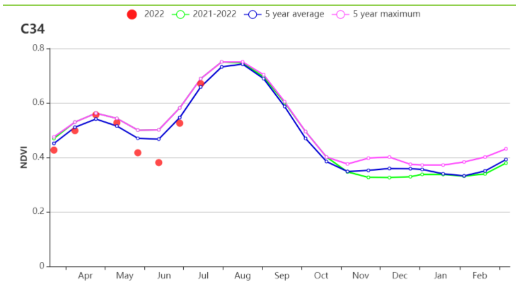
(g) Biomass departure from 15YA

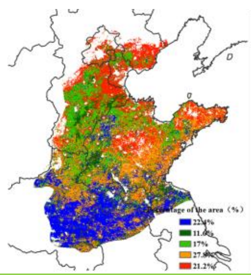
Huanghuaihai

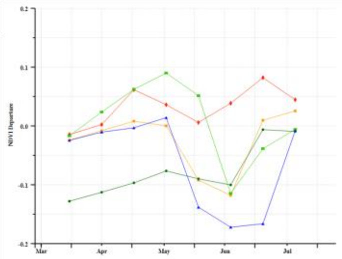
Winter wheat and summer maize are the main crops that grew in this monitoring period (April to July) in Hanghuaihai. The winter wheat harvest ended in mid-June, a few days later than usual because of the delayed sowing in October of last year. Maize was planted after the harvesting of winter wheat. Agro-climate indicators showed that radiation (+3%), precipitation (+1%), and temperature (+0.9°C) in this area were above the 15YA. Below-average precipitation between April and mid-June caused a 3% decrease in potential biomass. The CALF is similar to the 5YA and the maximum VCI value was 0.9.

The NDVI-based crop growth profile indicated a rapid decline in May and early June, which marked the maturity of winter wheat. High rainfall in late June and early July helped with the establishment of maize and the NDVI curve reached average levels by the end of this monitoring period. As the NDVI clusters and profiles showed, only 21.2% of the cropland in Central Shandong, Northeastern Shandong, and the Bohai Bay area was higher than the 5YA after mid-April. Wheat was harvested in most areas by mid-June. As precipitation increased, the emergence and early growth of maize after sowing were faster than in previous years thereafter. The crop conditions reached or even were above the average level by the end of July. In general, the crop conditions in the whole region were normal.

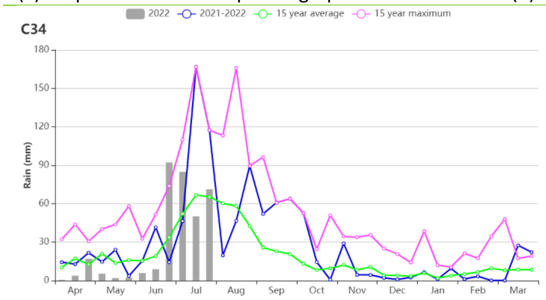
Figure 4.11 **Crop condition China Huanghuaihai, April - July 2022**

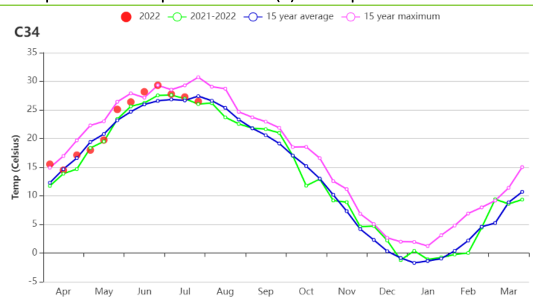




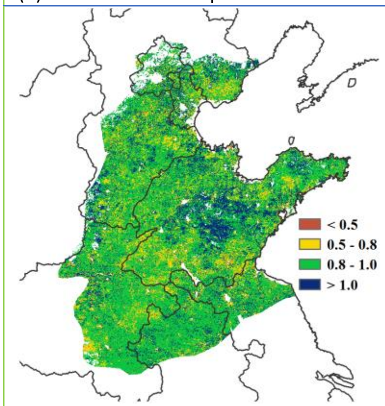


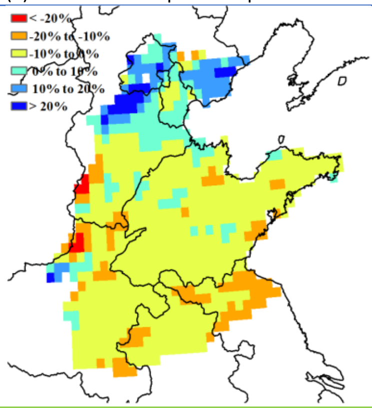
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles





(d)Time series rainfall profile (e)Time series temperature profile





(f) Maximum VCI (g) Biomass departure from 15YA

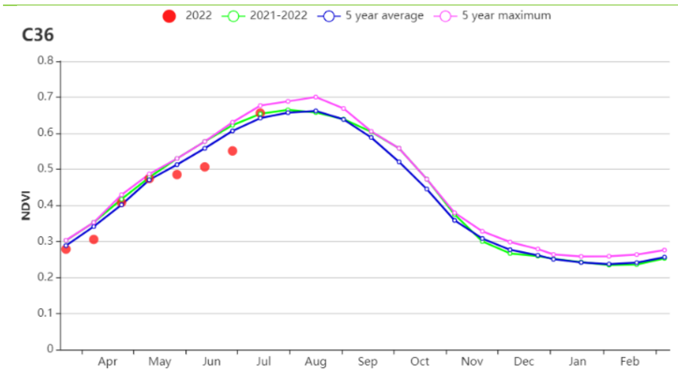
Loess region

During the reporting period, winter wheat was harvested from early to mid-June, while summer maize was planted in late June. The crop conditions in the Loess region were close to the 5YA.

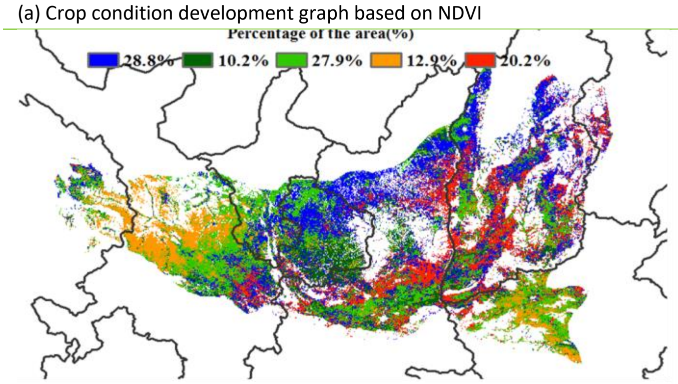
The CropWatch Agroclimatic Indicators (CWAIs) in the Loess Region show that the weather conditions were generally normal, precipitation was below average by 8%, the temperature increased by 0.8°C, and radiation was above the 15YA by 6%. Due to the overall low precipitation, potential biomass dropped by 3% compared to the 15YA. During the monitoring period, the precipitation exceeded the 15-year maximum in late April and mid-July, resulting in flooding in some areas of Gansu and Shanxi, while the precipitation remained below average from early May to early July. Temperatures fluctuated from April to May, and were slightly above average from June to early July, then dropped to below average in late-July.

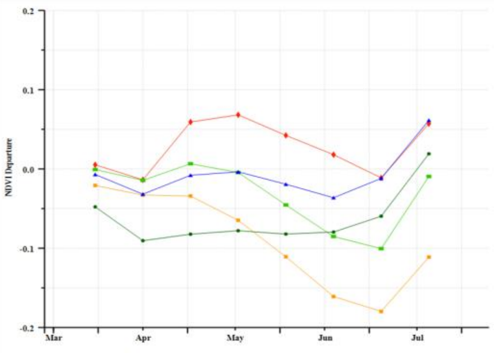
As can be seen from the regional NDVI development graph, the crop conditions were generally close to the 5YA during the monitoring period, except for June, which was significantly lower than the average level due to the extreme high temperature weather. NDVI clusters and profiles show that crop conditions in most regions were close to normal. Approximately 20.2% of the region was above average from late April to mid-June, mainly in Shanxi and Shaanxi provinces. In addition, about 12.9% of the area was below average from June to early July, mainly in central Gansu and northwestern Henan. The Maximum VCI map shows high VCIx values in most cropped areas of the region with an average value of 0.89 but the VCIx was below 0.5 in central Gansu. CALF was at 96% which is 1% above the 5YA. The APSI index of the region is greater than 1, so the agricultural production situation is improving. In conclusion, the agricultural conditions in the Loess region were close to average, and the production situation in central Gansu Province still depends on subsequent agro-climatic conditions.

Figure 4.12 Crop condition China Loess region, April - July 2022

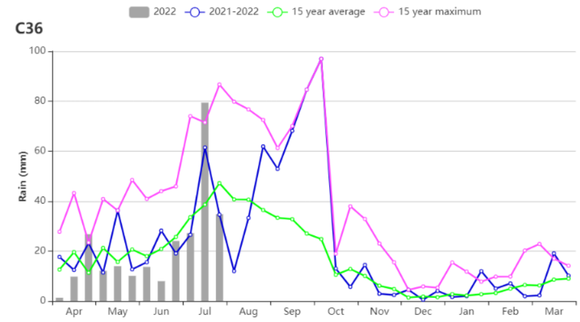


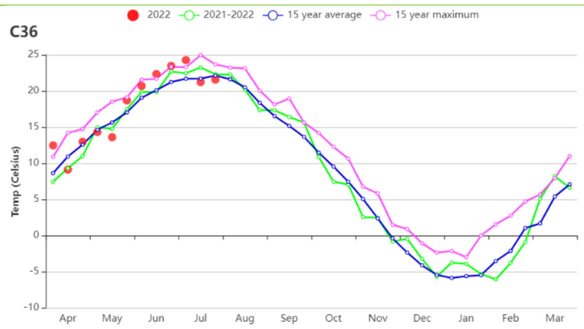
(a) Crop condition development graph based on NDVI



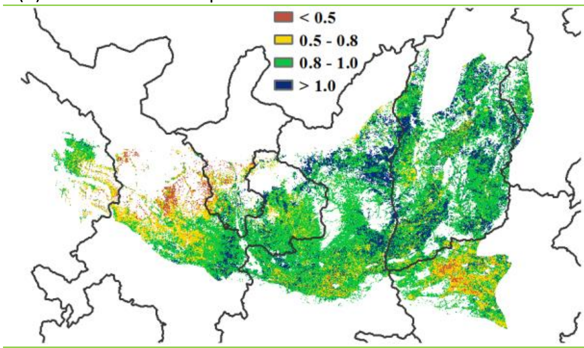


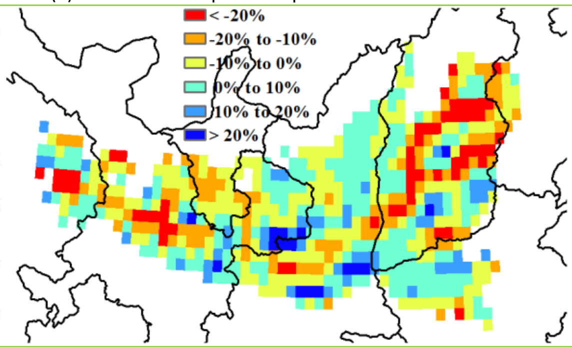
(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles





(d)Time series rainfall profile (e)Time series temperature profile





(f) Maximum VCI (g) Biomass departure from 15YA

Lower Yangtze region

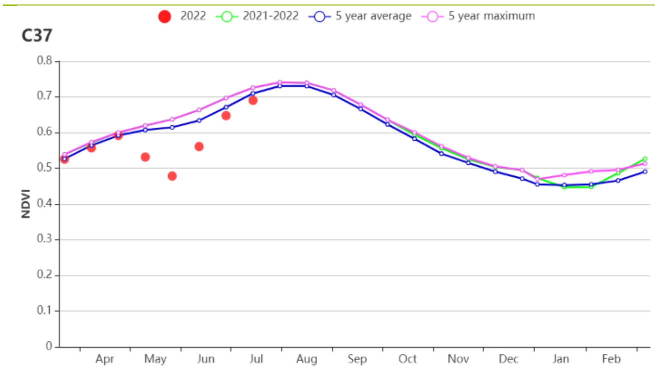
During this monitoring period, winter wheat and rapeseed had reached maturity by June in Hubei, Henan, Anhui and Jiangsu provinces. The semi-late and late rice crops are still growing in the south and the center of the region including Jiangsu, Fujian, Jiangxi, Hunan, and Hubei provinces, while early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

According to the CropWatch agro-climatic indicators, the accumulated precipitation from April to July was 6% below the long-term average in this region, the temperature and photosynthetically active radiation were 0.2℃ and 5% higher than the 15-year averages, respectively. The rainfall profiles also indicate that below average precipitation occurred in middle and late July. The slightly dry agro-climatic conditions resulted in a 3% negative departure of the biomass production potential.

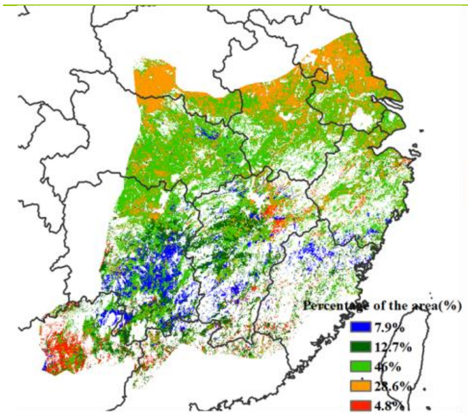
As shown in the NDVI departure clustering map and the profiles, 46% of the region, mainly distributed in the central part, had crop growth close to previous years. In the northern part of the region, including southern Henan, central Anhui and central Jiangsu, the crop growth was slightly lower than the average, and the potential biomass departure map shows a similar spatial pattern in this part with values between -20% and -10% (the orange area). The potential biomass departure in other areas was close to average and varied between -10% and 10%. The average VCIx of this region was 0.91, and most of the area had VCIx values ranging from 0.8 to 1.

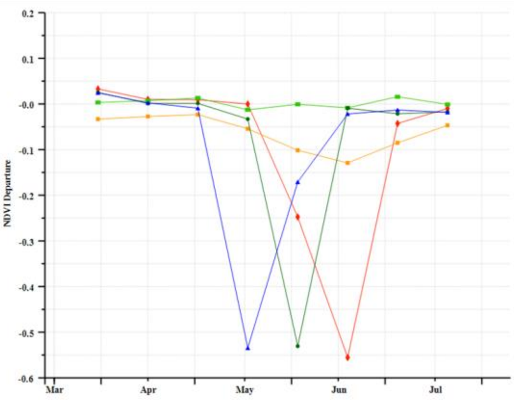
The crop conditions in the Lower Yangtze region were normal. However, the continuous high temperature and decrease of precipitation since July will negatively impact subsequent crop growth.

Figure 4.13 Crop condition China Lower Yangtze region, April - July 2022

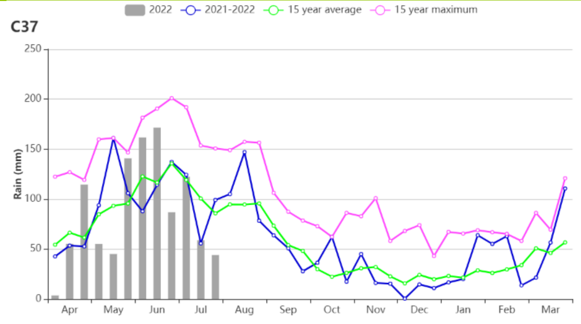


(a) Crop condition development graph based on NDVI

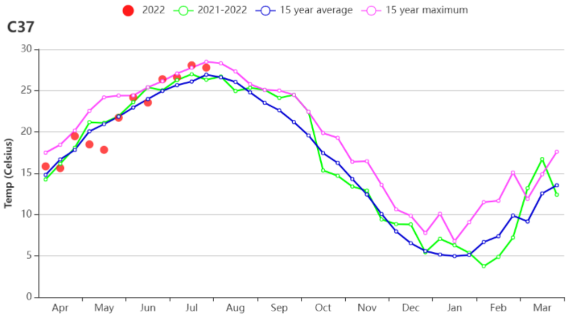




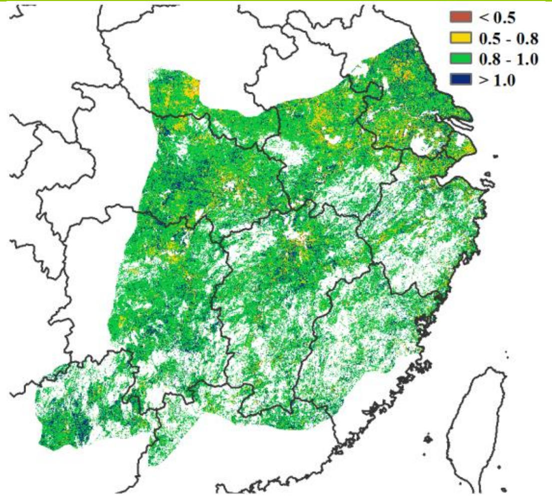
(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



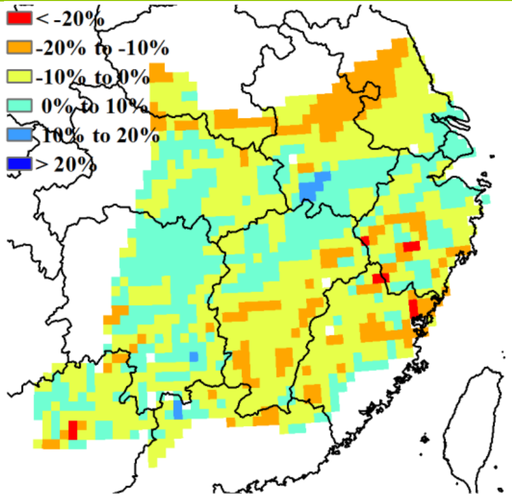
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure from 15YA

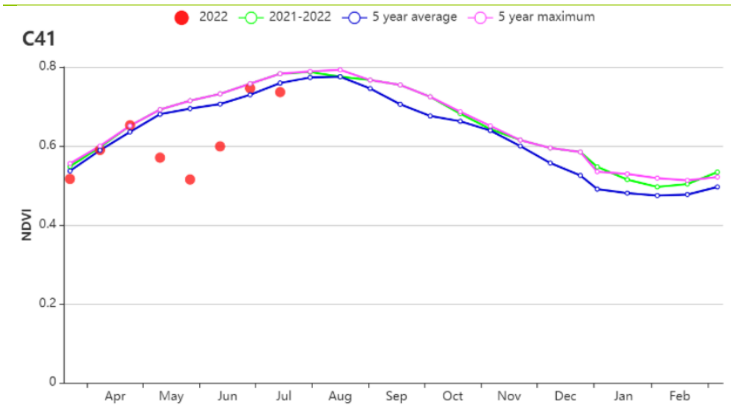
Southwest region

The reporting period covers the harvest of winter wheat in southwestern China, which was concluded by late April. Summer crops (including semi-late rice, late rice and maize) are still growing. In general, crop condition in the southwest region is below the average of the last five years.

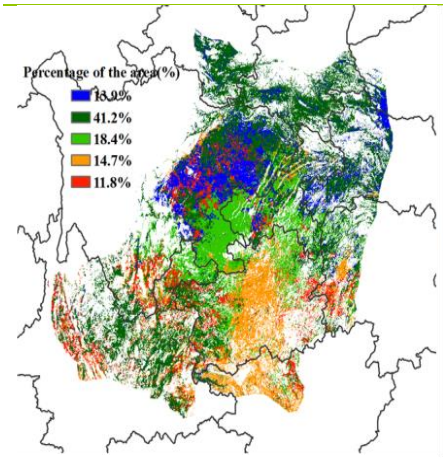
According to the CropWatch agro-climatic indicators the accumulated precipitation during this period was 817 mm (-9%), which was lower than the average for the same period in the past 15 years. Temperature was 18.6℃ (+0.2℃), which was slightly higher than the average, and RADPAR was 4% higher. The potential biomass was 1% lower due to the lower precipitation. CALF was the same as the average of the same period in the past 5 years, reflecting the overall normal condition of arable land utilization in this reporting period.

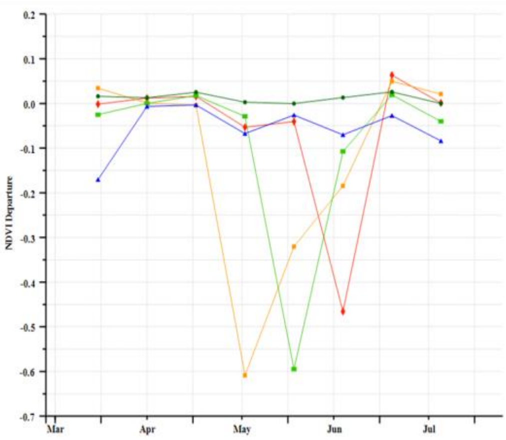
According to the NDVI departure clustering map and the profiles, crop condition in the north and southwest (about 41.2% of the region's cropland) were slightly above average throughout the monitoring period, while most of the Sichuan basin was affected by extreme heat and low rainfall, and crop conditions were significantly below average. Crop conditions in parts of southern Sichuan and western Hunan (about 11.8% of the region's cropland) were below average for most of the monitoring period and only rebounded to slightly above average at the end of the monitoring period. BIOMSS shows below-average biomass in the Guizhou region which may be associated with a substantial decrease in precipitation in Guizhou (-23%). The VCIx for the whole region was 0.94, indicating that crop conditions in southwest China were generally normal.

Figure 4.1 Crop condition China Southwest region, April - July 2022

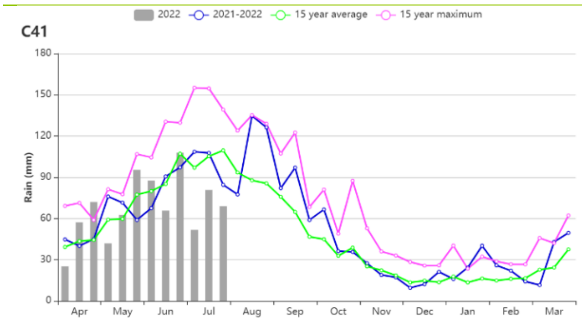


(a) Crop condition development graph based on NDVI

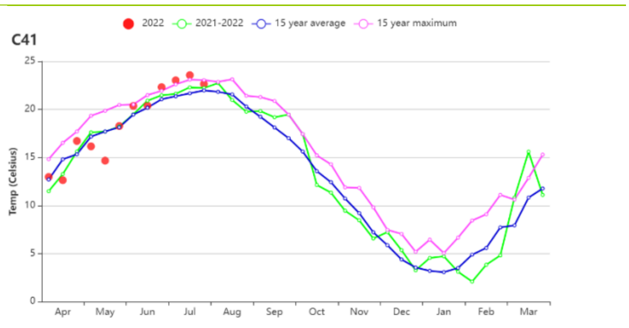




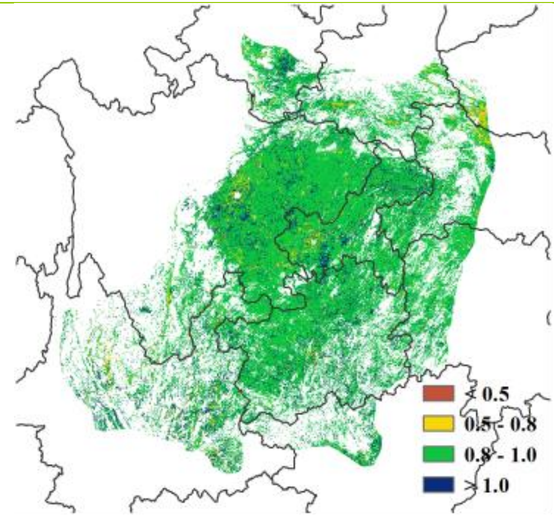
(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



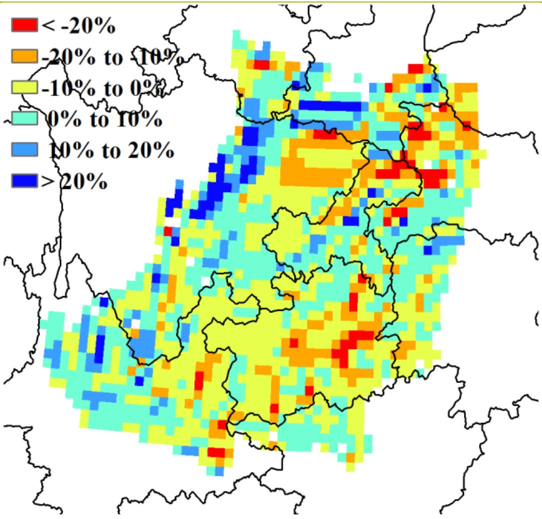
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure from 15YA

Southern China

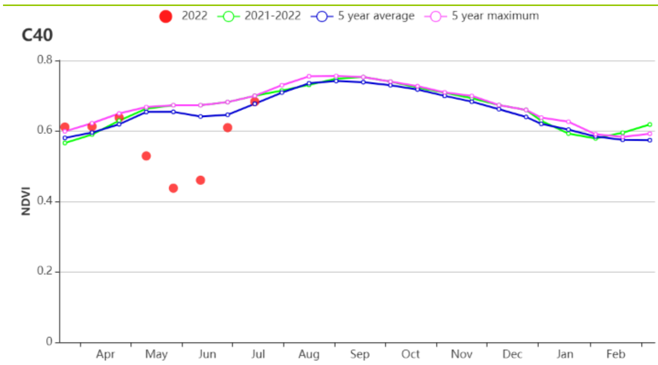
During the monitoring period, the harvest of wheat and early rice had been completed. Spring maize also reached maturity. In July, late rice was partially transplanted. The crop condition development graph based on NDVI showed that the crop conditions initially were better than the five-year average, but in May and June rapidly fell below the average level, and returned to the normal level at the end of the monitoring period.

For the whole region, although total rainfall was the same as the average, it was concentrated in May, June and early July, which hampered crop growth. Temperature was 22.5℃ (-0.1℃), slightly below the average, RADPAR was 3% higher. The biomass was 2% below average. CALF was the same as the average of the same period in the past 5 years, reflecting the overall normal condition of arable land utilization during this reporting period.

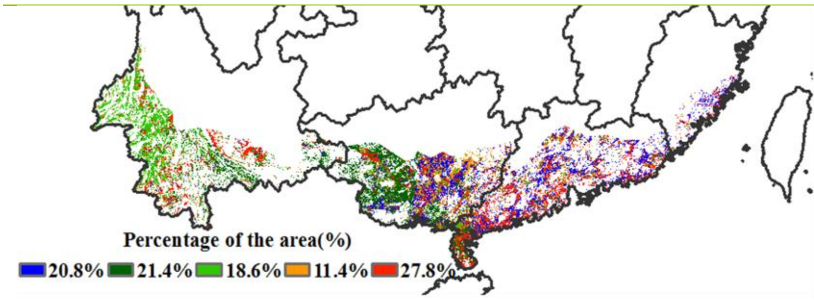
According to the NDVI departure clustering map and the profiles, values were close to average in most regions before May. Since mid-May, parts of Southern China have been hit by continuous heavy rainfall. Floods occurred in some regions of South China affecting farmland in low-lying areas. The continuous heavy precipitation resulted in poor crop conditions in those flooding areas. In July, with high temperature, less rainfall and more sunshine in most parts of the region, combined with sufficient precipitation in the early stages, the overall meteorological conditions were conducive for crop growth and NDVI in most regions of Southern China returned to average levels. The average VCIx of the Southern China region was 0.93, and most areas had VCIx values ranging from 0.80 to 1.00.

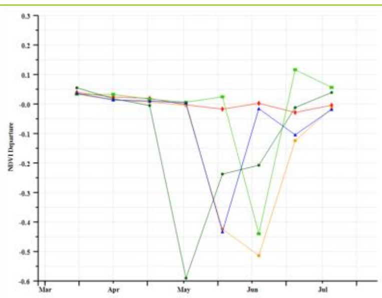
In general, crop condition in Southern China was slightly below average in some periods, it returned to normal at the end of the monitoring period.

Figure 4.14 Crop condition Southern China, April - July 2022



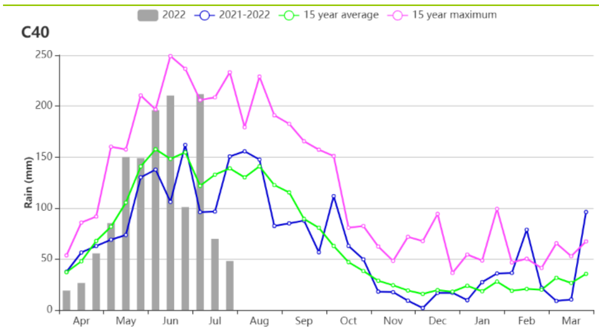
(a) Crop condition development graph based on NDVI

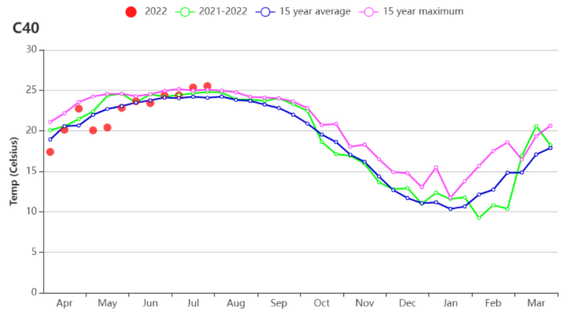




(b) Spatial NDVI patterns compared to 5YA

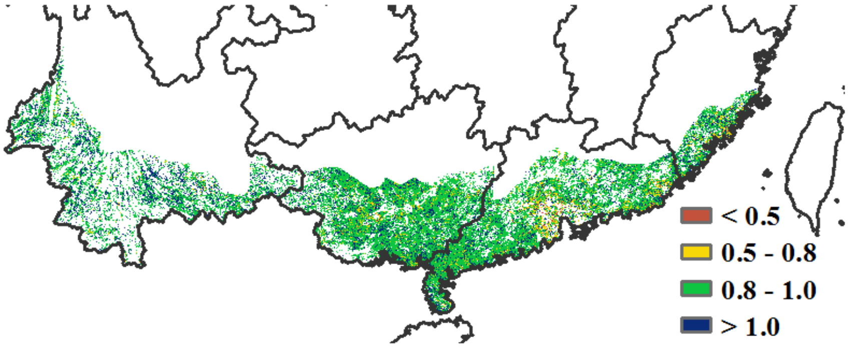
(c) NDVI profiles



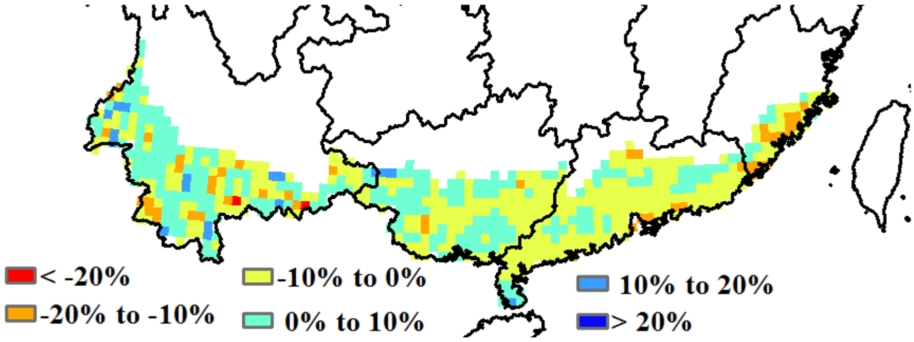


(d)Time series rainfall profile

(e)Time series temperature profile



(f) Maximum VCI



(f) Biomass departure from 15YA

4.4 Major crops trade prospects

(1) International trade for major cereals and oil crop in China

Maize

In the first half of the year, China imported 13.594 million tonnes of maize, a decrease of 11.1% over the previous year. The main import source countries were the United States and Ukraine, accounting for 62.0% and 36.1% of the total import volume, respectively. The import volume was US $4.427 billion. The export of maize was 600 tonnes, a decrease of 85.9% over the previous year, and the export value was US $610.8 thousand.

Rice

In the first half of the year, China imported 3.5803 million tonnes of rice, an increase of 40.2% over the previous year. The main import sources were India, Pakistan, Vietnam, Myanmar and Thailand, accounting for 34.5%, 25.6%, 12.3%, 11.2% and 10.2% of the total import volume, respectively. The import volume was US $1.509 billion. The export of rice was 982.3 thousand tonnes, a decrease of 25.5% over the previous year. It was mainly exported to Egypt, Turkiye, Papua New Guinea, Sierra Leone and South Korea, accounting for 29.6%, 12.3%, 8.5%, 7.6% and 6.8% of the total export volume respectively. The export volume was US $456 million.

Wheat

In the first half of the year, China imported 4.9416 million tonnes of wheat, a decrease of 7.8% over the previous year. The main import source countries were Australia, France and Canada, accounting for 60.8%, 29.5% and 9.4% of the total import volume, respectively. The import volume was US $1.841 billion. Wheat exports were 76.6 thousand tonnes, an increase of 1.14 times over the previous year, mainly exported to Afghanistan, with an export value of US $35.0424 million.

Soybean

In the first half of the year, China imported 46.2835 million tonnes of soybeans, a decrease of 5.4% over the previous year. The main import source countries were Brazil and the United States, accounting for 59.9% and 37.9% of the total import volume, respectively. The import volume was US $30.003 billion. Soybean exports were 47.6 thousand tonnes, an increase of 18.7% over the previous year, mainly exported to South Korea, Japan and North Korea, accounting for 48.2%, 26.2% and 9.1% of the total export.

(2) Trade prospects for major cereals and oil crop in China for 2022

On the basis of remote sensing-based production prediction in major agricultural producing countries in 2022 and the Major Agricultural Shocks and Policy Simulation Model, it is predicted that the import of major grain crops will increase slightly in 2022. The details are as follows:

In 2022, China's maize import will significantly decrease in 2022, with a year-on-year decrease of 10.2% and an export decrease of 75.6%. Since the beginning of this year, affected by factors such as the crisis in Ukraine and the global drought, the efficiency of global maize trade has declined, and China's import speed has slowed down. It is expected that China's maize import will decline significantly in 2022.

In 2022, China's rice import increased by 56.4%, and export decreased by 10.5%. Affected by the global extreme high temperature and other factors, India and other major exporting countries are facing production reduction, and the global import pattern will be affected. However, from the domestic perspective, due to the recovery of food and beverage consumption and the increase of feed demand, the import kept increasing throughout the year.

In 2022, China's wheat import decreased by 3.4% and export increased by 60.8% in 2022. Since the beginning of this year, the global wheat price has been running at a high level, and China's wheat import power is insufficient. It is expected that the wheat import will decrease slightly in 2022.

In 2022, China's soybean import will decrease by 6.4%, and export will increase by 12.8%. Due to the comprehensive impact of domestic soybean oil production, feed demand decline and low pressing profit, it is expected that the soybean import will be significantly reduced throughout the year.

Figure 4.15 Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2022 (%)