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 national summer and winter crop production (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 presents the results of ongoing pests and diseases monitoring, while sections 4.5 describe trade prospects (import/export) of major crops (4.5). 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 summer crops (early rice, semi-late rice, spring maize and soybean), were in the field during the reporting period. The agro-climatic conditions were mostly favorable, with rainfall slightly below average (8%), temperature up 0.5℃ and RADPAR up 1%. This was beneficial for crop growth and VCIx reached a high value of 0.91 at the national scale.

All the main agricultural regions of China recorded below-average rainfall, with the largest departure occurring in Huanghuaihai (-50%). However, rainfall anomalies fluctuated largely over time. 32.1% of cropped areas, located in the eastern China (Jiangsu, Anhui, Hubei, Henan and Shandong) recorded near-average rainfall between April and early June, but received significantly below-average rainfall (>-30 mm/dekad) since mid-June. 11.4% of crops experienced the largest departure of rainfall (>+165 mm/dekad) during late June, essentially in Jiangxi, Fujian, southern Hunan and northern Guangdong Provinces.

Temperatures were close to average in all the regions. Temperature anomalies also fluctuated largely in time for 75.3% of cultivated regions in central and southern parts of China, with low values (-3.0℃) occurring at mid and late April and high values (+2.0℃) in late May and July. RADPAR was close to average for all the main producing regions, with the departures between -7 %(south-west China) and +3% (Southern China).

As for the agronomic indicators, BIOMSS was near average in almost all the regions (-3% to +3%), except in southwest China (-7%). CALF increased by 9% points in both Inner Mongolia and the Loess region, compared to average, implying that the outlooks of crop production in these two regions are promising. The remaining regions showed average CALF. The VCIx values were high in almost all the main producing regions of China, including Inner Mongolia, Lower Yangtze, North-east China, Southern China and Southwest China, with values between 0.93 and 0.96. On the other hand, Huanghuaihai recorded the lowest values (0.82) among all the regions, which might be attributable to water deficit, as shown by the pattern of VHIn of which the lowest values (1-15) were distributed in the western parts of Huanghuaihai, including southern Hebei and northern Henan. Besides, the low VHIn also occurred in the northern parts of Northeast China (Heilongjiang) and Lower Yangtze (such as central Anhui and Jiangsu), and the southern part of Loess region (i.e., central Shaanxi and southern Shanxi), implying that these regions might have suffered from drought as well.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, April-July 2019, departure from 5YA and 15YA

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 15YA (2004-2018)				Departure from 5YA (2014-2018)	Current
	RAIN (%)	TEMP (℃)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	-50	0.5	2	1	-1	0.82
Inner Mongolia	-1	0.3	2	2	9	0.93
Loess region	-15	-0.2	-2	-1	9	0.85
Lower Yangtze	-1	-0.1	-2	-3	0	0.94
Northeast China	-14	0.1	3	1	0	0.96
Southern China	-13	0.6	2	3	-1	0.93
Southwest China	-6	0.1	-7	-7	0	0.94

Figure 4.1. China crop calendar

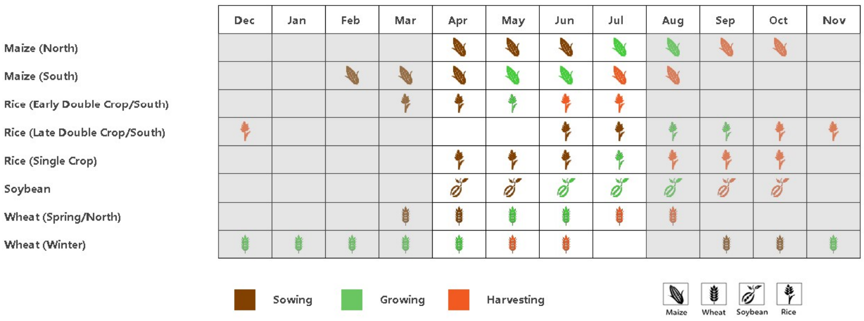


Figure 4.2. China spatial distribution of rainfall profiles, April-July 2019

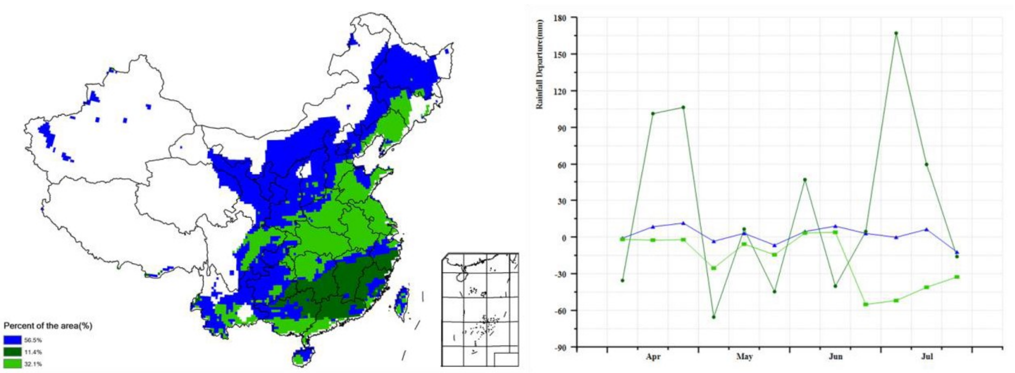


Figure 4.3. China spatial distribution of temperature profiles, April-July 2019

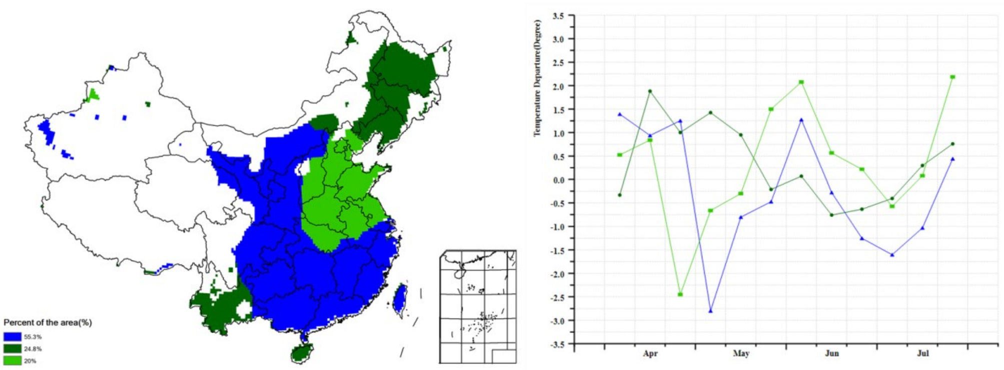


Figure 4.4. Cropped and uncropped arable land by pixel, April-July 2019

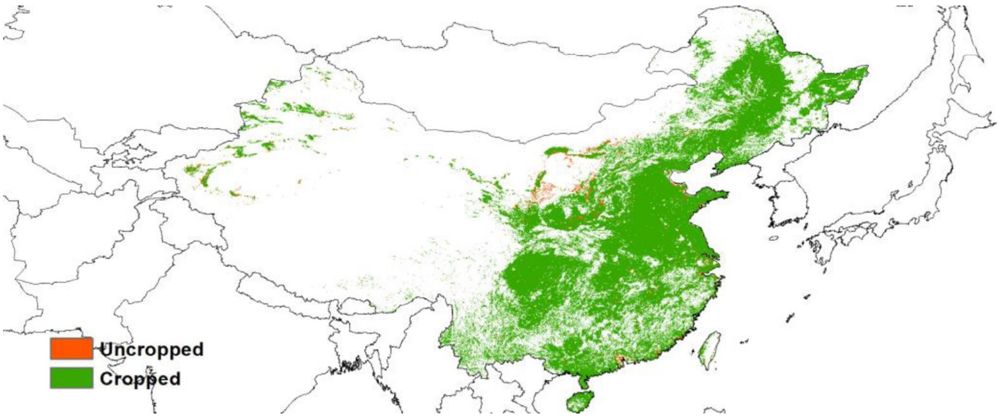


Figure 4.5. China maximum Vegetation Condition Index (VCIx) by pixel, April-July 2019

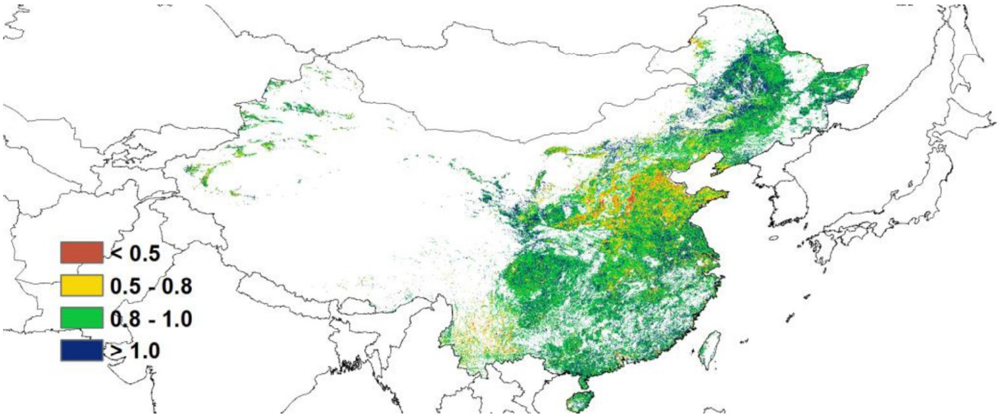
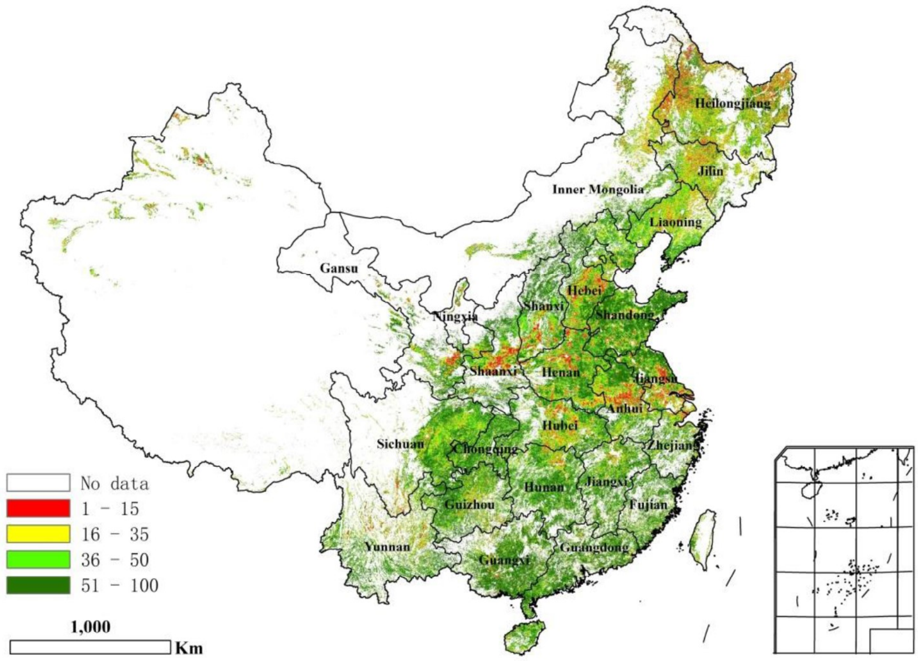


Figure 4.6. China Vegetation Health Index Minimum (VHIn), by pixel, April-July 2019



4.2 Chinese crop production

Based on the comprehensive utilization of multi-source remote sensing data such as ESA Sentinel 2 A/B satellite, US Landsat 8 satellite, Moderate-resolution Imaging Spectroradiometer (MODIS) and Chinese satellite data such as Gaofen-1 and Gaofen-2 satellite, as well as more than 370,000 ground samples covering 502 districts and counties in Northeast China, North China and the lower Yangtze River regions, crop area and production of four major crops for China and each province is estimated and forecasted. It is noteworthy that this is the first time to use the latest national 10 m resolution cropland data layer from for 2017-2018 in CropWatch. Based on the latest agrometeorological information and a large number of field measurements, the yield of maize, rice, wheat and soybean in China in 2019 was estimated by integration of remote sensing index model. Agrometeorological yield estimation model and crop planting and crop type proportion method.

The national soybean output reached 14,441,000 tons, an increase of 405,000 tons, with a year-on-year increase of 2.9%. The planted area of soybean in China is 7,901.3 thousand hectares, an increase of 265.5 thousand hectares or an increase of 3.5% over last year. This has been the fourth consecutive years for the incensement of soybean planted area. For each provinces, the soybean planted area in Heilongjiang increased by 137,000 hectares (about 2.06 million mu) over the same period of last year, an increase of 5.4%, contributing 52% to the increase of soybean planted area in the whole country. Soybean planted area in Inner Mongolia Autonomous Region, Henan and Jilin increased by 18,000 ha, 14,000 ha and 11,000 ha respectively, while that in Anhui, Liaoning, Shandong and Shanxi decreased from last year, which was in contrary to the soybean expansion policy. Although many provinces improved the subsidies of soybean lowered that for maize, they have not fully mobilized the enthusiasm of farmers to expand soybean cultivation. The average yield of soybean in China decreased by 0.6% compared with the same period last year. The main reason is that the soybean yield per unit area of Huang-Huai-Hai region has decreased by different extent due to severe drought. As far as the provinces concerned, soybean production in Heilongjiang, the largest soybean producing province, increased by 314,000 tons, up by 6.6%. Soybean planting area and yield in Inner Mongolia Autonomous Region and Jilin Province increased by a certain extent over the same period, with soybean production increasing by 55,000 tons and 74,000 tons respectively. Soybean was suffering from drought, especially in Shandong and Shanxi. The yield of soybean decreased by 9.1% and 12.6% respectively from the same period last year, with a reduction of 61,000 tons and 21,000 tons. Soybean yields in Anhui, Henan, Liaoning and Hebei decreased by different ranges.

Table 4.2. China 2019 production of maize, rice, wheat, and soybean (thousand tons), and percentage change from 2018, by province

	Maize		Rice		Wheat		Soybean	
	2019	Δ(%)	2019	Δ(%)	2019	Δ(%)	2019	Δ(%)
Anhui	3476	0.5	17378	2.6	10807	0.7	1025	-2.5
Chongqing	2094	3.3	4716	3.2	1064	-2.6		
Fujian			2784	-2.5				
Gansu	5544	3.6			3064	12.3		
Guangdong				11088	-1.7			
Guangxi			10481	-1.4				
Guizhou	5156	4.8	5369	1.1				
Hebei	17643	-2.9			10550	-3.7	178	-4.8
Heilongjiang	40995	0.4	21059	0.7		3.7	5097	6.6
Henan	14738	-3.7	3923	3.1	26309	2.8	753	-1.1
Hubei			15590	-0.2	3868	-10.2		
Hunan			25424	0.7				
Inner Mongolia	23903	3.4				10.4	1176	4.9
Jiangsu	2102	-0.9	16244	0.9	10053	2.4	738	-3.3
Jiangxi			16623	-2.3				
Jilin	30463	3.3	5926	3.6			798	10.2
Liaoning	16815	-0.8	4316	-0.2			364	-8.9
Ningxia	1746	4.5	473	6.5		1.0		
Shaanxi	3444	-4.6	1038	3.6	3920	-5.9		
Shandong	16949	-9.1			22450	5.2	607	-9.1

	Maize		Rice		Wheat		Soybean	
	2019	**Δ(%)**	**2019**	**Δ(%)**	**2019**	**Δ(%)**	**2019**	**Δ(%)**
Shanxi	7815	-13.0			2273	-6.1	143	-12.6
Sichuan	7048	0.5	14799	2.0	5016	8.7		
Xinjiang	6668	0.1						
Yunnan	6486	2.9	5781	1.0				
Zhejiang			6419	0.9				
Sub total	**213087**	**-0.7**	**189431**	**0.6**	**102601**	**1.6**	**10878**	**2.4**
China	**217156**	**-2.1**	**198830**	**0.8**	**123516**	**1.6**	**14441**	**2.9**

The total output of rice in China was 198.83 million tons, an increase of 0.8% over the same period of last year. The planting area of rice in China was 32627.7 thousand hectares, an increase of 184.9 thousand hectares (about 277 million mu) over the same period of last year, an increase of 0.6% over the same period of last year. Jiangsu and Anhui are the main rice producing provinces. Rice planting area increased by 2.3% and 1.0% respectively. Influenced by the reduction of planting area and the continuous rainy weather, the yield of early rice decreased by 809,000 tons, a decrease of 2.4%. The yield of early rice in Guangdong, Guangxi, Fujian and Jiangxi decreased by more than 4%. The yield of Mid-season rice/one-season rice was up by 1.3% to 130.440 million tons, an increase of 1643,000 tons. It is mainly due to the good Agrometeorological conditions during the growth period of middle-season rice and one-season rice. The yield per unit area increased by 1.2% compared with the same period last year. The yield of medium-sized rice decreased by 0.7% only in Liaoning. The yield of late rice was up by 1.9% to 35.152 million tons, an increase of 671,000 tons, while the yield of late rice in Hubei, Jiangxi and Zhejiang decreased.

Table 4.3. China 2019 early rice, single rice, and late rice production (thousand tons) and percentage difference from 2018, by province

	Early Rice		Single Rice		Late Rice	
	2019	Δ(%)	2019	Δ(%)	2019	Δ(%)
Anhui	1851	1.5	13832	3.1	1695	0.3
Chongqing			4716	3.2		
Fujian	1512	-5.8			1272	1.9
Guangdong	4860	-6.1			6228	2.0
Guangxi	4891	-5.1			5589	2.1
Guizhou			5369	1.1		
Heilongjiang			21059	0.7		
Henan			3923	3.1		
Hubei	2346	1.0	10455	0.3	2864	-0.3
Hunan	8315	3.6	8768	0.7	8469	-0.5
Jiangsu			16244	0.9		
Jiangxi	7342	-4.8	2966	2.6	6315	-1.6
Jilin			5926	3.6		
Liaoning			4316	-0.2		
Ningxia			473	6.5		
Shaanxi			1038	3.6		
Sichuan			14799	2.0		
Yunnan			5781	1.0		
Zhejiang	794	-3.2	4822	2.4	803	-3.4
Sub total	**31911**	**-2.2**	**124487**	**1.6**	**33234**	**0.3**
China*	**33237**	**-2.4**	**130440**	**1.3**	**35152**	**1.9**

* Production for Taiwan province is not included.

The total output of maize in China in 2019 was down by 2.1% to 217.156 million tons, which were 46.05 million tons less than that in 2018. On the basis of 2018, the maize planting area in China was further reduced to 39,650.4 thousand hectares, which was 0.4% less than that in 2018. The planting area of

Heilongjiang and Inner Mongolia Autonomous Region decreased slightly compared with the same period last year, by 28,000 hectares and 11,000 hectares respectively. The maize planting area of Jilin and Liaoning was almost the same as the same period last year. Affected by the persistent drought since summer sowing, maize planting area in Shandong, Shanxi, Henan and Hebei declined year-on-year. Among them, maize planting area in Shanxi and Shandong ranked first in China, with a reduction of 59,000 hectares and 44,000 hectares, respectively. The yield of maize decreased by 1.7% year-on-year in the whole country. The abundant rainfall in the north of Northeast China (Heilongjiang, Jilin and Inner Mongolia, ASEAN) was conducive to the development of maize and grain filling, and the yield of maize increased year-on-year. The precipitation in Hebei, Shanxi, Shandong and Henan was less than 2% since the sowing of maize. Typhoon Limagi in early August brought heavy rainfall to the eastern coastal provinces (Shandong, Jiangsu, etc.), alleviating drought and causing floods in some areas, which had a negative impact on maize production in some areas.

Using remote sensing data and ground observation data of the whole growth period of wheat, the output of wheat in China in 2019 was 12.3516 million tons, which increased by 1.6% compared with that in 2018, and the planting area of wheat in China was 23.314.9 thousand hectares, which increased by 0.4% over the same period of last year. The increase of wheat yield was mainly due to the simultaneous increase of planting area and yield in Henan and Shandong provinces, which increased wheat yield by 1.224 million tons and 724 million tons respectively. The total yield of wheat in other wheat-producing provinces was almost the same as the same year before.

The total output of autumn grain crops (including maize, mid-season rice, late rice, spring wheat, soybean, miscellaneous grain and tuber crops) in 2019 is estimated to be 455.037 million tons, 0.5% lower than that in 2018 and 2159,000 tons lower than that in 2018.The total output of summer grain crops in China in 2018-2019 is 128.044 million tons, compared with that in 2017-2018. The output increased by 1.185 million tons, an increase of 1.4%.

4.3 Regional analysis

Figures 4.7 through 4.13 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: Phenology of major crops; Crop condition development graph based on NDVI, comparing the current season up to July 2019 to the previous season, to the five-year average (5YA), and to the five-year maximum; Spatial NDVI patterns for April - July 2019 (compared to the (5YA)); NDVI profiles associated with the spatial patterns; time series profiles of precipitation (left) and temperature; maximum VCI (over arable land mask); and biomass for April - July 2019. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

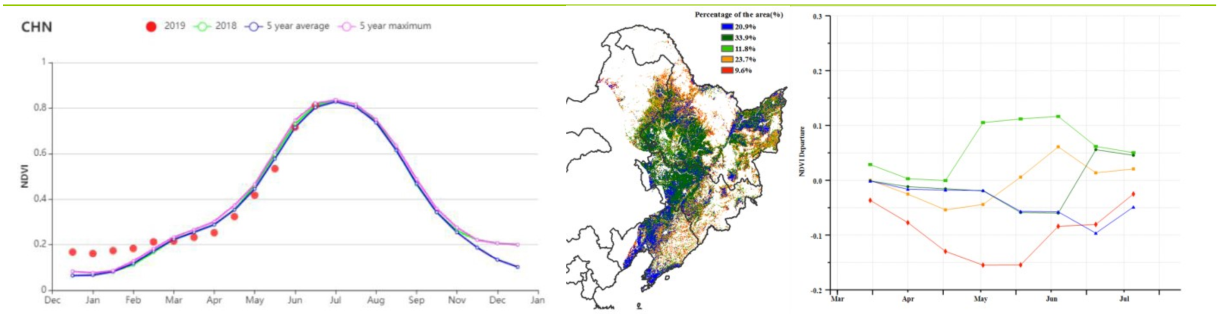
Northeast region

The current monitoring period mostly covers the sowing and cultivation of spring maize. Single cropping rice and soybean was sowed in part of the region since April.

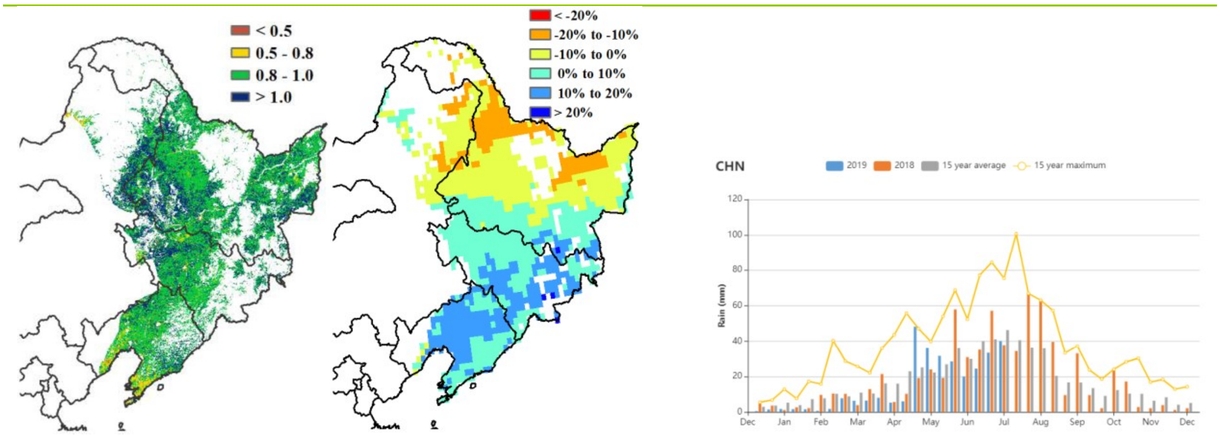
Overall condition of crops was below the five - year average before June, but recovered to average since then as a result of favorable weather, especially the abundant and above average rainfall after sowing in May. Rainfall was 14% below average, temperature decreased 0.1℃ and radiation increased 3% compared to average. The BIOMSS was 1% higher than average. CALF was at 96%.

NDVI followed diverse patterns in the region over the reporting period: it increased in the middle region of this area near Inner Mongolia and decreased in Liaoning. NDVI development profiles show that crop condition was close to average in the Region. Maximum VCI exceeded 0.8 in most areas except for south Liaoning, which suffered a heavy rainfall deficit (RAIN -47%). Significant below average rainfall was also observed in Jilin province (RAIN - 29%). At present, potential biomass of Liaoning and Jilin increased 8% and 9% respectively due to improved sunshine (RADPAR up by 6% in both provinces). Potential biomass was below average situation in central and northern Heilongjiang, which is corroborated by low NDVI. Overall, crop yield prospects in Northeast China are currently assessed as fair.

Figure 4.7. Crop condition China Northeast region, April - July 2019



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

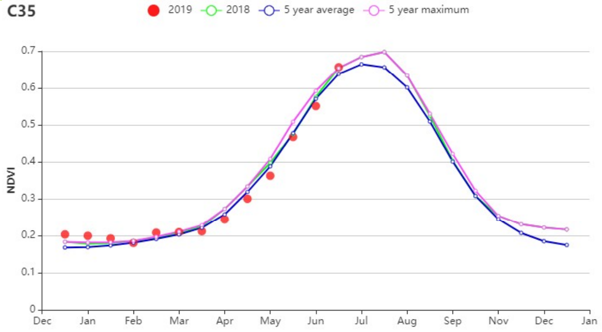


(d) Maximum VCI (e) Biomass departure (f) Time series rainfall profiles of North East China

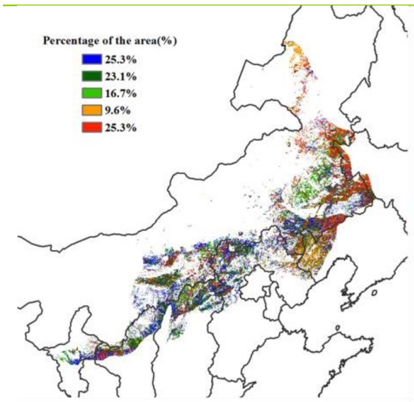
Inner Mongolia

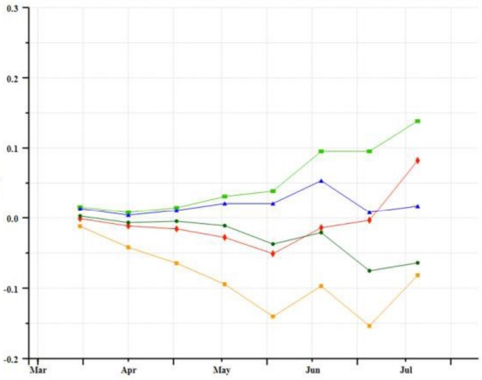
Single season crops (maize, wheat, rice and so on) prevail in inner Mongolia during the AMJJ period. Overall the crop condition was slightly unfavorable. RAIN was little below average, TEMP and RADPAR were about average (-1%, +0.3℃ and +2% respectively, relative to average) and so was BIOMSS (+2%). The spatial and temporal distribution for these indicators, however, was very uneven. Conditions were unfavorable for the sowing and early growth of spring crops, as illustrated in the crop development graph from April to June: 58% of the cropped areas displayed consistently below average NDVI especially in the East and North-east: West Liaoning, North Shannxi, north Hebei and north Shanxi. This condition is confirmed by VCIx values lower than 0.5 in the listed areas, where the biomass accumulation potential (BIOMSS) is also poor. Later crop condition improved to higher than average in July. Overall, however, Inner Mongolia saw the fraction of cropped arable land (CALF) increase by 9% to reach 94%; VCIx was 0.93 on average and crop condition was favorable from July. The outcome of the season will depend on August and later weather.

Figure 4.8. Crop condition China Inner Mongolia, April - July 2019

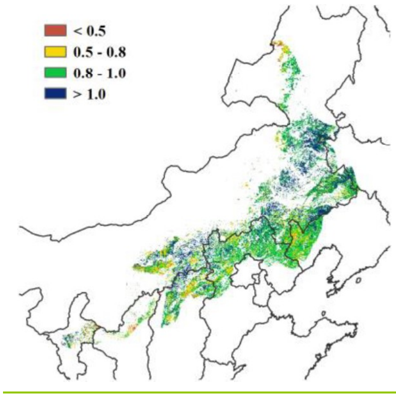


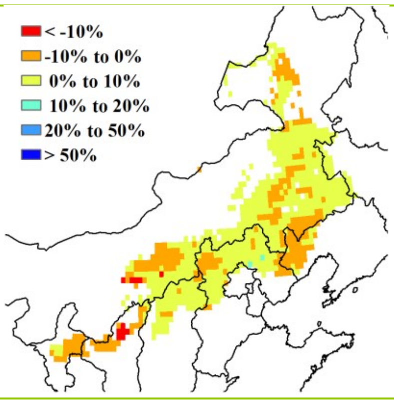
(a) Crop condition development graph based on NDVI





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



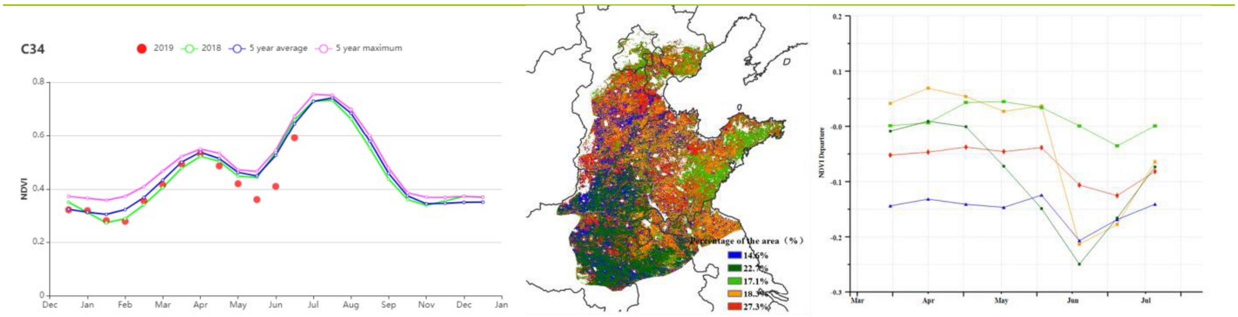


(d) Maximum VCI (e) Biomass departure

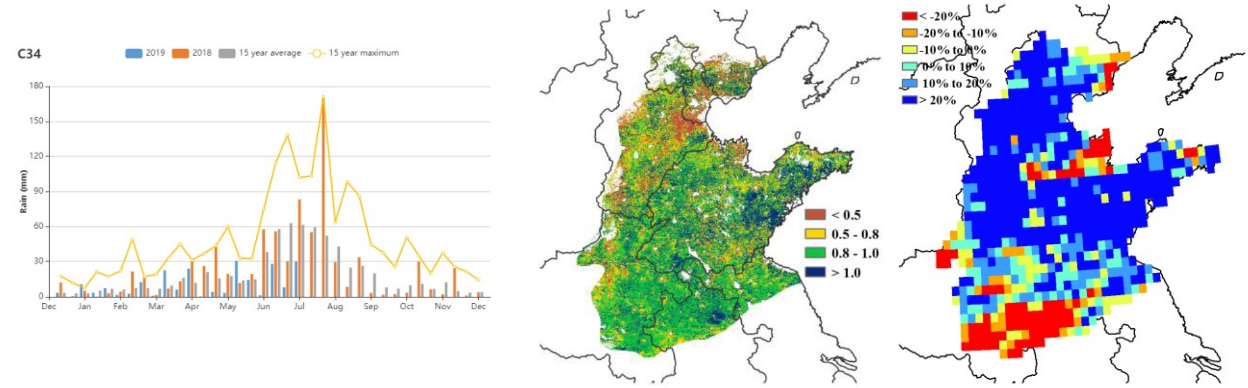
Huanghuaihai

The monitoring period covers the peak growth and harvesting of winter wheat as well as the sowing and early stages of summer maize during late June to July. The region experienced dry conditions with a 50% decline in precipitation compared to average. The drought, which occurred mainly in May and June affected maize more than wheat, which had reached maturity. BIOMSS 1% with temperature up 0.5℃ and sunshine (RADPAR) up 2%. 17.1% of cropland (eastern Shandong and northern Huanghuaihai) displays average NDVI condition almost throughout the reporting period. Some scattered areas across Hebei, Shandong, Anhui and Jiangsu, accounting for 18.3% of cropland, showed above-average condition before mid-May. Remaining areas has consistently negative NDVI departure values. VCIx averages 0.82 for Huanghuaihai and maize condition is generally below average.

Figure 4.9. Crop condition China Huanghuaihai, April - July 2019



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

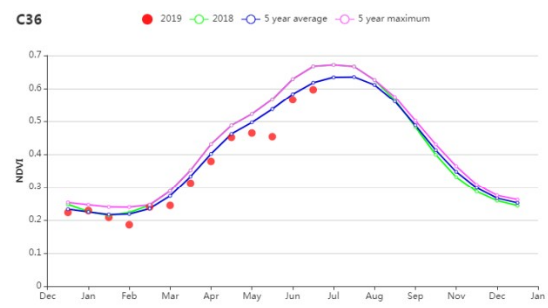


(d) Rainfall profiles (e) Maximum VCI (f) Biomass departure

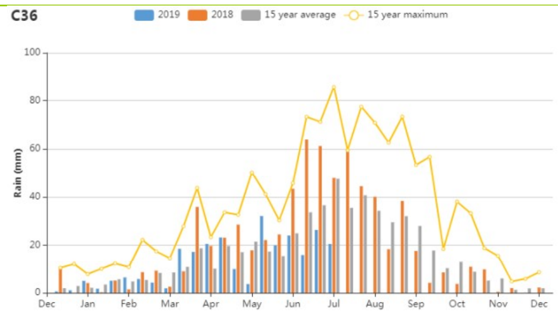
Loess region

Winter wheat was harvested from early to mid-June, while summer maize was planted from late May to late June. Compared to the average, rainfall (RAIN) was 15% below, radiation (RADPAR) dropped by 2%, and TEMP was down 0.2℃. The potential biomass (BIOMASS) was 1% below average as a result of reduced rainfall. Crop condition was consistently below the five −year average and last year's level. The VCIx for the Loess region is still fair at 0.85. The spatial NDVI clusters and profiles indicate that only 26.7% of the areas had better crop condition than the average during the monitoring period. The areas that suffered from poor crop condition include western and central Shanxi, and central Shaanxi. Although the Cropped Arable Land Fraction (CALF) increased 9%, the agro-climatic conditions were not favorable in this region. The outcome of the season will depend on weather during the JASO reporting period.

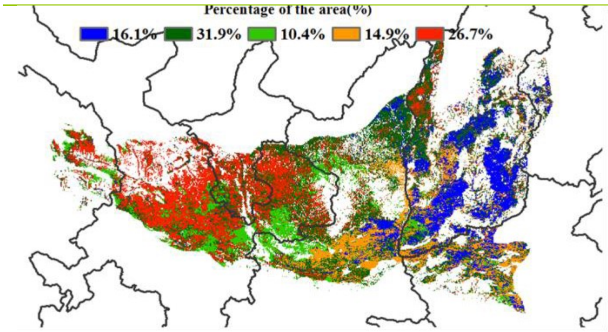
Figure 4.10. Crop condition China Loess region, April - July 2019



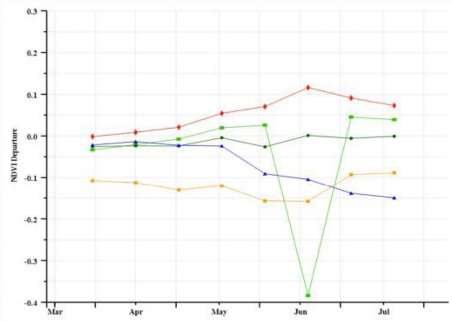
(a) Crop condition development graph based on NDVI



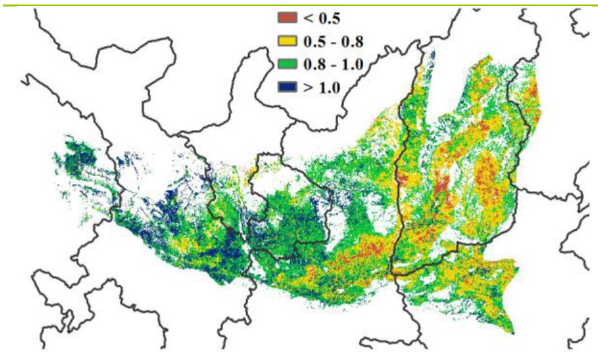
(b) Time series rainfall profile



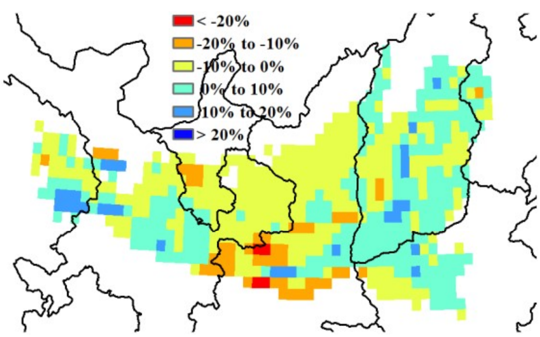
(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles



(e) Maximum VCI



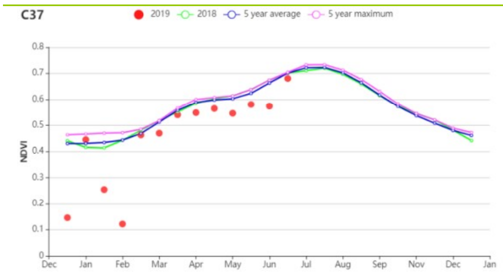
(f) Biomass departure

Lower Yangtze region

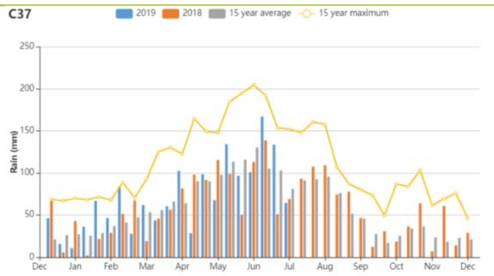
The winter wheat harvest was completed in the north of the Lower Yangtze region, including the south of Henan, Jiangsu, and Anhui provinces. The semi-late and late rice crops are still growing in the south and the center of the region (including in Fujian, Jiangxi, Hunan, and Hubei provinces), while early rice has been harvested.

During this monitoring period, accumulated rainfall and radiation were below average (RAIN -2%, RADPAR -2%). Accumulated rainfall was above average in April, middle of May and June. Except for isolated dekads, temperature was below average from the middle of April to June (TEMP down 0.1℃ for the region) Below average agro-climatic conditions resulted in unfavorable biomass production potential (BIOMSS -1%). According to the NDVI development graph, crop condition was below average, especially at the beginning of May and June. As shown in the BIOMSS map, positive departures occurred only in Hubei and Henan, north of Jiangxi, South of Jiangsu and south-western Anhui province. According to NDVI profiles, crop condition was slightly above average in 34.9% of cropped areas, mostly located in patches in West Hubei and Hunan and central Jiangxi province. Remaining areas of the Lower Yangtze region had slightly below average crop condition, which coincides with the spatial distribution of VCIx. Considering the favorable VCIx value of 0.96, crop production is anticipated to be slightly below but very close to average.

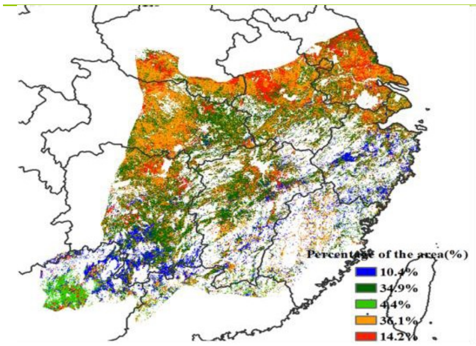
Figure 4.11. Crop condition Lower Yangtze region, April - July 2019



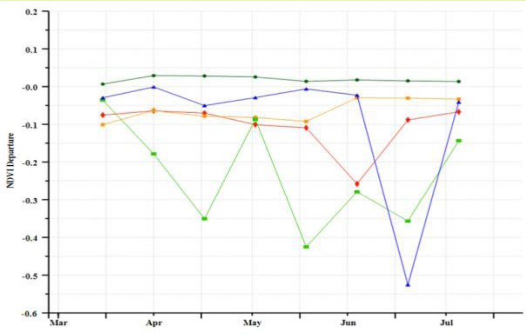
(a) Crop condition development graph based on NDVI



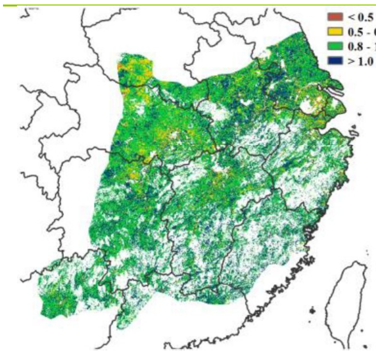
(b) Time series rainfall pofile



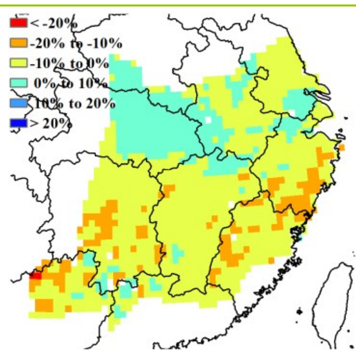
(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles



(e) Maximum VCI

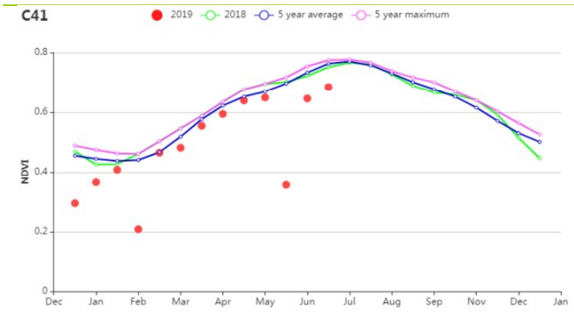


(f) Biomass departure

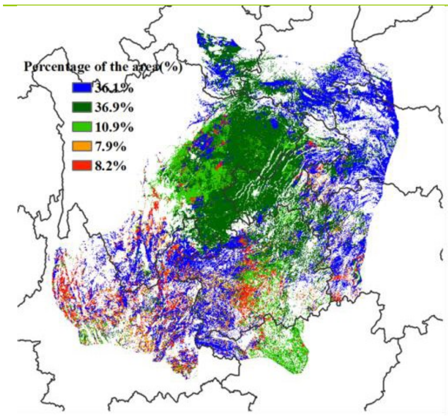
Southwest China

The reporting period covers the flowering and maturity of winter wheat in southwestern China. Summer crops (including semi-late rice, late rice and maize) are still growing. According to the regional NDVI profile, crop condition was generally below the 5-year average. Rainfall and radiation were both below average (RAIN - 6%, RADPAR -7%) , and temperature was close to average (TEMP + 0.1℃). The resulting BIOMSS is 7% below average as well. The cropped arable land fraction remained at the same average level as the previous five years. According to the spatial NDVI profiles, values were close to average from April to July, except in Chongqing and neighboring areas in Northern Yunnan, which recorded very low NDVI due to low RAIN from June to July (-11% and -12%, respectively). Average NDVI throughout the monitoring period was observed in western Sichuan and Guizhou, in spite of both precipitation and radiation being significantly above average (See Annex A.11). The maximum VCI reached 0.94 at the peak of the growing season. The value is comparable with the previous five years. The mixture of positive and negative departures of indicators show generally unfavorable crop condition.

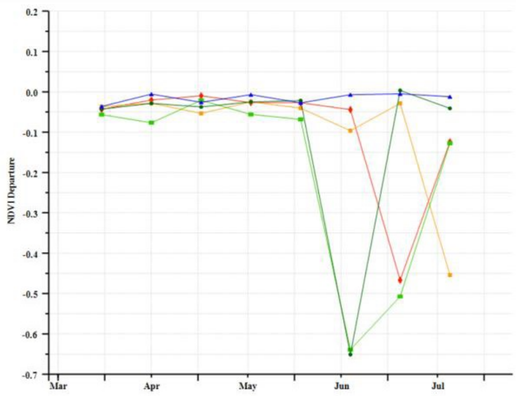
Figure 4.12. Crop condition Southwest China region, April - July 2019



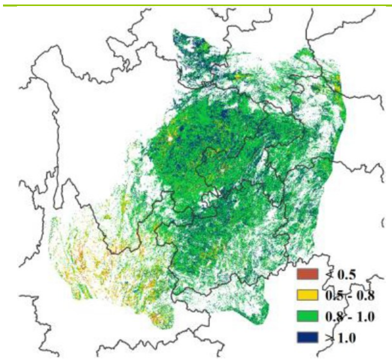
(a) Crop condition development graph based on NDVI



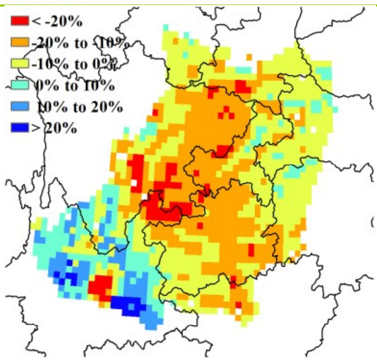
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

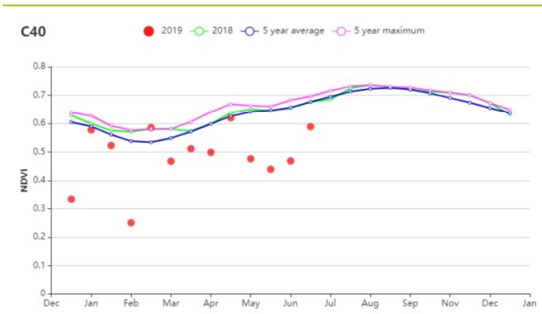


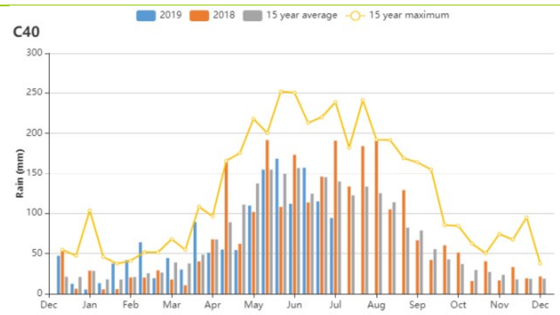
(e) Biomass departure

Southern China

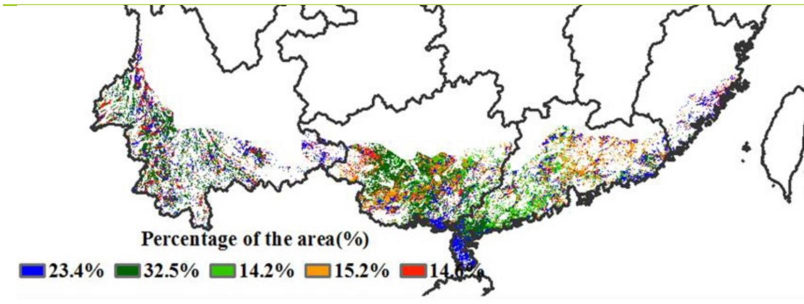
During the monitoring period, Maize completed its whole cycle from sowing to harvest, rice was planted winter wheat reached maturity. The NDVI development graph shows that crop condition was below average for most of the monitoring period. Rainfall reached 1192 mm,12% below average for the region as a whole, and -7%in Guangdong, -12% in Yunnan and +5% in Fujian. The precipitation of Guangdong, Guangxi and Fujian exceeded 1400 mm while Yunnan recorded 818 mm. The province experienced drought during May, which led to below average crops. From mid and late May, the central part of Guangxi and western Guangdong has been severely affected by floods. 61.9% of cropland in South China was affected by floods or drought in May to early June. 14.2% of the cropped area had consistently below the average NDVI during the whole monitoring period, which affected mainly south-western Guangdong Province. The average temperature in South China was 23.4℃, which is close to average. CALF was close to average as well and BIOMSS was up 3%. In Fujian, Guangdong and Guangxi, the biomass decreased while it increased in Yunnan. At the provincial level, the change of biomass was consistent sunshine (RADPAR), the main limiting factor for crop growth when water supply is adequate. Overall, floods and droughts may reduce crop yields in southern China. CropWatch will continue to monitor crop growth and production in South China in follow-up bulletins.

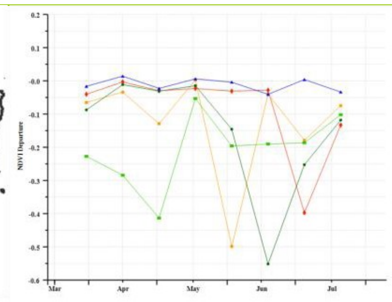
Figure 4.13. Crop condition Southern China region, April - July 2019



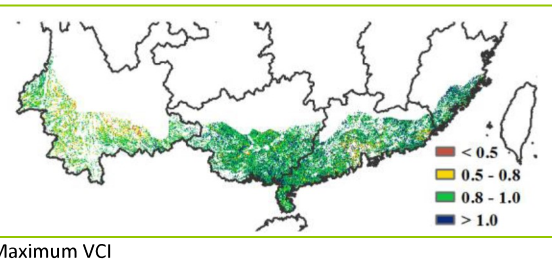


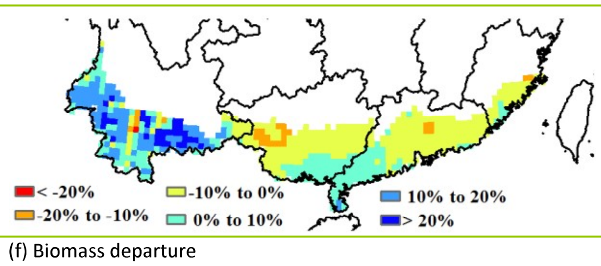
(a) Crop condition development graph based on NDVI (b)Rainfall profile





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





(e) Maximum VCI (f) Biomass departure

4.4 Pest and diseases monitoring

The impact of pests and diseases was moderate during mid-August 2019 in the main rice regions of China. The temperature was higher than during previous years in southern China and central China; precipitation was higher in middle and lower reaches of the Yangtze River. Northeast China, east China and south China were affected by typhoons and heavy rainfall provided suitable conditions for rice planthopper (Nilaparvata lugens) and rice leaf roller (Cnaphalocrocis medinalis) migration, and rice sheath blight (Rhizoctonia solani Kühn) dispersal.

Rice plant hopper

The distribution of rice planthopper during mid-August 2019 is shown in Figure 4.6 and Table 4.5. The total area affected reached 5.6 million hectares, with the pest severely occurring in Anhui, northern Zhejiang, Hunan and Guangxi, moderately in Heilongjiang, western Zhejiang and southern Hubei, and slightly in Jiangsu, Jiangxi, southern Hunan and central Hubei.

Figure 4.14. Distribution of rice plant hopper in China (mid-August 2019)

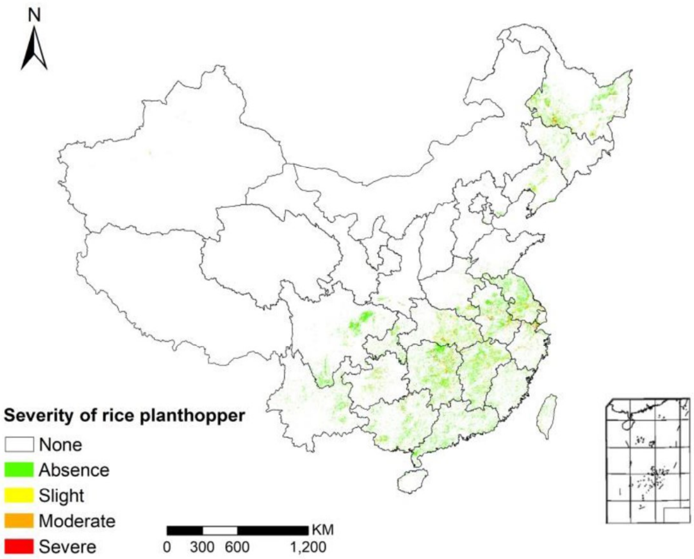


Table 4.4. Statistics of rice plant hopper in China (mid-August 2019)

Region	Occurrence ratio(%)			
	None	Slight	Moderate	Severe
Huanghuaihai	89	7	2	2
Inner Mongolia	71	25	3	1
Loess region	85	12	2	1
Lower Yangtze	76	14	6	4
Northeast China	78	12	6	4
Southern China	93	4	2	1
Southwest China	90	5	3	2

Rice leaf roller

Rice leaf roller (Figure 4.7 and Table 4.6) damaged around 4.4 million hectares, with severely occurring in southwestern Heilongjiang, central Anhui, northern Zhejiang and northeastern Hunan, moderately in southeastern Heilongjiang, central Zhejiang and southern Jiangsu, and slightly in Jilin, Liaoning, Jiangxi and central Guizhou.

Figure 4.15. Distribution of rice leaf roller in China (mid-August 2019)

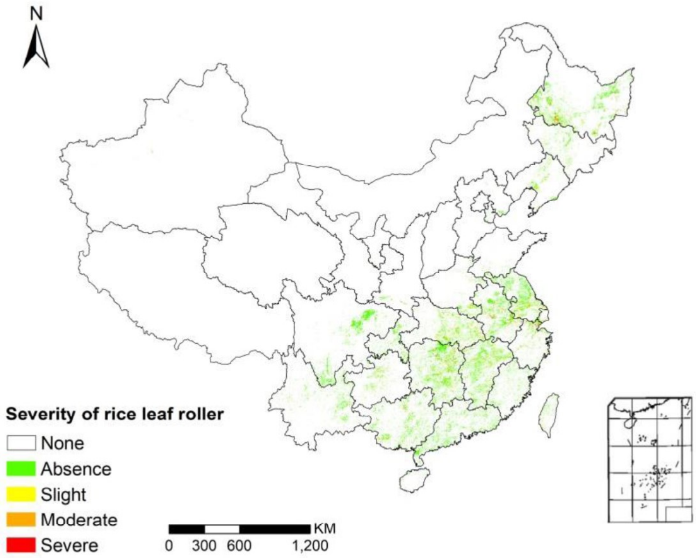


Table 4.5. Statistics of rice leaf roller in China (mid-August 2019)

Region	Occurrence ratio (%)			
	None	Slight	Moderate	Severe
Huanghuaihai	92	5	2	1
Inner Mongolia	74	22	3	1
Loess region	89	8	2	1
Lower Yangtze	81	11	5	3
Northeast China	83	9	5	3
Southern China	94	3	2	1
Southwest China	93	4	2	1

Rice sheath blight

Rice sheath blight (Figure 4.8 and Table 4.7) damaged around 3.4 million hectares, with severely occurring in southwestern Heilongjiang, central Anhui, Zhejiang and northern Hunan, moderately in Fujian, southern Hubei, northeastern Heilongjiang and northern Anhui, while slightly occurred in Jiangsu, northern Jiangxi, central Guizhou and northern Yunnan.

Figure 4.16. Distribution of rice sheath blight in China (mid-August 2019)

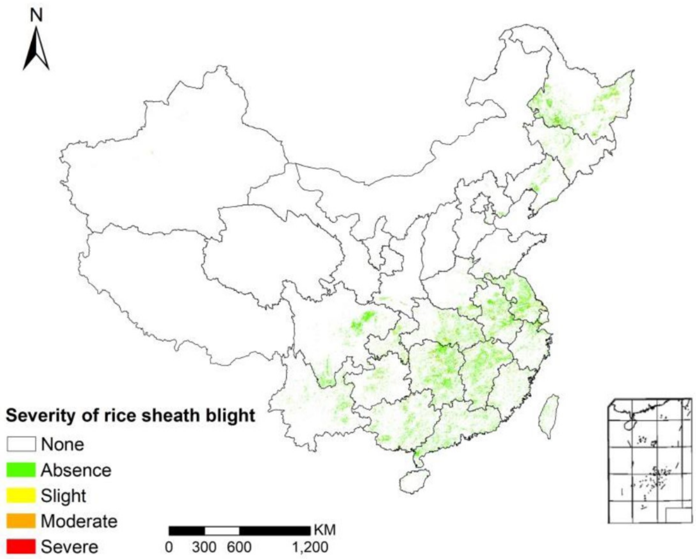


Table 4.6. Statistics of rice sheath blight in China (mid-August 2019)

Region	Occurrence ratio(%)			
	None	**Slight**	**Moderate**	**Severe**
Huanghuaihai	93	4	2	1
Inner Mongolia	95	2	1	2
Loess region	96	2	1	1
Lower Yangtze	88	6	4	2
Northeast China	88	7	3	2
Southern China	95	2	2	1
Southwest China	90	7	2	1

The maize suffered moderate pest and disease attacks during mid-August in the main maize production regions. Lower temperature in northeast China and higher humidity in southwest China and northern China than historical records were suitable for the reproduction of maize armyworm (Mythimna separata) and maize fall armyworm (Spodoptera frugiperda), and the dispersal northern leaf blight (Setosphaeria turcica).

Maize armyworm

The distribution of maize armyworm in mid-August 2019 is shown in Figure 4.9 and Table 4.8. The total area affected by armyworm reached 2.9 million hectares, which severely occurred in southwestern Heilongjiang, southern Jilin, northern Shandong and southeastern Hebei, moderately occurred in northern Jilin, and southern Shanxi, while slightly occurred in Henan, central Shanxi and northern Hunan.

Figure 4.17. Distribution of maize armyworm in China (mid-August 2019)

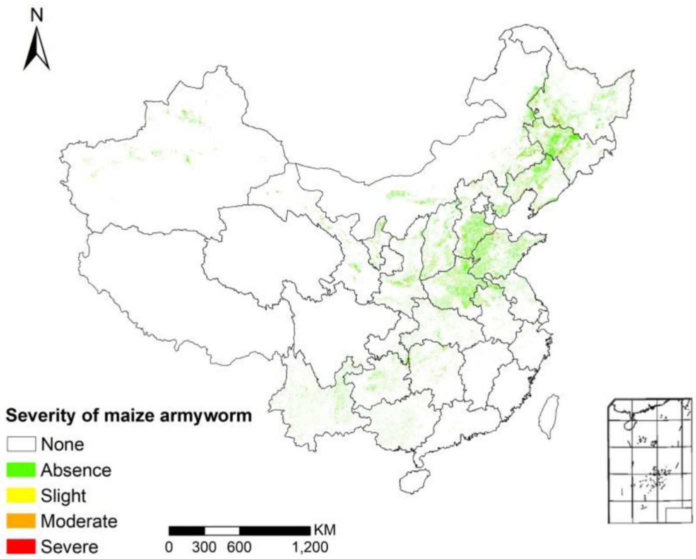


Table 4.7. Statistics of maize armyworm in China (mid-August 2019)

Region	Occurrence ratio (%)			
	None	**Slight**	**Moderate**	**Severe**
Huanghuaihai	91	5	2	2
Inner Mongolia	88	4	5	3
Loess region	88	7	3	2
Lower Yangtze	85	9	4	2
Northeast China	89	4	4	3
Southern China	98	1	1	0
Southwest China	93	4	2	1

Maize fall armyworm

Maize fall armyworm (Figure 4.10 and Table 4.9) damaged around 1.0 million hectares, with the pest severely occurred in southern Yunnan, Guangxi, Guizhou and southeastern Chongqing, moderately occurred in northern Yunnan, northern Hubei, southern Shaanxi, eastern Shandong and southern Henan, while slightly occurred in Guangdong, Hunan, southern Hubei, Zhejiang and northern Anhui.

Figure 4.18. Distribution of maize fall armyworm in China (mid-August 2019)

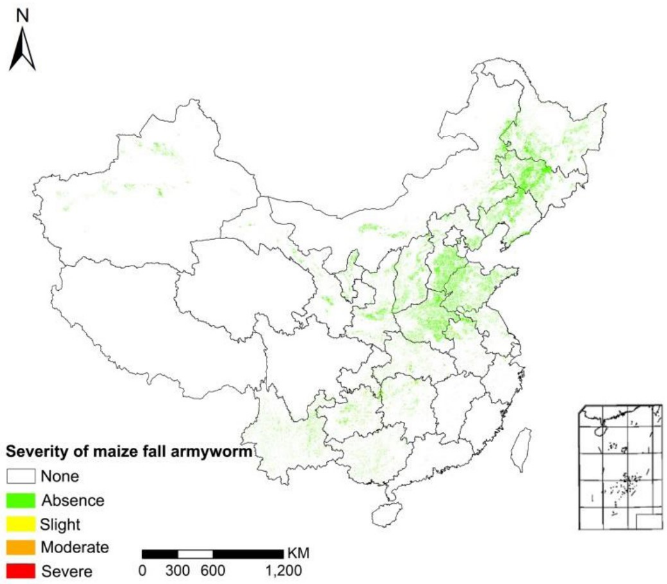


Table 4.8. Statistics of maize fall armyworm in China (mid-August 2019)

Region	Occurrence ratio (%)			
	None	Slight	Moderate	Severe
Huanghuaihai	97	2	1	0
Inner Mongolia	100	0	0	0
Loess region	98	1	1	0
Lower Yangtze	88	6	4	2
Northeast China	100	0	0	0
Southern China	90	3	4	3
Southwest China	90	3	4	3

Maize northern leaf blight

Maize northern leaf blight (Figure 4.11 and Table 4.10) damaged around 1.6 million hectares, with the disease severely occurred in southwestern Jilin, northern Shandong and southern Hebei, and moderately occurred in southern Liaoning and central Hebei, while slightly occurred in Henan and northern Hunan.

Figure 4.19. Distribution of maize northern leaf blight in China (mid-August 2019)

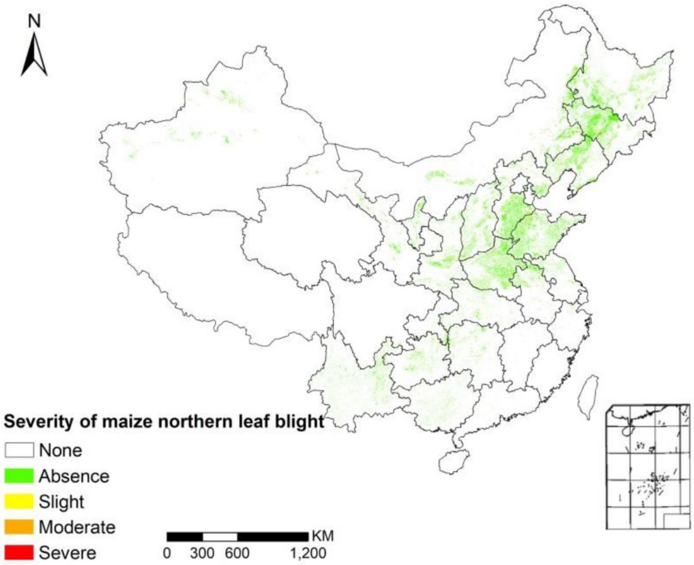


Table 4.9. Statistics of maize northern leaf blight in China (mid-August 2019)

Region	Occurrence ratio (%)			
	None	Slight	Moderate	Severe
Huanghuaihai	95	3	1	1
Inner Mongolia	93	3	2	2
Loess region	95	2	2	1
Lower Yangtze	95	3	1	1
Northeast China	94	3	2	1
Southern China	97	2	1	0
Southwest China	94	4	1	1

4.5 Major crops trade prospects

This section analyzes the import and export situation of the maize, rice, wheat, and soybean in the first half of 2019 in China.

Maize

Maize imports reached 3109,200 tons, an increase of 40.9% over 2018. The main suppliers were Ukraine and Russia, accounting for 98.6% and 1.1% of imports respectively. Imports amounted to US$674 million. The Democratic People's Republic of Korea (81.4%), Canada (10.6%), and Russia (5.8%) were the main destinations of Chinese maize exports, which reached to 8600 tons for a value of US$2.2349 million.

Rice

In the first half of 2019, the total import of rice in China was 1.2689 million tons, a decrease of 28.7% compared to the previous year. The imported rice mainly stems from Pakistan, Thailand, and Cambodia, respectively accounting for 31.0%, 29.0%, and 20.2% of imports. The expenditure for rice import was US$660 million. Total rice exports over the period were 1470,400 tons, mainly exported to Egypt, Côte d'Ivoire and Turkey (accounting for 24.7%, 16.1% and 10.3%, respectively). The value of the exports was US$559 million.

Wheat

In the first half of 2019, Chinese wheat imports totaled 1.7613 million tons, down by 9.8% year-on-year. The main sources include Canada (68.1%), Kazakhstan (12.1%), and France (7.5%). Imports amounted to

US$521 million. Wheat exports (154,700 tons) went mainly to the Democratic People's Republic of Korea (70.5%), Hong Kong (21.7%) and Ethiopia (4.8%). The generated income for wheat export was US$61 million.

Soybean

In the first half of 2019, the total imports of soybean in China were down 14.7% to 38265,800 tons. Brazil, the United States and Argentina respectively contributed 71.3%, 15.8% and 6.3%, for a total value of US$15676 million. Soybean exports were 67,400 tons, down by 19.2%.

Trade prospects for major cereals and oil crop in China for 2019

Based on the latest monitoring results, China grain imports are projected to increase. The projections are based on remote sensing data and the Major Agricultural Shocks and Policy Simulation Model, which is derived from the standard GTAP (Global Trade Analysis Project).

Maize

The model forecasts an increase of maize imports (+23.4%) in 2019, while exports decrease 4.4%. Global maize stocks were further reduced, production could not meet demand, and thus maize prices will be running at a high level. Maize imports are expected to increase in 2019.

Rice

According to the result of the model forecast, rice imports and exports will increase by 6.3% and 9.2% respectively in 2019. The global rice market will be basically balanced in supply and demand. International rice prices have further declined. Chinese rice production has declined slightly, and imports have maintained a certain scale. It is expected to maintain growth in 2019.

Wheat

According to the result of the model forecast, wheat imports are projected to increase by 5.2%, while exports will decrease by 8.6%. Global wheat production has further increased international wheat prices have fallen. But the persistence of wheat price difference at home and abroad still exists; wheat imports in 2018 will decrease slightly in 2019.

Soybean

Soybean imports and exports will decrease by 5.6% and 3.1%, respectively. Under the influence of insufficient domestic production and other factors, imports will remain high. Global soyabean supply and demand are loose. The outbreak of swine fever in Africa has affected the demand for soybean in China. In addition, the Frictions between Chinese and American Trade have not yet reached an agreement. Soybean imports in China will decrease slightly in 2019.

Figure 4.20. Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2019 compared to those for 2018(%)