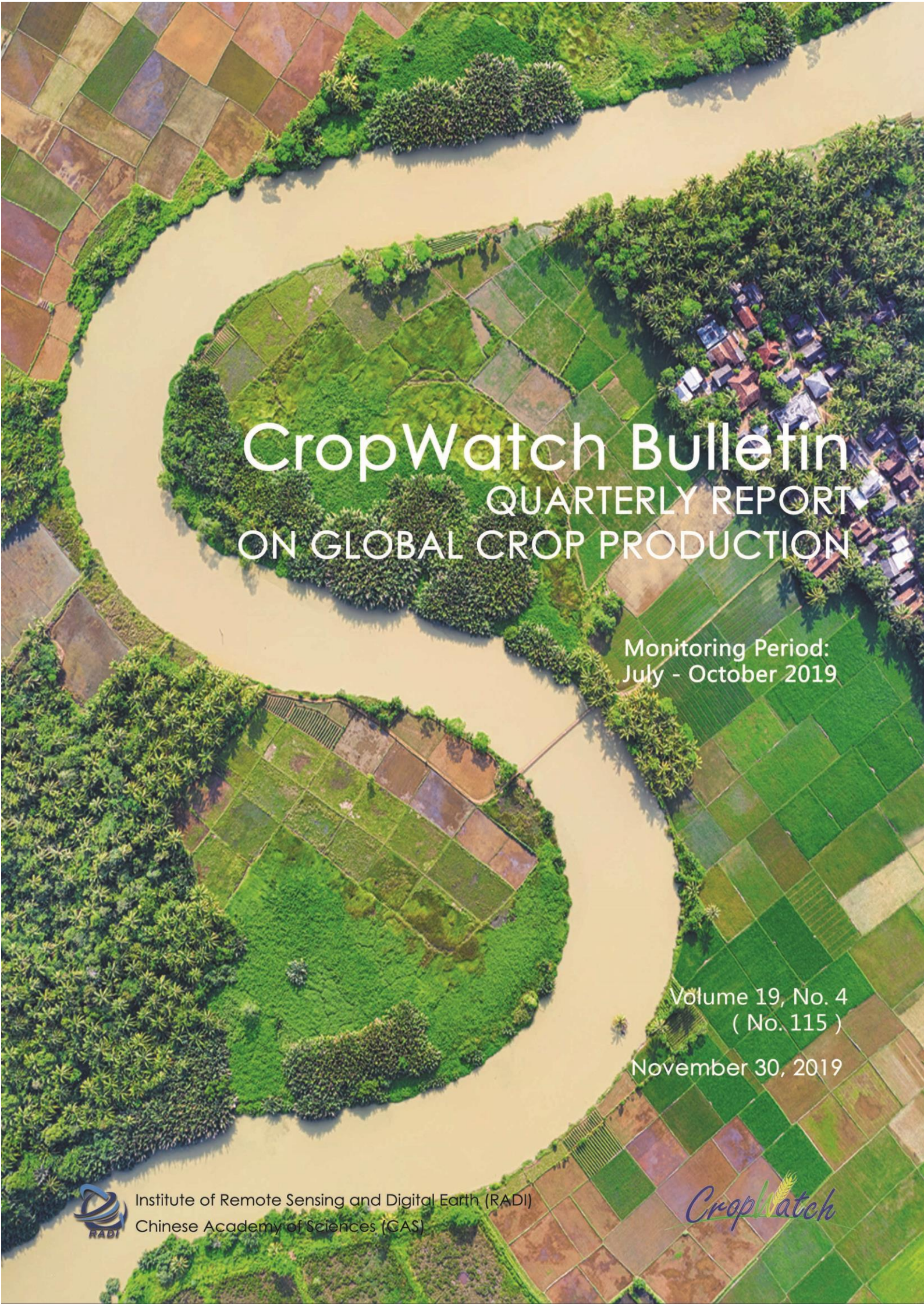

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CropWatch Online Resources: This bulletin along with additional resources is also available on the CropWatch Website at http://www.cropwatch.com.cn and http://cloud.cropwatch.com.cn/.

Contents

NOTE: CROPWATCH RESOURCES, BACKGROUND MATERIALS AND ADDITIONAL DATA ARE AVAILABLE ONLINE AT WWW.CROPWATCH.COM.CN.

LIST OF TABLES

LIST OF FIGURES

Abbreviations

5YA	Five-year average, the average for the four-month period from July from 2014 to 2018 to October next year; one of the standard reference periods.
15YA	Fifteen-year average, the average for the four-month period from July from 2004 to 2018 to October next year; one of the standard reference periods and typically referred to as “average”.
AEZ	Agro-Ecological Zone
BIOMSS	CropWatch agroclimatic indicator for biomass production potential
BOM	Australian Bureau of Meteorology
CALF	Cropped Arable Land Fraction
CAS	Chinese Academy of Sciences
CWAI	CropWatch Agroclimatic Indicator
CWSU	CropWatch Spatial Units
DM	Dry matter
EC/JRC	European Commission Joint Research Centre
ENSO	EI Niño Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
GAUL	Global Administrative Units Layer
GVG	GPS, Video, and GIS data
Ha	hectare
Kcal	kilocalorie
MPZ	Major Production Zone
MRU	Monitoring and Reporting Unit
NDVI	Normalized Difference Vegetation Index
OISST	Optimum Interpolation Sea Surface Temperature
PAR	Photosynthetically active radiation
PET	Potential Evapotranspiration
RADI	CAS Institute of Remote Sensing and Digital Earth
RADPAR	CropWatch PAR agroclimatic indicator
RAIN	CropWatch rainfall agroclimatic indicator
SOI	Southern Oscillation Index
TEMP	CropWatch air temperature agroclimatic indicator
Ton	Thousand kilograms
VCIx	CropWatch maximum Vegetation Condition Index
VHI	CropWatch Vegetation Health Index
VHIn	CropWatch minimum Vegetation Health Index
W/m^2	Watt per square meter

Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between January and April 2019, a period referred to in this bulletin as the JASO (July, August, September and October) period or just the "reporting period." The bulletin is the 115rd such publication issued by the CropWatch group at the Institute of Remote Sensing and Digital Earth (RADI) of the Chinese Academy of Sciences, Beijing.

CropWatch indicators

CropWatch analyses are based mostly on several standard as well as new ground-based and remote sensing indicators, following a hierarchical approach.

In parallel to an increasing spatial precision of the analyses, indicators become more focused on agriculture as the analyses zoom in to smaller spatial units. CropWatch uses two sets of indicators: (i) agroclimatic indicators—RAIN, TEMP, RADPAR, and potential BIOMSS, which describe weather factors and its impacts on crops; and (ii) agronomic indicators—VHIn, CALF, and VCIx, Cropping Intensity, and vegetation indices, describing crop condition and development. Importantly, the indicators RAIN, TEMP, RADPAR, and BIOMSS do not directly describe the weather variables rain, temperature, radiation, or biomass, but rather they are spatial averages over agricultural areas, which are weighted according to the local crop production potential. (ii) PAY indicators: planted area, yield and production.

For each reporting period, the bulletin reports on the departures for all seven indicators, which (with the exception of TEMP) are expressed in relative terms as a percentage change compared to the average value for that indicator for the last five or fifteen years (depending on the indicator).For more details on the CropWatch indicators and spatial units used for the analysis, please see the quick reference guide in Annex B, as well as online resources and publications posted at www.cropwatch.com.cn.

CropWatch analysis and indicators

The analyses cover large global zones; major producing countries of maize, rice, wheat, and soybean; and detailed assessments for Chinese regions, 41 major agricultural countries, and 201 Agro-Ecological Zones (AEZs).

This bulletin is organized as follows:

Chapter	Spatial coverage	Key indicators
Chapter 1	World, using Monitoring and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMSS
Chapter 2	Major Production Zones (MPZ), six regions that contribute most to global food production	As above, plus CALF, VCIx, and VHIn
Chapter 3	42 key countries (main producers and exporters) and 205 AEZs	As above plus NDVI and GVG survey
Chapter 4	China and regions	As above plus high resolution images; Pest and crops trade prospects
Chapter 5	Production outlook, and updates on disaster events and El Niño.	

Regular updates and online resources

The bulletin is released quarterly in both English and Chinese. E-mail **cropwatch@radi.ac.cn** to sign up for the mailing list or visit CropWatch online at **www.cropwatch.com.cn**, **http://cloud.cropwatch.com.cn/**

Executive summary

The current CropWatch bulletin describes world-wide crop condition and food production as appraised by data up to the end of October 2019. It is prepared by an international team coordinated by the Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences.

The assessment is based mainly on remotely sensed data. It covers prevailing weather conditions, including extreme factors, at different spatial scales, starting with global patterns in Chapter 1. Chapter 2 focuses on agro-climatic and agronomic conditions in major production zones in all continents. Chapter 3 covers the major agricultural countries that, together, make up at least 80% of production and exports (the "core countries") while chapter 4 zooms into China. Special attention is paid to the major producers of maize, rice, wheat, and soybean fr which the bulletin presents a global production estimate for crops harvested throughout 2019 (Chapter 5.1).

The bulletin is issued at a time when virtually all 2019 crops have been harvested in the temperate northern hemisphere, while in many tropical areas in both hemispheres rice crops are growing (to be harvested in early 2020) or are close to harvest. In the southern hemisphere the summer season/monsoon season is ongoing.

Agro-climatic conditions (Chapter 1)

Global agroclimatic conditions are assessed based on CropWatch Agroclimatic Indices which describe weather and climate over agricultural areas only. They are referred to as RAIN, TEMP and RADPAR and expressed in the same units as the corresponding climatological variables (rainfall, temperature and photosynthetically active radiation). BIOMSS is an estimate of the plant biomass production potential.

The current reporting period was globally warm and dry, and this is confirmed by numerous fires listed in the section on Disasters (Chapter 5.2) on almost all continents. CropWatch uses 65 large spatial units (referred to as MRU) to asses global agro-climatic patterns, Most MRUs experienced average RAIN, 57% had above average temperature and 66% had above average sunshine.

On a continental basis, RAIN anomalies were largest in north America (+24% above average), central Asia (+22%) and in Oceania (down 38% compared with average). Low precipitation in southern and especially central America (-9%) is directly associated with a very tense situation in the "drought corridor" (refer to Chapter 5.2 on Disasters).

In North America, TEMP was 0.4°C below average. Positive anomalies occured in central and eastern Asia (+0.3°C compared with average) where almost all MRUs has consistently warmer than average weather positive over their agricultural areas (89% and 100%, respectively). RADPAR was generally close to average except in South and Central America (+3%) and Oceania (+6%), where all MRUs were affected. The largest BIOMSS increase occurred in central Asia (+5%)

Acutely abnormal or damaging weather conditions are described in Chapters 3.1 by country and in Chapter 5.2 impact type. They include several tropical cyclones in different Basins: Kyarr, in the Indian Ocean, affected southern Asia and the Horn of Africa; Dorian created havoc in the Caribbean and the western Pacific, Lekima, Faxai and Hagibis affected eastern Asia and south-east Asia.

Global Agricultural production estimates (Chapter 5.1)

The bulletin provides the second revised global estimate by the CropWatch team for 2019 production of the major commodities. About 90% of the production is actually modeled and about 10% is trend-based.

The volumes produced in 2019 include 1055 million tonnes of maize, up 0.5% from 2018, 754 millions for rice (as paddy; up 4.2%), 716 million tonnes of wheat (a 0.9% increase) and 324 million tonnes of soybeans, 1.0% lower than last year's output.

The largest net cereal production increases in million tonnes occurred in India (13.3, in spite of a drop in wheat output), China (10.6), United States (9.7), Pakistan (5.2) followed by Bangladesh (3.7), Argentina (3.3), Myanmar (2.6) and several central and western Asian countries where wheat did well after several years of poor performance (2.0 to 2.4 in Afghanistan, Iran and Uzbekistan). The largest net cereal production decreases in excess of 1 million tons affected Australia (-5.4 due to poor wheat), Kazakhstan (-3.5, wheat), South Africa (-1.7, maize), Indonesia (-1.6, rice) and Ukraine (-1.4, maize and wheat). As described in the country narratives in Chapter 3, the listed situations are directly related to prevailing environmental conditions

China (Chapter 4)

The total 2019 annual crop production is estimated at 628 million tons, up 2% from 2018. For summer crops (including maize, semi-late rice / single rice, late rice, spring wheat, soybean, tuber crops, and other minor summer crops) the output is put at 467 million tons, a 2% increase This is mainly due to the good performance of maize and rice, the production of which reached 224 million tons, 1% above the 2018 output. Maize yields in Heilongjiang, Jilin, Liaoning and Inner Mongolia were up 3%, 5%, 3%, and 2%, respectively. In contrast, Both Henan and Shandong maize production dropped by 2% due to drought at early growing stage.

At 203 million tons, rice production (mostly single rice and late rice) was 3% above last year's output. Yield increase due to favorable late season weather was the main factor behind the improved production. The wheat production estimate of 126 million tons was up 2% over 2018.

Soybean output (14441 thousand tons) underwent a year-on-year increase of 3%. 2019 was the fourth consecutive year of increased soybean hectarage and production. In Heilongjiang, the main soybean region of China, production was up 8%. This is exceeded in Jilin where increased planted area and yield resulted in an 10% increase in output. .