

# CropWatch Bulletin

## QUARTERLY REPORT ON GLOBAL CROP PRODUCTION

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中国科学院空天信息创新研究院  
Aerospace Information Research Institute, Chinese Academy of Sciences

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**Aerospace Information Research Institute (AIR), Chinese Academy of Sciences**

P.O. Box 9718-29, Olympic Village Science Park

West Beichen Road, Chaoyang

Beijing 100101, China

This bulletin is produced by the CropWatch research team, Aerospace Information Research Institute (AIR), Chinese Academy of Sciences, under the overall guidance of Professor Bingfang Wu.

Contributors are Diego de Abelleira (Argentina), Jose Bofana (Mozambique), Sheng Chang, Shuping Cheng (Hubei, China), Abdelrazek Elnashar (Egypt), Li Fu, Zhijun Fu, Wenwen Gao (Shanxi, China), Yueran Hu, Kangjian Jing, Mengxiao Li, Yuanchao Li, Zhongyuan Li (Hubei, China), Wenjun Liu (Yunnan, China), Yuming Lu, Wenwen Ma (Hubei, China), Zonghan Ma, Linghua Meng (Jilin, China), Elijah Phiri (Zambia), Elena Proudnikova (Russia), Xingli Qin, Mohsen N. Ramadan (Egypt), Igor Savin (Russia), Urs Christoph Schulthess (CIMMYT, Netherlands), Binfeng Sun (Jiangxi, China), Fuyou Tian, Huanfang Wang, Linjiang Wang, Qiang Wang (Anhui, China), Yixuan Wang, Yuandong Wang (Jiangxi, China), Zhengdong Wang, Bingfang Wu, Cong Xu, Jiaming Xu (Zhejiang, China), Nana Yan, Leidong Yang, Min Yang (Hubei, China), Zhishan Ye (Anhui, China), Hongwei Zeng, Miao Zhang, Xiwang Zhang (Henan, China), Dan Zhao, Hang Zhao, Xinfeng Zhao, Yifan Zhao, Liang Zhu, Weiwei Zhu, and Qifeng Zhuang (Jiangsu, China).

**Editor:** Liang Zhu

**Corresponding author:** Professor Bingfang Wu

Aerospace Information Research Institute, Chinese Academy of Sciences

Fax: +8610-64858721, E-mail: [cropwatch@radi.ac.cn](mailto:cropwatch@radi.ac.cn), [wubf@aircas.ac.cn](mailto:wubf@aircas.ac.cn)

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**NOTE: CROPWATCH RESOURCES, BACKGROUND MATERIALS AND ADDITIONAL DATA ARE AVAILABLE ONLINE AT [WWW.CROPWATCH.COM.CN](http://WWW.CROPWATCH.COM.CN).**

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## Abbreviations

5YA	Five-year average, the average for the four-month period from July to October for 2016-2020; one of the standard reference periods.
15YA	Fifteen-year average, the average for the four-month period from July to October for 2006-2020; 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	El 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	Mapping and Reporting Unit
NDVI	Normalized Difference Vegetation Index
OISST	Optimum Interpolation Sea Surface Temperature
PAR	Photosynthetically active radiation
PET	Potential Evapotranspiration
AIR	CAS Aerospace Information Research Institute
RADPAR	CropWatch PAR agroclimatic indicator
RAIN	CropWatch rainfall agroclimatic indicator
SOI	Southern Oscillation Index
TEMP	CropWatch air temperature agroclimatic indicator
Tonne	Thousand kilograms
VCIx	CropWatch maximum Vegetation Condition Index
VHI	CropWatch Vegetation Health Index
VHIn	CropWatch minimum Vegetation Health Index
W/m <sup>2</sup>	Watt per square meter

## Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between July and October 2021, 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 123<sup>th</sup> such publication issued by the CropWatch group at the Aerospace Information Research Institute (AIR) 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. 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; and (ii) agronomic indicators—VHIn, CALF, and VCIx and vegetation indices, describing crop condition and development. (iii) 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.cn](http://www.cropwatch.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, 42 major agricultural countries, and 217 Agro-Ecological Zones (AEZs).

This bulletin is organized as follows:

Chapter	Spatial coverage	Key indicators
<b>Chapter 1</b>	World, using Mapping and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMSS
<b>Chapter 2</b>	Major Production Zones (MPZ), six regions that contribute most to global food production	As above, plus CALF, VCIx, and VHIn
<b>Chapter 3</b>	42 key countries (main producers and exporters) and 210 AEZs	As above plus NDVI and GVG survey
<b>Chapter 4</b>	China and regions	As above plus high-resolution images; Pest and crops trade prospects
<b>Chapter 5</b>	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.cn**, **http://cloud.cropwatch.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 2021. It is prepared by an international team coordinated by the Aerospace Information Research Institute, Chinese Academy of Sciences.

Special attention is paid to the major producers of maize, rice, wheat and soybean throughout the bulletin. 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. Each is the object of a detailed analysis. Chapter 4 zooms into China. The bulletin also presents this year's fourth CropWatch production estimates for selected countries and reviews the disasters in chapter 5.

This report for the period from July to October 2021 covers wheat, maize, soybean and rice production in the Northern Hemisphere. Winter wheat reached maturity in June/July. The harvest of the summer crops (spring wheat, maize, single-season rice/middle-season rice and soybean) started in August and was mostly finished by the end of October, then the harvest of late rice was finished in November. In the Southern Hemisphere, wheat is the only major crop that was grown during this monitoring period. It reaches maturity in October (Southern Brazil) or in November and December (Argentina, South Africa and Australia).

While COVID-19 keeps impacting the lives of the entire world population, it has generally had very limited effects on the production of the key staple crops, which are maize, rice, wheat and soybean. The outbreak of desert locusts in East Africa and Middle East is getting under control, although efforts are hampered by conflicts in the Horn of Africa. Harm to crops, while devastating for the affected farmers, has been limited to some pockets.

## **Agro-climatic conditions**

Global temperatures continue to set alarming records in 2021. July 2021 was the Earth's hottest month on record. It was also the hottest month for Asia. August to October also ranked at the very top of hottest months ever recorded.

Climate change not only impacts the temperatures, it also affects precipitation and wind. It causes prolonged and more severe droughts, such as the one that occurred in the West of the USA. On the other hand, rainfall intensities tend to increase. On July 20, more than 200 mm of rainfall were recorded over the city of Zhengzhou between 4 and 5 pm. This was the heaviest hour of rainfall ever reliably recorded in China. Many other parts of the world were also affected by floods during this monitoring period. Fertile agricultural land is often located in flood plains. Thus, not only droughts, but also floods, amplified by climate change, can pose a major threat to food security.

Overall, conditions for the production of maize, rice and soybean were favorable during this monitoring period. Conditions for wheat were highly variable. In 2021, total production of major cereal and oil crops globally is estimated to be at 2,882 million tonnes, a decrease by 0.4%, equivalent to 10.3 million tonnes. Maize production is estimated at 1,077 million tonnes, an increase of 0.6% or equivalent to 6.9 million tonnes; global rice production is at 764 million tonnes, an increase of 0.5% or an increase of 3.5 million tonnes; global wheat production is 720 million tonnes, a 2.4% decrease or 17.7 million tonnes drop from

2020, due to the consistent drought impact in South America, Western Africa and Western Asia. The global soybean production is estimated to be at 320.3million tonnes, a decrease by 0.9%.

The following is a summary of the conditions in the key production regions:

- North America: In the USA, production conditions were generally favorable for maize (+1.8%), and soybean (+0.2%). Rice (-3.0%) was negatively impacted by the drought conditions in California. Conditions were mixed for wheat. Especially the Pacific Northwest and the Northern Plains were unfavorable, due to drought conditions and high temperatures. This resulted in a decline of wheat production by 2.7%. Wheat in the Canadian Prairies was also severely impacted by the drought. Canada's wheat production is estimated to have declined by 15.2% as compared to last year. Rainfed maize production in Mexico (+3.9%) benefitted from abundant rainfall during the summer months.

- South America: Wheat production in Argentina (+12.3%) and Brazil (+17.7%) is estimated to be higher than last year. Conditions in Brazil were mixed, as wheat in Parana was affected by drought and several freezes. But production increased due to an expanded area. The soybean crop in Brazil is off to a good start. Dry weather in the first half of October provided good conditions for sowing. Subsequent heavy rains in late October helped with germination and crop establishment.

- Europe: This summer was rather wet in most of western and northern Europe. Harvest of wheat was negatively impacted by frequent rains and quality suffered due to lodging and sprouting. France, Europe's largest producer, saw an increase in wheat production by 2.4%, whereas in Germany, it declined by 1.6%. Conditions in Hungary were drier than usual, causing a decline in maize (-10.3%) and wheat (-5.2%) production.

- Eastern Europe to the Ural: In the Ukraine, a top exporter of wheat and maize, conditions were favorable. Wheat production increased by 9% and maize by 28.7%. In Russia, conditions were mixed. Irregular rainfall caused a decline in wheat production in the southern Ural and Volga region.

- Africa: Rainfall was generally below average, by as much as 30% and more in Western Africa. The only region with average rainfall was Ethiopia, but crop production declined in its conflict regions. Maize production is estimated to decline by 2.6% and wheat by 2.3%. Wheat production is up by 16.4% in Zambia and by 6.2% in South Africa.

- Central Asia: Prolonged drought conditions caused a decline in crop production in this region. Slightly below average rainfall could not compensate for the drought conditions that had been observed in Kazakhstan during the previous monitoring period, and yields declined by 12.7%. Afghanistan has been negatively affected by the severe drought and the food crisis got exacerbated by the conflict and subsequent change of government.

- South Asia: Rice production in India (+0.9%), Pakistan (-1.1%) and Bangladesh (+4.5%) stayed near average levels, aided by regular monsoon rains.

- Southeast Asia: Rice production stayed near average. It slightly declined in Thailand (-0.7%), Vietnam (-0.5%), Cambodia (-1.8%), Myanmar (-2.8%) and Philippines (-1%), whereas it increased in Indonesia (+2.2%).

- Australia: Rainfall was generally favorable in Australia. Wheat yields are forecasted slightly below last year's record levels (-2.1%).

- China: The country generally benefitted from abundant, though occasionally excessive, rains. Especially the regions along the Yellow River received above-average rainfall, causing flooding conditions. Late rains in October also delayed the harvest of maize and the sowing of the subsequent winter wheat crops in some areas. Overall crop production is estimated to have increased by 0.9% over the same

period of last year. Conditions were much more favorable than last year in the Northeast, resulting in an increase in crop production by more than 5 million tonnes in that region. At the country level, maize production is estimated at 229.7 million tonnes (+1.6%), rice production increased to 202.96 million tonnes (+0.9%) and soybean production decreased slightly by -1.6% to 14.3 million tonnes. Wheat production increased by 0.7% to 128 million tonnes.