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covid-19 Brief

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October 2020

Predicting Food Crop Production in Times of Crisis: The Case of Sorghum in Burkina Faso.

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The COVID-19 pandemic has caused disruption in several areas of the country due to the burden of the disease and the policies implemented to mitigate its spread. In the Agricultural sector, the impacts are wide-ranging, including on access to markets for crops and inputs or on the mobility of farmers and agricultural workers, among others. Being able to assess and quantify the combined effect on countries' food crop production allows various stakeholder groups to better plan ahead and respond more effectively. The sooner we can anticipate the impact on food production and supplies, the easier it will be to prevent the pandemic from morphing into a food and nutrition security crisis. More accurate and timely information on food crop production makes it possible for countries to design targeted policies to protect access to food among the most vulnerable communities.

The challenge of accessing and collecting data during the time of crisis makes it very difficult to obtain accurate and timely information on production systems and, thus, food supplies in local markets. This can be overcome by making use of remote sensing data. Nowadays, high temporal and spatial resolutions satellite images are publicly available and allow to remotely access a rich set of information related to vegetation and climate data. With the opportunities offered by artificial intelligence, it is possible to use machine learning techniques as a framework to learn patterns embedded within datasets and generate information regarding future production outcomes.

Figure 1. *2017 Spatially Disaggregated Sorghum production in The Burkina Faso; model SPAM 2017; IFPRI 2020*

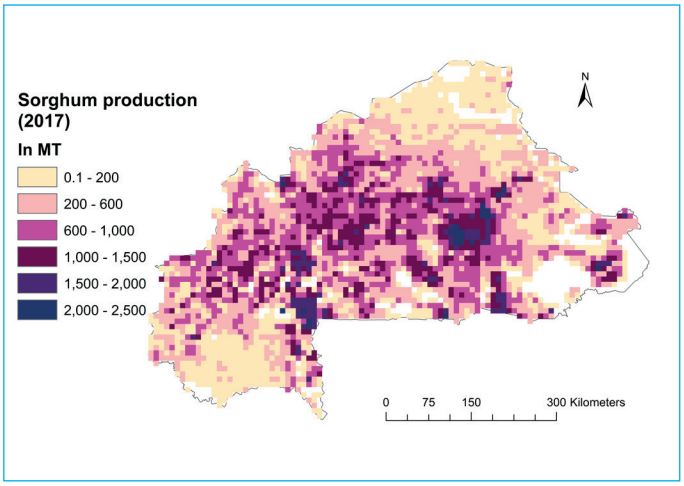
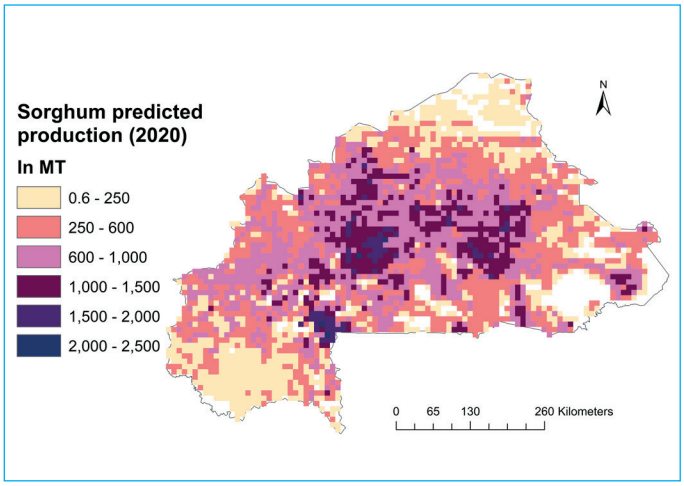


Figure 2. *2020 (predicted) of Sorghum production in The Burkina Faso*



We used Artificial Neural Networks and biophysical remotely sensed data to predict Sorghum production in Burkina Faso for 2020 at the pixel level (Figure 2) and compared it with 2017 production (Figure 1). Sorghum is one of the main cereal crops grown in Burkina Faso. It is the main staple food of rural populations in Burkina Faso. The country is ranked third in sorghum production in Africa.

Our model allows us to examine the spatial distribution of production changes between 2017 and 2020 at a pixel level. The two maps, Figures 1 and 2, respectively, show the distribution of actual and predicted sorghum production in 2017 and 2020 growing seasons. The model predicts a production of 1714511 metric tons of sorghum in 2020, which represents an increase of 3.8% compared to 2017.

It is easily observable from the two maps that Sorghum production in 2020 is expected to be higher than in 2017 for the majority of areas. Figure 3 expresses predicted 2020 Sorghum production levels across the country as ratios of production levels in 2017, pixel by pixel (10 km). It shows that the most significant increase in production is expected in the northern, central and south-western regions of the country. On the other hand, a decrease in production compared to 2017 is expected in the south-eastern and central-western regions of the country.

The ability to forecast production more accurately and with greater spatial differentiation makes it possible to

devise more targeted policies for increased impact in terms of protecting the most vulnerable communities in areas where the sharpest decrease in production may be expected. In addition, better forecasting of food crop production in the context of possible widespread disruption of production systems is a good starting point to identify where attention could be needed to assess the impacts of COVID-19 on local food supply. we will come back to this in our next publications

Background documents

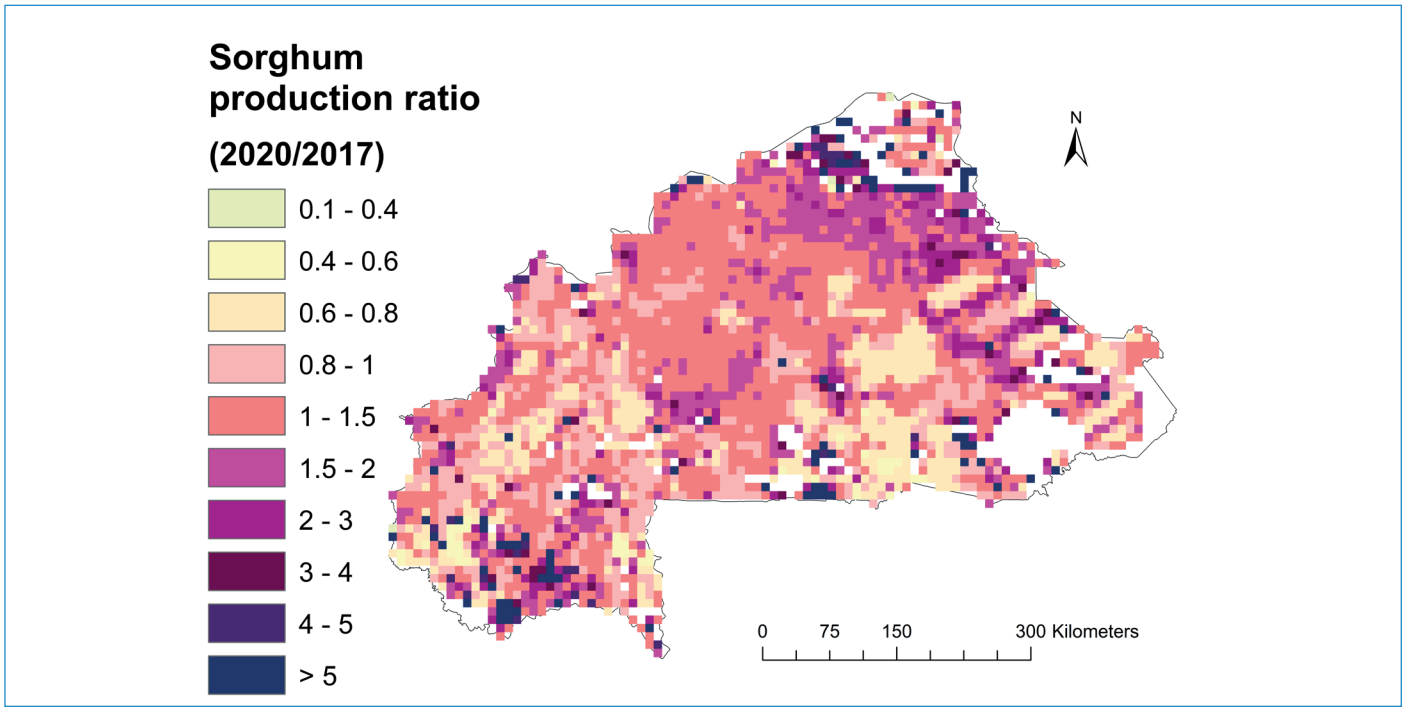
1. Racine Ly, Khadim Dia. 2020. Application of Remote Sensing and Machine Learning for Crop Production Forecasting During Crises. Covid-19 Bulletin No. 4, August. Kigali. AKADEMIYA2063.

2. FAOSTAT Data (http://www.fao.org/faostat/en/#data/QC)

3. International Food Policy Research Institute. 2020. "Spatially-Disaggregated Crop Production Statistics Data in Africa South of the Saharan for 2017", https://doi.org/10.7910/DVN/FSSKBW, Harvard Dataverse, V1.

Note: The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by AKADEMIYA2063.

Figure 3. *2020 (predicted) and 2017 (FAOSTAT) ratio of Sorghum production in Burkina Faso. Ratio below unity means production reduction in 2020 compared to 2017 and, 2020 Sorghum production increase otherwise.*



AKADEMIYA2063 is grateful to USAID for funding for this work through a Feed the Future grant with Policy LINK. Any opinions stated here are those of the author(s) and are not necessarily representative of or endorsed by AKADEMIYA2063.

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