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covid-19 Brief

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# Shift of Yield Dynamic during a time of Crisis: The Case of Sorghum in Burkina Faso.

**Mariam Diallo,** *Associate Scientist, AKADEMIYA 2063;* ***Racine Ly,*** *Director, Data Management, Digital Products and Technology;* **Khadim Dia**, *Associate Scientist, AKADEMIYA 2063*

The COVID-19 pandemic is disrupting several countries due to the disease burden and policies implemented to mitigate its propagation. The impacts in the agricultural sector are wide-ranging, including disruptions of market access for crops and inputs, farmers and farm workers' mobility restrictions, and logistics and transport systems disruption. The ability to assess and quantify early in the season the combined effects on countries' agricultural production systems allows various stakeholders to better plan ahead and respond more effectively. The sooner we can anticipate the impact on agricultural production and domestic 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 yields makes it possible for countries to design targeted policies to protect access to food for the most threatened communities.

This brief uses remotely sensed data and applies machine learning techniques to forecast future Sorghum yield in Burkina Faso in the context of the evolving Covid-19 crisis.

The challenge of accessing and collecting data during a 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 partly 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 then use machine learning techniques as a framework to learn patterns embedded within accumulated datasets and generate information regarding future yield outcomes.

***Figure 1.****2017 Spatially Disaggregated Sorghum yield in Burkina Faso . Data and map sources: Authors*

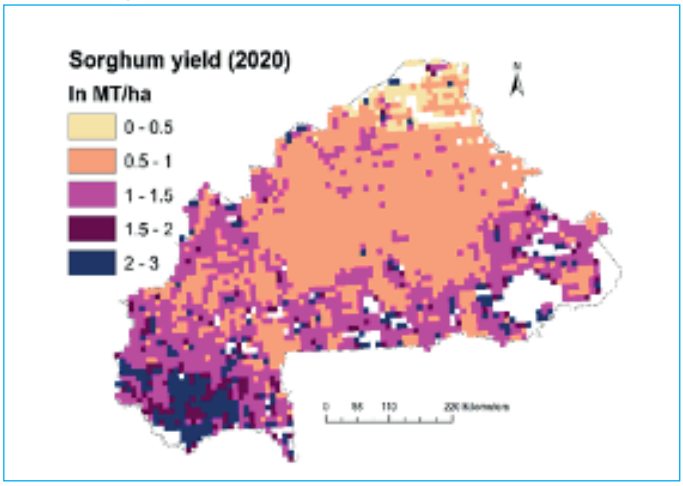
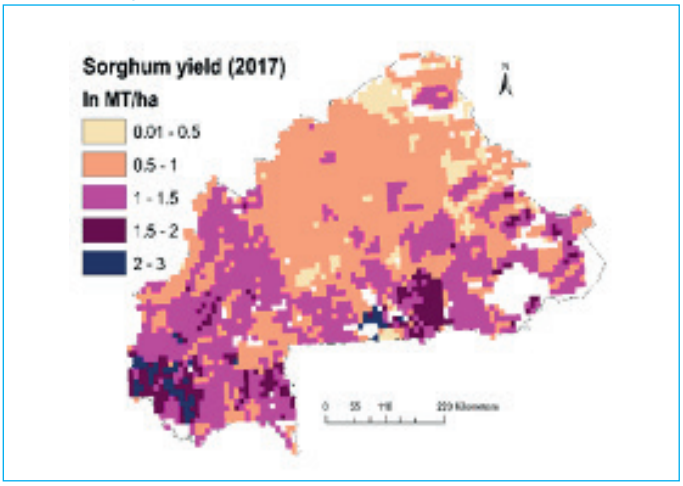



***Figure 2.*** *2020 (predicted) of Sorghum yield in Burkina Faso. Data and map sources: Authors*

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

Our model allows us to examine the spatial distribution of yield changes between 2017 and 2020 at a pixel level. The two maps, Figures 1 and 2, respectively, show a slight difference in terms of agricultural productivity over the 2017-2020 period. The results also show that the 2020 Sorghum yield is higher than the 2017 yield for the majority of the areas. Figure 3 compares the predicted 2020 Sorghum yield as a fraction of yield in 2017, pixel by pixel (10 km).

According to the model's projections, Sorghum productivity is expected to increase on average across the country. The sharpest increases are expected in central and southern parts of the country, while the decrease is expected at the northern, western, and eastern areas.

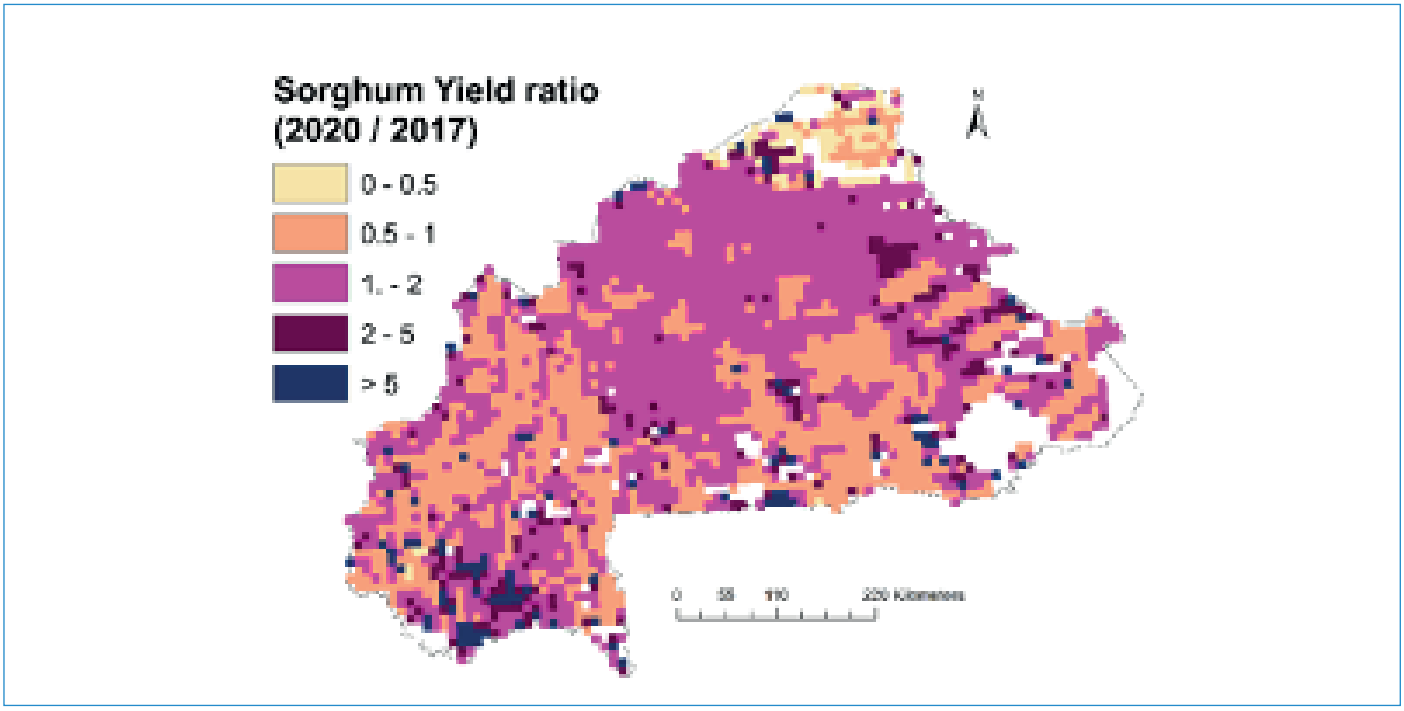
The more significant spatial differentiation makes it possible to devise more targeted policies for increased impact in terms of protecting the most vulnerable communities in areas where the sharpest decrease in yield may be expected. In addition, better forecasting of food crop yield in the context 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. This will be the next focus of our analysis.

## Background documents


1. FAOSTAT Data (http://www.fao.org/faostat/en/#data/QC)
2. 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 Yield in Burkina Faso. Ratio below unity means agricultural yield reduction in 2020 compared to 2017 . Map source: Authors*





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a: AKADEMIYA2063 | Kicukiro/Niboye KK 360 St 8 | 4729 Kigali-Rwanda
p: +221 77 761 73 02 | p: +250 788 304 270 | e: hq-office@akademiya2063.org | w: akademiya2063.org