

Satellite-Based Yield Measurement

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Through trials in Uganda, this project is testing a novel approach to derive reliable data on crop productivity from satellite imagery. The technique relates satellite-based data to plot-level ground measures of yields. This enables future yield predictions, which can inform better policymaking to help farmers improve productivity.



CHALLENGE

Reliable data on crop productivity is essential for policy decisions that will improve agricultural yields and reduce poverty. Traditional approaches to measuring yields and productivity (such as household surveys) are resource-intensive and difficult to implement, particularly for smallholder systems. However, pioneering techniques using data from satellite imagery now offer more accurate, timely and affordable agricultural statistics. To validate the approach, this project tested satellite-based yield predictions against results on the ground for 900 maize plots in Uganda, a country highly dependent on smallholder agriculture.

INNOVATION

The team used the Scalable Satellite-based Crop Yield Mapper, a statistical approach newly developed at Stanford University which relates satellite data to plot-level ground measures of yields in order to make future yield predictions. The outlines of each maize plot were captured via handheld GPS devices and used in conjunction with satellite imagery. The project took objective and subjective

measures of soil fertility (through conventional analysis of subsamples, and farmer reporting), maize variety (through DNA fingerprinting of leaf and grain samples, and farmer assessment assisted by photographic prompts). Questionnaires were also submitted to each household. The combined satellite and field datasets provide an unprecedented opportunity for testing the ability of satellites to improve and predict yield measurement in smallholder systems.

The project is the first to test yield estimation in smallholder production via high-resolution satellite imagery against farmer self-reported harvest and objective ground research into actual yields. The approach could be scaled up across different crops and regions. Uganda is the first of several countries in Sub-Saharan Africa in which the team plans to validate this satellite-based remote sensing approach.