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SMART GREENHOUSES

# Kenyan farmers optimise water use with mobile phones

Remote monitoring of greenhouses is allowing Kenyan smallholders to irrigate their crops from afar and improve their quality of life.

*Toby Penrhys-Evans and Bob Koigi*

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Smallholders are regulating their water supply using solar-powered sensors linked to drip irrigation systems and their mobile phones

Locally-built greenhouses and solar-powered sensors linked to a drip irrigation system are enabling Kenyan farmers to efficiently manage water use on their crops. The sensors, which are linked to farmers' mobile phones via SMS, regulate the water supply channelled through drip lines, and also monitor temperature, humidity and soil moisture in the greenhouse. The technology is reducing the labour required for manual irrigation and increasing crop yields. Nairobi-based Illuminum Greenhouses is the company behind the innovation and, since 2014, the agri-tech firm has built 1,200 greenhouses across Kenya with 5,500 smallholder farmers using the technology.

Wooden and metal greenhouses constructed by the company are also helping to reduce the risk of crops succumbing to pests and disease when grown without cover, and are enabling farmers to improve their productivity. "Greenhouses allow farmers to grow hybrid seeds (capsicum, cucumbers and tomatoes) that have a longer harvest period and up to four times greater yield compared to open field seeds. This massive increase in yield over a small growing area with less risk exposure to pests and diseases results in increased revenue to the farmer," explains Taita Ngetich, cofounder and chief of operations for Illuminum Greenhouses.

**5,000** farmers have adopted greenhouse remote-monitoring technology

"The average cost of an 8 m by 30 m metallic greenhouse fully equipped with drip technologies, installation, and greenhouse farming training, costs US$4,500 [€4,000], while the average income of smallholder farmers per year is about US$2,000 [€1,800]," says Ngetich. To make the structures affordable and avoid paying the total cost upfront, the company has created an asset finance mechanism – taking the constructed greenhouse and the crops grown as security. "In this way, farmers pay up to 20% of the total value instead of the entire amount and we structure the repayment to match with their harvesting cycles," explains Ngetich. "We proved this works over 2017 and 2018, where we constructed greenhouses for 345 farmers and only requested 10% deposit and recouped the balance over the harvesting season. We now hope to bring on board financial institutions and government to scale this method."

Recognising the need to continuously innovate and expand what it offers to farmers, Illuminum Greenhouses has developed an updated version of the irrigation technology. "We have started building an online analytics interface accessible via smartphones that will provide actionable insights on field conditions, water usage, warning indicators, diagnostics and other useful information," says Ngetich.

Farmers' lack of financial data often makes it difficult for lenders to credit score them. To bridge this funding gap, Ngetich is looking to develop a new credit-scoring approach using the Illuminum technology. "Farmers may not have financial footprints, but they have data from our sensors which lending partners can use to credit score these farmers. By sharing data on irrigation patterns, yield harvested per season, price per kilo of produce harvested, historical weather patterns and farming records, we believe we can have a credit score," he says.

Illuminum Greenhouses was one of four winners of the CTA Agrihack 2018 competition – which supports young entrepreneurs in ICTs for agriculture – that each received a prize of €7,500. "The [online analytics] system will capitalise on Kenya's strong smartphone adoption, as 83% of the country's internet penetration was through smartphones in 2017. This [development of the platform] has been made possible by CTA which is funding this development and will allow farmers to access big data and machine-learning technologies," states Ngetich. ■