

CASE STUDIES: SOIL TESTING

CASE STUDY 1: Daktari Wa Udongo,



Mary Afande Lwaka, Cropnuts customer. Credit: Fintrac Ltd.

Daktari Wa Udongo (Swahili for “Soil Doctor”) is a partnership between the United States Agency for International Development (USAID), Fintrac’s Kenya Horticulture Competitiveness Project (KHCP), and Crop Nutrition Lab Services (Cropnuts). The project brings professional soil testing services to smallholder farmers in rural Kenya via agrodealer networks.

Smallholders are trained in soil sampling by Daktari Wa Udongo extension workers, then deliver their samples to a local agrodealer. The agrodealer sends samples to the Cropnuts soil testing laboratory in Nairobi where they are analysed. Full results are emailed to the agrodealer, while an SMS is sent to the farmer with specific soil and fertiliser

recommendations. The farmer can access inputs and technical support from the agrodealer. Cropnuts have developed a web-based system, Inputs4Ag, to link farmers, agrodealers and input suppliers to ensure the necessary inputs are available to the farmers.¹

Cropnuts uses spectrometer analysis that delivers results quickly and is low cost at Ksh 2,500 (\$30) per sample. This can still be a considerable cost for smallholders, so extension workers provide on-site training and use demonstration plots to show the potential benefits. The demonstration plots also exhibit better agricultural techniques, such as proper plant spacing and use of organic mulch, to farmers who have not yet bought in to the service. This helps to raise incomes so that farmers can afford to buy into the scheme. Agrodealers make Ksh 500 (\$6) per sample, which provides a significant incentive to promote the technology and proper techniques to farmers. Furthermore, discounted services are offered to first-time customers at Ksh 1,500 (\$18).²

Mary Afande Lwaka is a farmer who was one of the first 670 smallholders to receive soil recommendations by SMS. She had been adding fertilizer to her soil without realising it was making the soil acidity worse and damaging her yield. Soil analysis showed that she actually needed lime, which improved her soil health and crop yields dramatically. Another Cropnuts customer, Samuel Tanui, reports that “by implementing all the recommendations, we have almost doubled our production.”³ By April 2015 the soils of almost 8,000 farmers had been analysed, and Cropnuts analyse up to 5,000 samples per year.⁴

CASE STUDY 2: Soil testing in Rwanda

Francis Munyengango worked his family’s 1 acre (0.4ha) plot of land in the hills of Rwanda. His annual yield of two bags of beans was not enough to feed his family, or provide income for his children’s school fees. The Rwanda Institute of Agronomic Sciences (ISAR) invited Francis to join a project supported by AGRA’s Soil Health Programme.

Since 2009, AGRA has trained an estimated 1.8 million farmers in 13 African countries in ‘integrated soil fertility management’ (ISFM). ISFM encourages a wide range of soil management and farming



Bean market in Uganda. Credit, Neil

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techniques such as modest applications of mineral fertilisers combined with organic matter, such as crop residue or animal manure, and intercropping with nutrient rich legumes like cowpea, pigeon pea, beans or soybeans. Other practices aim to reduce soil erosion, improve water efficiency and reduce tillage.

Together, AGRA and ISAR discovered that Francis was trying to grow beans in highly acidic soil that needed lime to neutralise the acid. By applying lime, mineral and organic fertiliser, alongside other ISFM practices, Francis' yields grew from 2 to 5 bags, enough to feed his family and sell his surplus at the local market to earn additional income.⁵

CASE STUDY 3: SoilDoc, portable testing kit



Training on data management. Credit, Columbia University

SoilDoc, created by the Agriculture and Food Security Center, part of Columbia University's Earth Institute, is a portable, on-site soil testing kit that provides tailored fertiliser recommendations for farmers. The kit uses an Android® device to transmit soil information electronically, allowing extension workers to make on-the-spot diagnoses of soil constraints and targeted advice to farmers. The SoilDoc field kit can test soil pH, biologically active soil organic matter, electrical conductivity (a general measure of

fertility as well as salinity) and micronutrients such as nitrate, sulphate, phosphate and potassium. The kit also includes tools to measure physical properties of the soil and is capable of testing nutrients in the sap of growing crops.⁶ SoilDoc is not yet commercially available but is expected to cost US\$3 per test and takes 1-2 days for the results to come back.⁷

Currently under trial in Zambia, with support from DuPont, Columbia University and the University of Maryland, 100 soil samples have been collected and tested in Eastern Province with plans to collect 10,000 samples from across the country to validate soil mapping information and create a database for companies to formulate fertiliser packages.⁸ Provided high adoption rates, farmers will be able to access and apply the right types of fertilisers exactly where they are needed. By increasing fertiliser efficiency through tailored recommendations, the creators of SoilDoc hope to minimise nutrient losses, increase yields, reduce input costs for farmers, and improve food security.

¹ Fintrac 2013, *Kenya Horticulture Competitiveness Project Case Study: Soil Analysis*, Available from: <<https://www.fintrac.com/sites/default/files/soildoctor.pdf>> [22 January 2016]

² Fintrac 2013, *Kenya Horticulture Competitiveness Project Case Study: Soil Analysis*, Available from: <<https://www.fintrac.com/sites/default/files/soildoctor.pdf>> [22 January 2016]

³ Cropnuts Ag, 2013 *Cropnuts Daktari wa Udongo*, Available from: <<https://www.youtube.com/watch?v=ltejPPhIgn0>> [22 January 2016]

⁴ Lewis, K 2015, *Soil Doctor Offers Healthy Advice for Smallholder Farmers*, Available from: <<http://www.voanews.com/content/soil-farmers-education-kenya-agricultural-fintrac-crops-samples-yields-education/2779336.html>> [22 January 2016].

⁵ Alliance for a Green Revolution in Africa (AGRA) 2014, *AGRA Soil Health Report: Seeking Fertile Ground for a Green Revolution in Africa* [24 June 2015].

⁶ Columbia University 2014, Evaluating the effect of site-specific soil information on farmers input choices and the relationship between poverty and soil quality: A Proposal to the BASIS CRSP [24 June 2015].

⁷ Columbia University (no date), *The Water Food Energy Nexus*, The Earth Institute, Columbia University [24 June 2015]

⁸ 2015, 'Soil testing promises sustainability,' *Zambia Daily Mail Online* 8 April 2015 [20 June 2015].