

Towards more sustainable small holder farmer livelihoods by using infrared spectroscopy for soil analytical advisory services

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ABSTRACT

Soil fertility degradation in Kenya leads to decreased financial crop yields resulting in worsened livelihood conditions of smallholder farmers. The degradation is mainly caused by a lack of knowledge on sustainable land management soil fertility management, namely misuse of fertilizer and ignorance of the importance of soil organic matter. To stop further degradation farmers need information on the actual fertility status of their soils and recommendations how to improve the fertility status. Recommendation should be based on a combination of organic and inorganic fertilization including crop residue management. This approach aims at a simultaneous increase of soil fertility and crop yield using a low cost soil and organic resource analyses and advisory services. We are running for BLGG Kenya Ltd. since 2011 a six year lasting project bringing research into business funded by the African Economic Challenge Fund with Kenyan and international partners from the research and the business sector. Our business provides a low cost soil and organic resource analytical and advisory service to smallholders to improve soil fertility management and livelihoods. The analytical method we use is infrared (IR) spectroscopy, which is already used in other industrial applications for routine analysis, because it is fast, reliable and cheap. The fertilization advice is field and crop specific and is based on an extended version of the QUEFTS-model (Quantitative Evaluation of the Fertility of Tropical Soils).

Why do we think that a service like ours will be sustainable? Because all involved parties invest into their future – relating people, planet and profit. How does this look like? The samples are taken by a local farmer organization, having a network of staff all over Kenya. They aim to attract more members by offering this service to their members. All recommended fertilizer is available in Kenya. Fertilizer logistics will create new business opportunities. Soil organic matter levels are adjusted by advising compost application. Within farm nutrient cycling is promoted by composting crop residues or animal wastes. In this way the nutrient use efficiency and soil ecosystem functions are brought back to economic needed levels. Field and crop specific fertilizer advice is given, which reduces costs for the farmers while optimizing financial crop yield. Analytical costs are minimized and recommendation generation is automated, which reduces costs and increases business capacity and outreach. All this leads to more efficient and sustainable crop production and improved livelihoods of small holder farmers in Kenya.

How is the farmer convinced to use the proposed service? On-farm demonstration sites are conducted countrywide and used as showcases. They will be used to proof other farmers the value of soil analysis and knowledge driven fertilization advice. Partners from research and business are invited to develop together business cases leading to the extended use of sustainable land management.

Keywords: Small holder farmers, infrared spectroscopy, advisory services, soil fertility, sustainable land management, demonstration sites