Agricultural Fertility and Environmental Resources (AFER) in Ethiopia

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AGRICULTURAL FERTILITY AND ENVIRONMENTAL RESOURCES
A joint research project by WUR, Teagasc, TARI, ARARI and GIZ

1. Introduction

- Soil resources will struggle to keep pace with the growing demand for food, feed and fiber in the future unless carefully managed.
- Ethiopia has an increasing serious food security challenges due to:
  - Land degradation through erosion and SOM depletion
  - Intermittent drought & future climate change
  - Declining soil fertility and nutrient availability
- Current crop production systems are characterized by:
  - Poor soil management and water conservation practices
  - Low application rates of organic and inorganic fertilizer
  - Mining of inherent soil nutrient reserves
  - Low crop productivity, quality and nutrient density
- Scientifically proven and affordable soil and crop specific fertilizer recommendations are required by farm advisors and farmers.
- The soil diagnostic approach presented here, provides a practical approach by which farmers can better understand the response of their soils to various fertiliser additions, what is needed for the soils and what is unnecessary. This should result in better crop productivity and less wastage of fertilisers.

Figure 1. A landscape dominated by wheat based farming system , Southern Tigray, Ethiopia

New understanding of functional relationships between soil diagnostic features and fertiliser response by crops.

- Paired soil and crop response data will be modelled to build new understanding of the factors, including diagnostic features, controlling the functional relationships between soil nutrient supply and crop response to applied fertilisers and organic matter inputs. These functional relationships for soil nutrient supply and fertiliser response by crops will form the basis for soil and crop specific fertiliser recommendations.

Develop prototype fertiliser recommendation and soil management decision support tool (DST) for smallholder farms

- This knowledge will be developed into fertiliser DST used to prescribe soil, crop and climatic region specific fertilizers type and application rate recommendations for farmers
- The DST will provide systematic nutrient advice to farmers and farm extension experts in an easily understandable format (see figure 3).

2. Project Objectives

- To explain the key soil and landscape factors that govern the nutrient suppling capacity of different agricultural soils
- To quantify the relationships between the supply of nutrients from the soil and nutrient requirements of crops and to establish fertilizer requirements (type, rate) for different agricultural soils and cropping systems
- To evaluate the resulting recommendations for nutrient management within the wider sustainability (land functions) context at community level.

3. Research Methods

Elucidate nutrient suppling capacity of different agricultural soils from field plot to landscape scales.

- The Diagnostic approach (WRB) will be used to group soils according to their characteristics and functional capacities in relation to nutrient supply and crop yield potentials
- The diagnostic criteria will be applied in the field during soil profile description across 3 Woreda's in the Tigray region of Ethiopia and also where legacy soil survey data exist.

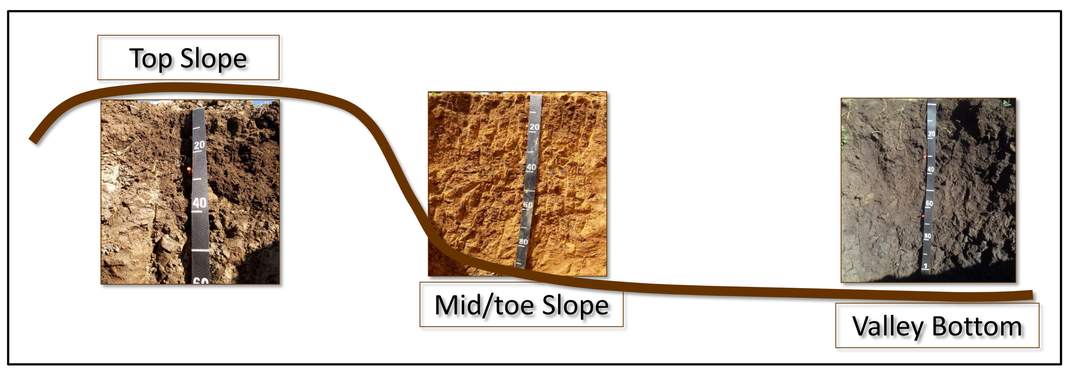

Figure 2. Different soils and soil diagnostic features identified at different landscape positions

Figure 3. The approach to developing nutrient advice taken in the Decision Support Tool (DST)

Assessing the prototype decision support tool within the functional land management (FLM) framework.

- Assess how the demand for, and supply of 'nutrient cycling function' interacts with the other four primary soil functions; primary production, water regulation, carbon sequestration & biodiversity.
- Identify the policy options and dissemination methods available for maximising the application of the decision support tool.

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