Soils of lower Moshi irrigation scheme, NE Tanzania: their implications for agricultural land management

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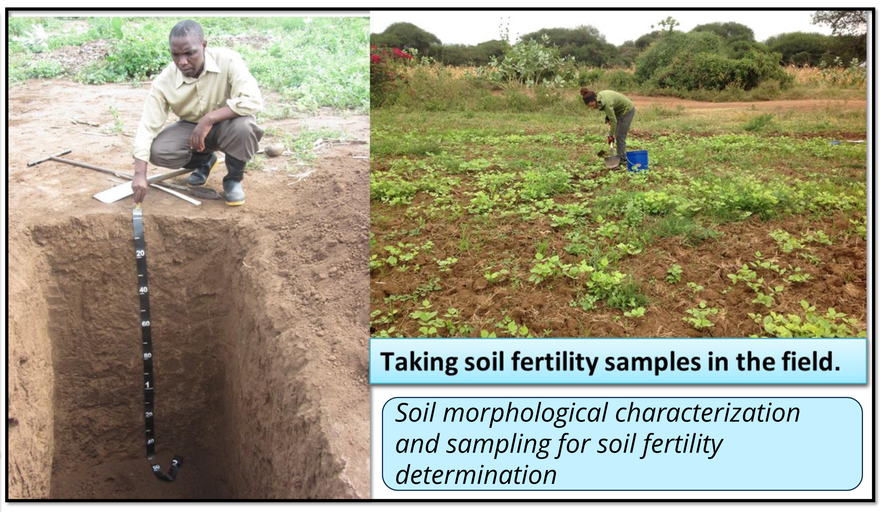
Introduction

- The Lower Moshi Irrigation Scheme has been operational since 1987
- Produces a considerable amount of rice for the natives of Kilimanjaro, Tanzania, and Kenya.
- Soils of the study area have never been studied since the scheme became in operation
- Characterization of the soils should be a priority

Challenges:

- ✓ declining in crop yields
- ✓ reduced stream flows
- ✓ increasing water use conflicts

Irrigated continuous rice under harvesting



Taking soil fertility samples in the field.

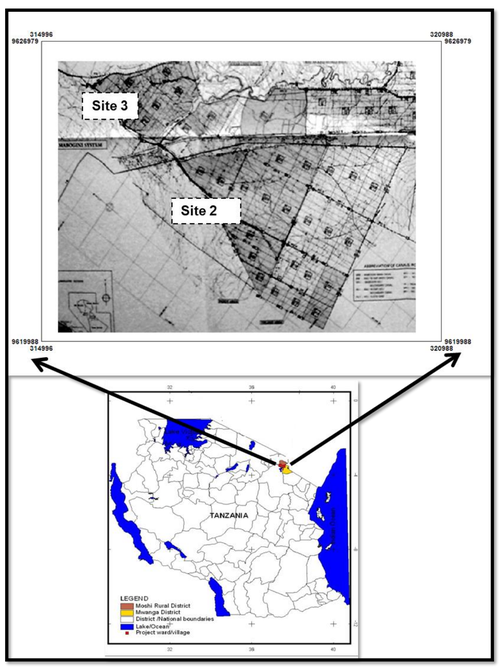
Soil morphological characterization and sampling for soil fertility determination

Objectives:

- To characterize the soils morphological, physical and chemical properties for guiding nutrient management in the scheme
- To provide baseline information for nutrient management experimentation

Material and Methods

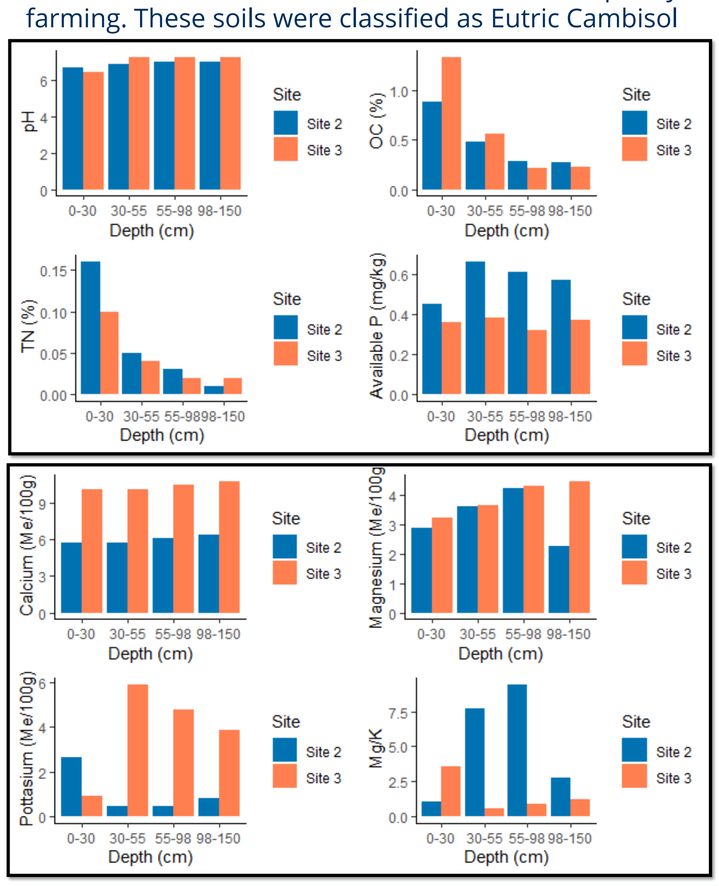
- Soil morphological and physico-chemical properties were studied in three soil pits dug to a depth of 150 cm.
- Bulk samples were taken in triplicate at the depth of 0–20 cm on-farm plots under continuous irrigated rice, irrigated maize-rice rotation for soil fertility characterisation.
- Soils were classified according to the World Reference Base for Soil Resources (WRB) (2014)



Location of the study area (Site 2 = Irrigated Maize-Rice Rotation; Site 3 = Irrigated Continuous Rice

Results

Very deep, well-drained reddish-brown clayey soil over a layer of unconsolidated gravel below a depth of 150 cm for both maize-rice rotation and continuous paddy farming. These soils were classified as Eutric Cambisol



Soil fertility status

Discussion

- Although an impression of good fertility, still the problems are:
- The soils under Maize-rice rotation have unfavourable Mg/K ratios of > 7 below a depth of 25 cm.
- very low soil fertility as shown by low organic carbon (<1.0%), low levels of major nutrients (nitrogen <0.1% and phosphorus <1 mgP/kg).
- Low soil fertility could be attributed to nutrient mining arising from the farming system
- The nutrient mining is mainly attributed to the removal of crop residues (maize and rice straw) to feed indoor kept cattle and goats in form of hay
- This observation is supported by the low levels of organic carbon, total nitrogen & K across the site
- For the sustainable use and improved productivity, management recommendations should include addition or conservation of organic matter

Conclusion

- The results obtained in this study should therefore be considered for guiding sustainable agricultural management of the scheme. This includes experimentation on the management of fertilizers; their interaction and their effect on crop performance.

References:

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