Scaling-up soil quality assessments: efficient infrared-spectroscopic workflows across space and time

PhD defense

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2021-11-19

Introduction

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Ay now it is **time**

Chapter 1: Estimation of soil properties with mid-infrared soil spectroscopy across yam production landscapes in West Africa

Background:

- Increasing **land use frequencies** and **shorter fallow periods** in the **"yam belt" of West Africa**
- Importance of **soil organic matter** for soil quality:
  - storage capacity and availability of essential plant nutrients

Aims:

- Provide a tool to **rapidly identify** and understand soil fertility constraints to yam production for new soils in the project regions:
  - .e.g., to better derive **site-specific** nutrient recommendations for yam in **four different** yam-growing **soil ecoregions** in Ivory Coast and Burkina Faso (timing, placement, form of fertilizer)
  - **cover the typical variation** in soil properties for yam-growing areas: soils from 80 fields of smallholder farmers; climatic gradient between humid forest and northern Guinean savanna
  - verify the soil quality effects of sustainable and innovative soil and crop management options

Main objectives and research questions:

- **Develop and assess mid-IR spectroscopy models** to estimate soil properties that describe inherent soil fertility and control nutrient availability.
- What is the **potential** and what are the the **limitations** of **spectroscopic soil diagnostics** for discriminating landscape level and farm specific soil variability for agronomic purposes?