Impact of Alternative Management Practice on Fertilizer Recovery by Cotton in Different Soil Types of West-Africa

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Problem Statement

**Causes**

1. Erratic rainfall
2. Sub-optimal nutrient management
3. Soil Degradation

**Effects**

- Soil carbon and nutrient stock depletion
- Soil erosion
- Reduced soil water retention
- Limited root depth

Alternative management options consisting of a combination of tillage, crop residue incorporation and nitrogen management might be a potential technical solution to restore soil nutrient stocks and efficient use of applied fertilizer.

Research Aim

What is the relative contribution of alternate management practices to the efficient use of applied fertilizer?

1. To assess the interactive effects of tillage and different nitrogen doses on Apparent Nutrient Recovery Efficiency (ANR) and Agronomic Efficiency (AE) under four different soil types.

2. To collect field data to improve and calibrate soil-crop models and conduct simulations of long-term nitrogen use efficiency and fertilizer management decisions in tropical soils.

Study Area

Location 1: Tambiri (Dano watershed), Burkina Faso

Location 2: Ouriyoui (Dassari watershed), Republic of Benin

Experimental Setup

Strip-Split Plot design

Main Plot: Tillage (Contour Ridge & Reduced Tillage)
Sub-plots:
- a. Crop Residue
- b. Nitrogen Management
  - 0 Kg/ha
  - 45 Kg/ha
  - 90 Kg/ha

Randomized within the main plots

Crops: Maize and cotton rotation
A total of 48 sub plots under each soil type

Sampling & Analysis

- Sampled during the physiological maturity stage
- Processed and analysed for nitrogen content in the laboratory
- Calculated Apparent Nutrient Recovery Efficiency (ANR) and Agronomic Efficiency using the following formulas:

  - $\text{ANR} \% = \frac{(\text{Total N uptake, F} - \text{Total N uptake, C})}{\text{Amount of Fertilizer Applied}} \times 100$
  - $\text{AE} = \frac{\text{Yield, F} - \text{Yield, C}}{\text{Amount of Fertilizer Applied}}$

  Where, F = plots with fertilizer; C = plots without fertilizer

References


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