AFRICAN MICROFINANCE JOURNAL (INTERDISCIPLINARY -
Vol. 1 | No. 1 | 2024 | 10.5281/zenodo.18949990

# Integrating Soil Diagnostics with Agricultural Credit

*A Comparative Analysis of Fertiliser Application Rates among Maize Farmers in Lilongwe*

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Received: 02 November 2023 | Accepted: 14 December 2023 | Published: 03 January 2024 | **DOI:** 10.5281/zenodo.18949990

## ABSTRACT

Agricultural credit programmes in sub-Saharan Africa often provide standardised input packages, which may not align with site-specific soil nutrient requirements, leading to inefficient fertiliser use and potential environmental harm. This study compares the fertiliser application rates of maize farmers participating in two distinct credit schemes: a conventional input loan programme and an integrated programme that combines input credit with a soil testing subsidy and tailored recommendations. A quasi-experimental design was employed, using propensity score matching to analyse survey data from a sample of smallholder farmers. Quantitative analysis compared mean application rates of nitrogen (N) and phosphorus (P) fertilisers between the two groups. Farmers in the integrated soil-test-credit programme applied fertiliser at rates significantly closer to agronomic recommendations. Specifically, their mean nitrogen application showed a 22% reduction in deviation from the optimal rate compared to the conventional loan group, indicating more precise usage. Integrating soil diagnostics with agricultural credit can lead to more efficient and scientifically informed fertiliser application, moving away from blanket recommendations. Microfinance institutions and agricultural development partners should design and pilot bundled financial products that incorporate soil health assessments to promote precision agriculture and improve input use efficiency. agricultural credit, soil testing, fertiliser use efficiency, precision agriculture, Malawi, smallholder farmers This paper provides novel empirical evidence on the efficacy of bundling soil testing services with input loans, a policy mechanism previously under-researched in microfinance literature.

**Keywords:** *Precision agriculture, Agricultural credit, Sub-Saharan Africa, Soil diagnostics, Fertiliser use efficiency, Comparative analysis, Smallholder farmers*

**Article Highlights**

- Integrated credit with soil testing reduces deviation from optimal fertiliser rates by 22%.
- Bundled financial products can move smallholders away from blanket input recommendations.
- Site-specific diagnostics align credit with actual soil nutrient requirements.
- Findings support designing credit schemes that promote precision agriculture.

**Policy Implication**

Microfinance institutions should pilot bundled products incorporating soil health assessments to improve input use efficiency.

*This study provides novel empirical evidence on bundling soil testing with agricultural credit.*

# ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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