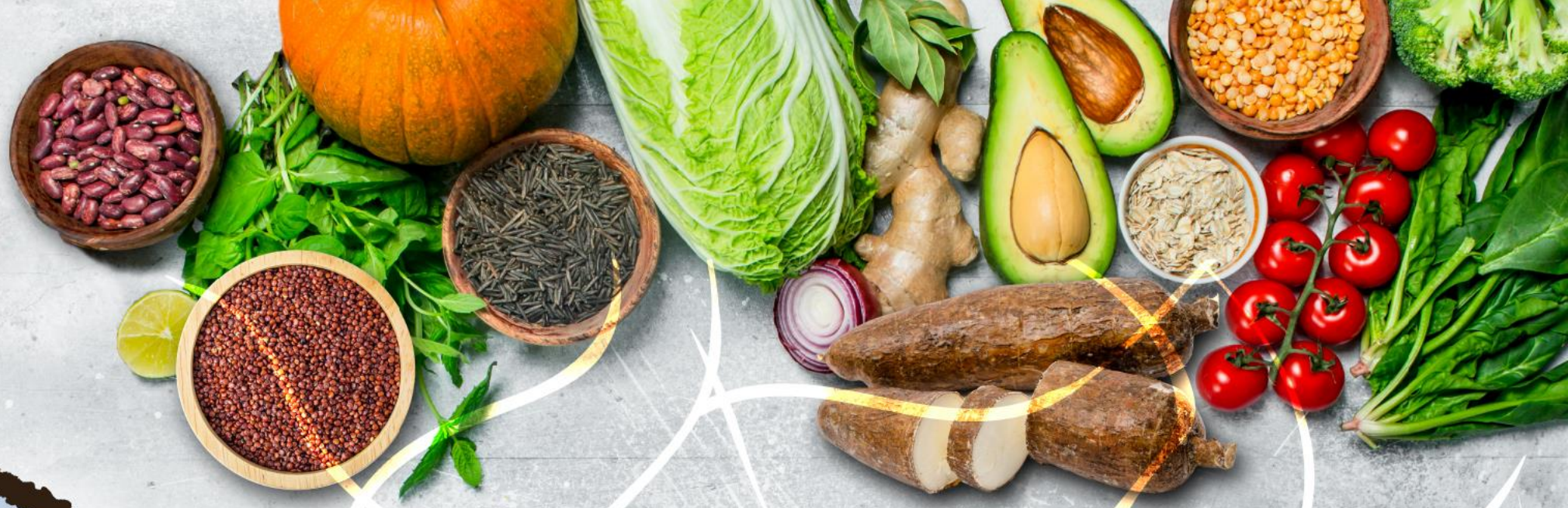

Role of Integrated Nutrient Management for improving crop yield and enhancing soil fertility under smallholder farmers in degraded soils of Tanzania

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SOILS: WHERE FOOD BEGINS

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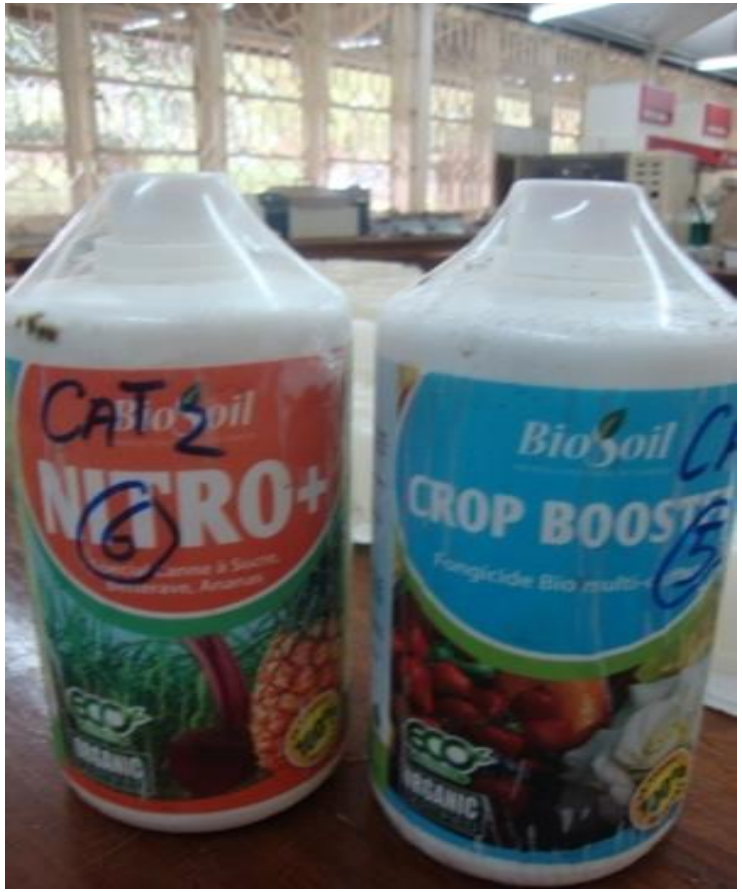
Presentation Outline

- Introduction
- Research objectives
- Materials and Methods
- Results
- Conclusion and recommendations



Introduction

- **Low crop productivity** in Tanzanian Soils due to low soil fertility, high nutrient mining and inadequate replenishment of nutrients (Adu-Gyamfi *et al*., 2007, Kiriba et al., 2019).
- Low soil fertility can be managed through
  - ✓Use of mineral fertilizers alone
  - ✓Integrated use of inorganic fertilizers and organic soil amendments (e.g. animal manures)
  - ✓Integrated use of inorganic fertilizers and bio-fertilizers (Kwesiga and Coe, 1994).

Use of bio-fertilizers such as *Azospirillum spp* and *Bacillus spp,* either alone or in combination with inorganic fertilizers have been shown to increase yields in maize, sorghum, and wheat (Ahmed, 2010).

Research Objectives

Overall objective: Increase maize yields and soil fertility through use of phosphorus solubilizing bacteria (P-solubilizers) in Ultisols of Morogoro, Tanzania.

Specific objectives

1. To verify the quality of selected commercial products so as to ascertain their nutrient contents and/ or microbial composition.

- ✓**Enumerated by serial dilutions in sterile water, plating on nutrient agar and incubated at 27°C for one week (Motsara and Roy, 2008).**
- ✓**Data on CFU values as shown in labels of Bio-soil crop booster and Bio-soil nitro+ products.**

Materials and Methods

2. To evaluate the effects of graded doses of NPK fertilizer, with and without inoculation of phosphorus solubilizing bacteria (P-solubilizers) on improving yields of SITUKA maize variety and soil fertility.

✓**Six treatments, arranged in RCBD, 3 replications; plot size 3m x 3m; spacing 75x 30 cm**

T1= Control (without fertilizers),

T2= Inoculation of P-solubilizers alone at manufacturer's recommended rate

T3= Inoculation of P-solubilizers alone at double rate,

T4= Inoculation of P-solubilizers + 10 kg P ha-1 fertilizer,

T5= 10 kg P ha-1 fertilizer

T6= 20 kg P ha-1 fertilizer were used.

✓**N (60kg N ha^{-1}) was applied in two splits; 50 kg N ha^{-1} (as YaraMila Cereal fertilizer) and 10kg N ha^{-1} (as Urea).**

Results

Treatment (T)	Maize grain yields (kg/ha)
Control	2037
Bio-soil Crop Booster (5 ml/0.5 kg seed)	3259
Bio-soil Crop Booster (10 ml/0.5 kg seed)	1714
Bio-soil Crop Booster (5 ml/0.5 kg seed) + YaraMila Cereal (10 kg P ha^{-1})	2610
YaraMila Cereal (10 kg P ha^{-1})	2188
YaraMila Cereal (20 kg P ha^{-1})	3534
LSD (5%)	**1082**
CV (%)	23.3

- The P-solubilizers, either alone or in combination with P-fertilizer (at HR), showed significant differences amongst themselves and with the control, with Bio-soil crop booster (at RR) resulting in significantly ($P<0.05$) higher grain yields.

Conclusion & Recommendations

- **The observations made in field experiment imply that use of phosphorus solubilizing bacteria (P-solubilizers) were outstandingly effective.**
- However, it was recommended that;
  - TFRA should require manufactures to improve the quality standards before their products are accepted in the country.
  - P-solubilizers products can be used in ISFM program for improved maize productivity; however, manufactures should improve its quality standards and it should further be tested in other P-deficient soils before the product is accepted in the country.
  - Dual or triple combinations of P-solubilizing bacteria, with or without P should be further tested.


Thank you !
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