

Managing soil as a natural resource for Sustainable intensification in East and Southern Africa

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Key messages

- Use of fertilizers combined with organic resources such as manure are increasing crop productivity and profitability in farmer fields
- Farmers are increasingly aware of the benefits of soil fertility management practices demonstrated within Africa RISING
- Variable responses of crops to organic and inorganic resources are calling for more site-specific recommendations.

Objectives and approach

Research teams across ESA project identified technologies that present the best opportunity to increase productivity under variable contexts: This entailed...

1. Best performing crop varieties for different ecozones
2. Microdosing P from different sources to maximize agronomic efficiency and crop yield
3. Combinations of organic and inorganic nutrient sources including cereal-legume rotations/intercropping

Key results

A. Malawi

- Application of high quality (chicken) manure increased ($P < 0.05$) grain yield of different beans varieties by at least 53% both in pure stands in bean-maize intercrops relative to control.
- Maize after cowpea applied with only 50% of NP fertilizer, achieve same maize yield as that with 100% NP fertilizer for two consecutive seasons; and co-application of NP with manure yielded an additional 500 kg ha⁻¹.

B. Tanzania

- New varieties (including MeruHB513 and MeruHB515) perform equally to SC627 and are becoming a good alternative for farmers (Table 2).
- In 2 of 3 ecozones of Babati (Tanzania), combined N and P application increased yields by 32-68% relative to single nutrients; P is not required in the 3rd ecozone.
- Both application of Minjingu mazao and DAP are highly profitable in most sites tested, attracting a marginal rate of return of >2 (Table 1).
- YARA fertilizers perform similarly to Minjingu in Kongwa Kiteto (these and also DAP lead to yield increases of 22 to 84% depending on site)
- Application of 15 kg P ha⁻¹ is a cost effective rate and can be adopted for semiarid areas of Tanzania as there is no national fertilizer recommendation for this ecozone

Table 1: Marginal rate of return for two fertilizer types in Tanzania

	Babati 2015/16		Kongwa Kiteto 2013/14	
	Low rainfall	High rainfall	Low rainfall	High rainfall
DAP	2.3	2.4	-	-
Minjingu Mazao	2.1	1.6	1.9	2.3

P is applied at 20 kg/ha in Babati and 15 kg/ha in Kongwa Kiteto. N is applied at 60 kg/ha in all sites

Table 2: Variety ranking based on a participatory evaluation by farmers

	SC 627	DK 8031	PIONEER 3253	PAN 4M 19	Total	Rank
SC 627		SC 627	Pioneer 3253	SC 627	2	2
DK 8031			Pioneer 3253	DK 8031	1	3
PIONEER 3253				Pioneer 3253	3	1
PAN 4M 19					0	4



Figure 1: Crop performance with and without fertilizer application in Babati, Tanzania, left adjacent field for the same farmer with typical farmer practice

Significance and scaling potential

- ISFM options demonstrated are suitable for different ecozones and potential for different components including basic agronomic practices is evident to farmers (Figure 1)
- Over 800 baby farmers are observing profitable yield increases and there is potential to extend this to over 1m smallholder farmers in the maize-pigeonpea growing zones of Tanzania and Malawi.