Understanding system innovation adoption: A comparative analysis of integrated soil fertility management uptake in Tamale (Ghana) and Kakamega (Kenya)

Urban Food Plus

Ivan Solomon Adolwa[1]* , Stefan Schwarze[2], Boaz Waswa[3], Andreas Buerkert[1]

[1] Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Universität Kassel, D-37213 Witzenhausen, Germany

[2] Department of Agricultural Economics and Rural Development, Georg-August-Universität Göttingen, D-37073 Göttingen, Germany

[3] International Centre for Tropical Agriculture (CIAT), ICIPE Duduville Campus, Kasarani, P.O. Box 823-00621, Nairobi, Kenya

*Corresponding author: ivan.adolwa@gmail.com

Introduction

- Sustainable intensification is key for enhanced crop production.
- System innovations entail different synergistic agronomic and management components aimed at improving crop productivity and environmental resilience.

Methods

- The study was conducted in Tamale, Ghana and Kakamega, Kenya (Fig. 1).
- Stratified random sampling employed: 285 farmers in Tamale and 300 in Kakamega.
- Structured questionnaires were used (Figure 2).

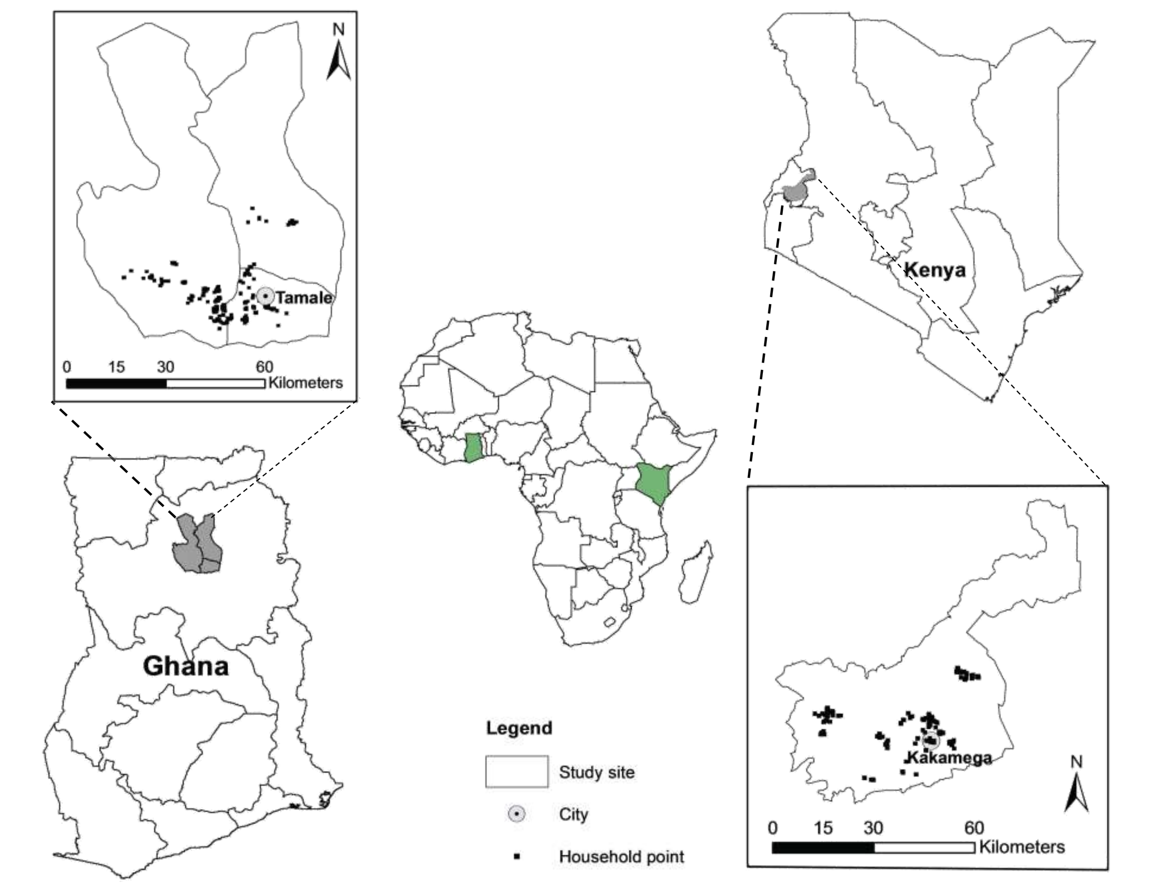

Figure 1. Maps of the study areas

Figure 2. Conducting interviews

Figure 3. Soil sample collection

Introduction

- However, their uptake has been slow and partial adoption is common.
- Analyses on plot level constraints to system innovation adoption are scarce.
- This study assesses factors at plot, household and farm level that hinder or promote the adoption of ISFM.

→ **Hypothesis: soil fertility indicators may influence ISFM adoption**

Methods

- Soils samples were drawn from 322 (Tamale) and 459 (Kakamega) maize plots (Figure 3).

Methods

- Laboratory analysis: 10% of soil samples subjected to conventional laboratory analysis. Elemental analysis was used for total N and total C analysis (0.5 mm sieve). All samples were subjected to mid infra-red (MIR) analysis after dry grounding through a 0.5 mm sieve.
- Ordinal regression model was used to estimate adoption (STATA 13).

Results

- Only 11% of farmers' plots in Tamale entailed either partial or complete set of ISFM practices compared with 80% in Kakamega (Figure 4).

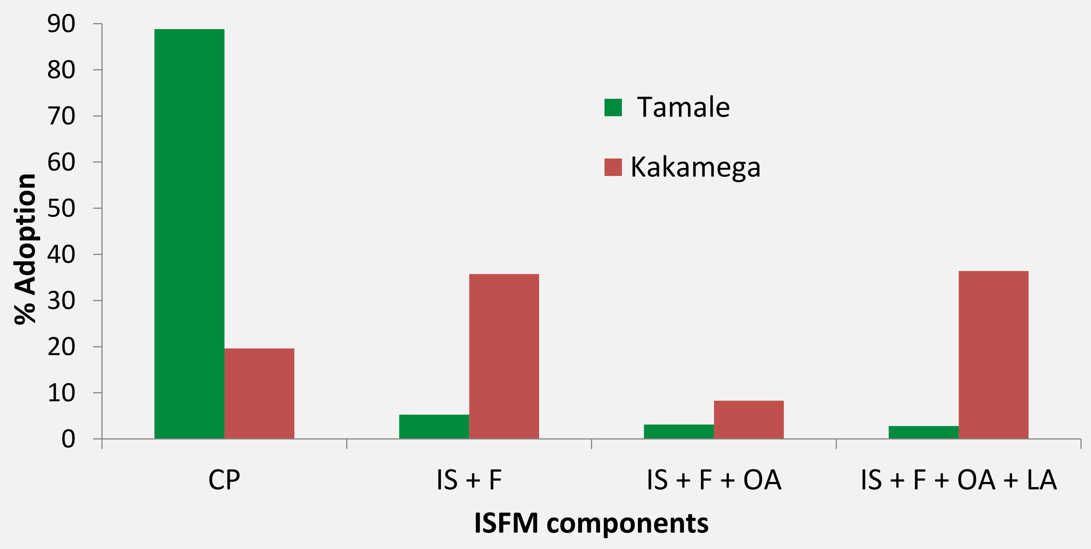

Figure 4. Adoption of ISFM components at plot level in Tamale, Ghana and Kakamega, Kenya. CP-current practice , IS-improved seed, F-fertilizer, OA-organic amendments, LA-local adaptation

Highlights

- Soil quality factors are critical determinants of adoption.
- Farmers tend to judiciously allocate scarce resources across their fields.
- Soil carbon is a constraint in Tamale whereas in Kakamega it is acidity. Possible organic amendments include shea butter chaff and filter mud (Fig. 5).
- Livestock ownership, off-farm income, farmer groups, education are other drivers of ISFM adoption

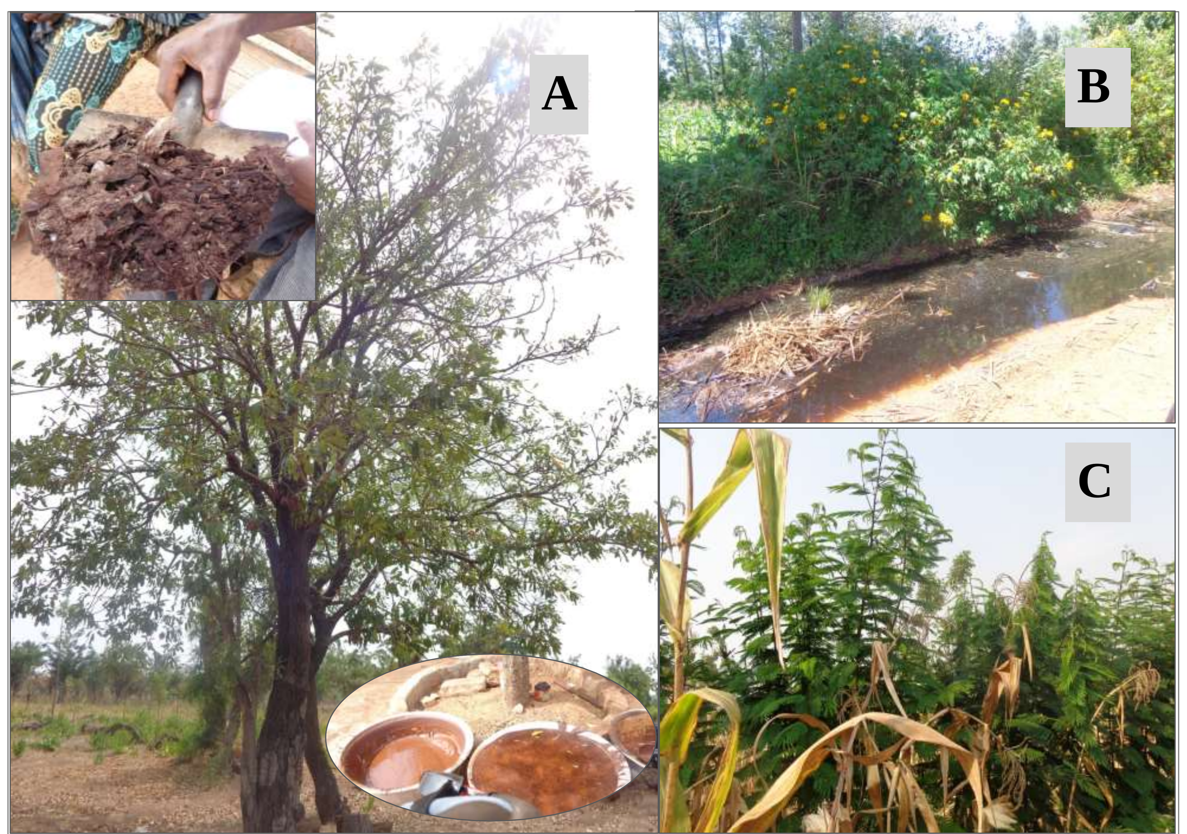

Figure 5. Local organic amendments that can be used to boost soil fertility and combat acidity include; (A) shea butter chaff and residue (inset photos) from the Shea tree, (B) filter mud from sugarcane, and (C) *Calliandra calothyrsus*

Results

- A unit increase in soil C increases the chances of non-adoption by 11% in Tamale and complete adoption by 28% in Kakamega (Table 1).

Table 1. Determinants of ISFM adoption . Top panel relates to Tamale and lower panel to Kakamega . D is dummy, HH-household head, TLU-tropical livestock units, ***P<0.01, **P<0.05, *P<0.1.

			No of cumulative ISFM components adopted			
	All	ISFM	0	1	2	3
	Coeff.	Std. Error	Margins	Margins	Margins	Margins
Organic C (%)	**-2.53**	**1.21****	**0.115**	**-0.069**	**-0.020**	**-0.025**
TLUs	0.04	0.02*	-0.002	0.001	0.000	0.001
Urban residents (D)	1.60	0.64**	-0.107	0.062	0.019	0.030
HH education (yrs)	0.16	0.04***	-0.008	0.004	0.001	0.002
Adults in HH (no.)	-0.25	0.09***	0.011	-0.007	-0.002	-0.003
Off-farm occupation (D)	1.30	0.61**	-0.048	0.029	0.008	0.010
Group membership (D)	1.27	0.61**	-0.050	0.030	0.009	0.011
Organic C (%)	**1.16**	**0.59****	**-0.165**	**-0.121**	**0.022**	**0.264**
% Clay	**-0.05**	**0.03***	**0.007**	**0.005**	**-0.001**	**-0.011**
pH	**-1.22**	**0.62****	**0.173**	**0.127**	**-0.023**	**-0.278**
TLUs	0.18	0.06***	-0.025	-0.019	0.003	0.041
Urban residents (D)	0.53	0.28*	-0.075	-0.055	0.010	0.120
Off-farm occupation (D)	0.53	0.25**	-0.165	0.083	-0.038	0.121
Group membership (D)	0.82	0.28***	0.011	-0.163	-0.034	0.186

- An increase in one pH unit increases non-adoption by 18% in Kakamega.

Acknowledgements

The Urban Food^Plus project (FKZ: 031A242A) is funded under the GlobE-Africa-Initiative by the German Federal Ministry of Education and Research (BMBF). Thanks to University for Development Studies (UDS), CSIR-Soil Research Institute, Savannah Agricultural Research Institute (SARI), Ministry of Food and Agriculture (MoFA) Ghana, Kenya Agricultural Research and Livestock Organisation (KARLO), village elders and farmer participants in Kenya and Ghana.

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SPONSORED BY THE
Federal Ministry of Education and Research