Impacts of integrated soil fertility management on yield and household income: The case of Tamale (Ghana) and Kakamega (Kenya)

Ivan Solomon Adolwa¹, Stefan Schwarze²*, Andreas Buerkert³

¹ Food Crops Research Centre, Kenya Agricultural and Livestock Research Organization, Alupe, P.O. Box 278-50400, Rusia, Kenya
² Institute of Rural Studies, Johann Heinrich von Thünen Institute, Bundesallee 50, D-38116 Braunschweig, Germany
³ Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Steinstr. 19, Universität Kassel, D-37213 Witzenhausen, Germany

*Corresponding author: stefan.schwarze@thuenen.de

Introduction

- Integrated soil fertility management (ISFM) has been widely promoted across Africa to improve soil fertility and hence crop yields.
- Still scant empirical evidence of its impact on crop yields and household income.

Aim of the study

- Assess the impact of ISFM adoption on maize yield and total household income.

Hypotheses

- ISFM adoption increases maize yield and household income.
- The effect increases with the number of ISFM components adopted.

Components of ISFM

- Application of chemical fertiliser
- Use of improved seeds
- Application of organic fertilizer
- Knowledge on how to adapt these practices to local conditions
- The progressive adoption of the different components maximizes agronomic efficiency.

Highlights

- ISFM adoption leads to higher yields in both Tamale and Kakamega, but increasing the number of ISFM components does not.
- At both locations, yield benefits did not translate into income benefits.
- From a farmers’ perspective our results suggest that ISFM is not a particularly attractive choice.
- However, ISFM has positive environmental externalities, which might lead to positive effects for farmers in the medium to long term.

Impact of adoption

- Yield effect of 27% in Tamale and of 16% in Kakamega (Table 1)
- No effect on household income

Table 1. Treatment effects for maize yields and household incomes in Tamale, Ghana and Kakamega, Kenya.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Maize yield</th>
<th>Household income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effect (log yield)</td>
<td>% change</td>
</tr>
<tr>
<td>Tamale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA/PA/CA</td>
<td>0.19**</td>
<td>27.3</td>
</tr>
<tr>
<td>PA/CA</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>Kakamega</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA/CA</td>
<td>0.12*</td>
<td>15.5</td>
</tr>
<tr>
<td>CA</td>
<td>-0.03</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- *: partial adopter 1 (adoption of 2 components); **: partial adopter 2 (adoption of 3 components); CA: complete adopter (adoption of all 4 components)
- **: p<0.01, *: p<0.05

Data collection

- The study was conducted in Tamale, Ghana, and Kakamega, Kenya (Figure 1).
- Stratified random sampling
- Interviews with 285 farmers in Tamale and 300 in Kakamega.
- Collection of plot, farm, and household level data using questionnaires (Figures 2 and 3).

Data analysis

- Estimation of the average treatment effect on the treated (ATET) using inverse-probability-weighted regression adjustment (IPWRA).
- The IPWRA estimator combines regression adjustment and propensity score weighting.

Adoption of ISFM

- Higher share of non adopters and low share of complete adopters in Tamale, Ghana.
- Hardly any non adopters in Kakamega, Kenya.

Impact of adoption on yield and household income: The case of Tamale (Ghana) and Kakamega (Kenya)

Acknowledgements

The Urban FoodPlus project (FKZ: 031A424A) is funded under the Glob-Africa-Initiative by the German Federal Ministry of Education and Research (BMBF) and the German Federal Ministry of Economic Cooperation and Development (BMZ). 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 and Livestock Research Organization (KALRO), village elders and farmer participants in Kenya and Ghana.

Details can be found in


www.urbanfoodplus.org