

Research Application Summary

**An analysis of productivity and technical efficiency of conservation agriculture in Malawi: A case of Nkhotakota district**

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**Abstract**

Maize productivity, measured as the amount of output for a given input set, is lower than it could be in Malawi due to poor access to agricultural inputs and environmental depletion especially declining soil fertility. Malawi is promoting conservation agriculture in order to reverse the trend. The overall objective of this study is to determine economic performance of conservation agriculture in Malawi. The study will apply a normalized translog yield response model to assess productivity and a stochastic frontier production model (SFPM) to assess technical efficiency (TE) of conservation agriculture (CA). The study has just been initiated.

Key words: Agricultural input, conservation agriculture, environmental depletion, Malawi

**Résumé**

La productivité du maïs, mesurée comme la quantité à la production pour un ensemble indiqué des besoins, est inférieure à ce qu'elle pourrait être au Malawi en raison de difficultés d'accéder aux intrants agricoles et à la dégradation environnementale, notamment la baisse de fertilité du sol. Le Malawi favorise l'agriculture de conservation afin d'inverser la tendance. L'objectif global de cette étude est de déterminer la performance économique de l'agriculture de conservation au Malawi. L'étude appliquera un modèle normalisé de réponse de rendement « translog » pour évaluer la productivité et un modèle stochastique de production de frontière (SFPM) pour évaluer l'efficacité technique (TE) de l'agriculture de conservation (CA). L'étude a été juste lancée.

Mots clés: Invariant agricole, agriculture de conservation, dégradation environnementale, Malawi

**Background**

Maize production in Malawi is limited by several factors including environmental depletion but in particular declining soil fertility which threatens both the productivity and sustainability of natural resources (Malawi Government, 2005a, b). Conventional farming practices like intensive hoeing also

contribute to the problem. In response, a national wide targeted inorganic fertilizer subsidy programme was introduced in 2004. The programme has increased maize production but needs sustainability options like conservation agriculture.

This study has been designed to contribute to the national conservation agriculture strategy of improving knowledge and skills of smallholder farmers. The study will be done in partnership with the Total Land Care and the International Food Policy Research Institute (IFPRI) through the Strategic Analysis and Knowledge Support System (SAKSS) programme in Malawi.

## **Literature Summary**

Crop productivity and profitability under conservation agriculture increases over time relative to conventional agriculture. It also reduces labour costs for land preparation by 50-60%. Time is saved thereby allowing the production of more crops in a given period. There is also more efficient utilization of the fixed land resource which results in higher annual net returns per ha (FAO, 2001).

Studies in different countries have also reaffirmed the existence of numerous economic benefits of conservation agriculture. For instance, Kienzle (2003) found out that conservation agriculture increases incomes because of reduced costs of labour and additional revenue through fodder and cash crops like lablab in Sub-Saharan Africa. To-date, there is paucity of information on productivity and technical efficiency of conservation agriculture in Malawi farming systems.

## **Study Description**

The overall objective of the study is to determine the economic performance of conservation agriculture in Malawi. The specific objectives are to assess productivity of conservation agriculture in Malawi; evaluate technical efficiency of conservation agriculture in Malawi; and; identify factors that determine technical efficiency of conservation agriculture in Malawi

A normalized translog yield response model will be applied to assess productivity and a stochastic frontier production model (SFPM) will be used to assess technical efficiency (TE) of conservation agriculture practices.

Study population will consist of farmers practicing conservation agriculture in Linga, Zidyana and Mwansambo EPAs in Nkhotakota district where Total Land Care has 6 demonstration plots in each EPA. All the 18 farmers participating in the

demonstration will be purposely interviewed. Two sections from each EPA will be sampled giving a total of 6 sections. Probability proportional sampling will be applied to obtain the number of farmers practicing conservation agriculture and non-adopters in the sampled sections.

In order to effectively run models, the sample size should be at least 10 times the number of variables in the respective model (Edriss, 2003). The maximum number of variables in a single model will be 12 basing on studies that applied the same models. The study will require 120 farmers practicing conservation agriculture. This will give a total of 138 farmers practicing conservation agriculture with the addition of the 18 trial farmers. A total of 138 non-adopters will also be interviewed as a control giving a total of 276. Structured questionnaires will be used to collect primary data through household interviews.

### **Expected Results**

The research will generate the following outputs;

1. Technical efficiency and productivity of conservation agriculture evaluated to inform household decision making and policy.
2. Factors influencing technical efficiency of farmers practicing conservation agriculture identified.

Based on the above two outputs, a technical manual on conservation agriculture in Malawi will be produced. Additionally, policy related issues will be synthesized and communicated to policy organs.

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