Researchers
Kate Ambler
International Food Policy Research Institute (IFPRI)

Alan de Brauw
International Food Policy Research Institute (IFPRI)

Mike Murphy
International Food Policy Research Institute (IFPRI)

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1,328 farmers in 66 farmer-based organizations

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Yes

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Increasing the adoption of conservation agriculture: A framed field experiment in Northern Ghana

Kate Ambler | Alan de Brauw | Mike Murphy

Abstract

Conservation agriculture techniques have the potential to increase agricultural production while decreasing CO_2 emissions, yet adoption in the developing world remains low—in part because many years of continuous adoption may be required to realize gains in production. We conduct a framed field experiment in northern Ghana to study how incentives and peer information may affect adoption. Incentives increase adoption, both while they are available and after withdrawal. There is no overall effect of peer information, but we do find evidence that information about long-term adoption increased adoption, particularly when that information shows that yield gains have been achieved.

KEYWORDS
conservation agriculture, experiment, Ghana, lab-in-the-field

JEL CLASSIFICATION
C93, O12, Q12

1 | INTRODUCTION

Climate change is a serious threat to the livelihoods of millions of smallholder farmers in developing countries, particularly in Africa, where farmers are largely dependent on rainfed agriculture and vulnerable to droughts, flooding, and seasonal rainfall pattern disruptions (UNDP, 2017). Smallholder productivity is further threatened by increasing soil degradation, which reduces land productivity over time (UNCCD, 2017). A package of practices called conservation agriculture (CA) has been proposed as one solution to the consequences of climate change and soil degradation. Proponents argue that CA combines private benefits to adopters—by increasing yields and reducing vulnerability to rainfall shocks—and public good characteristics, via carbon sequestration in soil and reduced soil runoff into water catchment systems (Bell et al., 2018a; Hobbs, 2007).

Despite these claims about CA, adoption of its practices in developing countries remains low (Giller et al., 2009; Michler et al., 2019). One explanation is that while benefits take time to be realized, adoption costs are borne up front: yield gains from improved soil health can take up to 10 years to be realized, but adopting CA requires immediate additional investments in the form of labor and/or herbicide application for weeding (Giller et al., 2009). Poor farmers may be unwilling to take on these up-front costs for uncertain future gains. In this article, we conduct a framed field experiment with farmers in northern Ghana to test two strategies to encourage adoption by reducing this uncertainty: offering time-limited subsidies and providing information on others' adoption decisions.

PUBLICATION

Financial Incentives Encourage the Adoption of Conservation Agriculture in Ghana

In This Image
Farmers practicing conservation agriculture ©Peter Steward 2016

Abstract

Conservation agriculture (CA) is a farming system that can improve soil health and reduce erosion risk. Despite its potential, however, adoption of CA remains low due, in part because costs are immediate while payoffs are relatively long-term. In northern Ghana, researchers examined whether providing short-term financial incentives and information about peers' experiences with CA or conventional practices impacted farmers' decisions to adopt CA. Incentives increased farmers' adoption of CA practices, but there was no overall impact of information sharing on a farmer's CA adoption.

Policy Issue

As temperatures in Sub Saharan Africa rise, rainfall patterns are becoming more unpredictable and intense. As a result, growing seasons become shorter and the proportion of arable land shrinks.[1] Farmers also contend with soil degradation, which reduces the quality and the capacity of the earth to produce healthy yields over time.[2] These challenges can significantly threaten farmers' productivity.[3] CA has been proposed as a strategy to

mitigate the effects of climate change and soil degradation. Through a set of practices, CA increases soil organic matter to improve water retention and soil nutrients, allowing farmers to maintain on-farm productivity while protecting soil structure. However, because the positive effects on production can take up to ten years and require significant additional and upfront investments for weeding application and labor, smallholder farmers may be hesitant to take on these costs. As a result, CA adoption rates tend to be low in the region.

Interventions have promoted CA practices in low- and middle-income countries (LMIC) farming communities but most findings are based on observational studies, rather than randomized evaluations.[4] This study aims to contribute to the literature by rigorously evaluating the role of incentives on stimulating adoption of CA. In addition, extensive research exists on how peers can influence technology adoption through information sharing.[5] This study builds on the literature by examining how information sharing impacts adoption of technologies with delayed profitability.

Evaluation Context

As climate change continues, rainfall in Ghana is more unpredictable, putting smallholder farmers–who primarily rely on the rain to nourish the soil and their crops–at risk. This is particularly the case in the north where scarce and inconsistent rainfall has had a negative impact on crop production, poverty rates, and malnutrition rates.[1] The Ghanaian government and partners have promoted CA practices in the north to mitigate climate change and soil degradation.[2] One of these practices is minimum soil disturbance, in which farmers directly seed or input fertilizer into the soil without using tilling equipment to reduce soil erosion and enhance water infiltration.[3] In the part of northern Ghana where this intervention takes place, farmers who had adopted or were familiar with CA practices noted that they had the least experience with minimum soil disturbance.

Details of the Intervention

Researchers partnered with the Ghana Agricultural Sector Investment Program (GASIP) and International Initiative for Impact Evaluation (3ie) to examine whether short-term financial incentives and information about peers' experiences with minimum soil disturbance (MSD) and conventional practices impacted farmers' decisions to adopt MSD.

A total of 1,328 farmers in 66 farmers organizations participated. In the intervention, they made real-life decisions on whether to adopt MSD over ten rounds to simulate medium-long term aspects of practicing conservation agriculture. Each round served as an agricultural season. Prior to each round, farmers could select MSD or conventional practices and were presented with the fixed costs they'd pay for each choice, the probability of rainfall during that season, and the value of their "harvest" that season–which depended on the practice they chose and the rainfall outcome. Payoffs were equivalent to a day or two of local wages.

To measure whether farmers would be more willing to adopt MSD if they were incentivized, researchers randomly divided the farmers into the following groups:

- **Incentives:** Two-thirds of farmers were eligible to receive an additional payment if they adopted MSD within the first four rounds.
- **No incentives:** One-third of farmers would not be eligible to receive additional payment to adopt MSD within the first four rounds.

In conjunction with examining the impact of incentives on MSD adoption, researchers measured whether farmers would be more willing to adopt MSD within the first four rounds if they heard about another hypothetical peer farmer's experiences. This consisted of information about whether the peer farmer had practiced MSD or conventional practices in the long term or had recently switched, as well as the peer farmer's earnings in the previous round. The farmers were randomly divided equally into the following groups:

- **Peer information:** Farmers received information about a peer's experiences with MSD and conventional practices.
- **No information:** Farmers did not receive information about a peer's experiences with MSD and conventional practices.

Results and Policy Lessons

Incentives increased farmers' adoption of MSD practices by 7.6 percent. There was no overall impact of peer information sharing on a farmer's MSD adoption.

Effects of incentives on MSD adoption: Adoption rates for MSD in the incentive group were higher across all rounds than in the no incentive group.

Incentivized farmers increased adoption of MSD practices by 7.6 percent over non incentivized farmers, were 8.3 percentage points more likely than non-incentivized farmers to experience the production gain from MSD (12 percent increase), and 7.4 percentage points less likely than non-incentivized farmers to return to conventional practices after adopting MSD (22 percent decrease).

Effects of peer information sharing on MSD adoption: Information sharing about peers' experiences did not affect MSD adoption overall. However, evidence suggests that sharing information about a peer's long term positive experiences with MSD increased a farmer's adoption.

Sources

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