

**Date**  
March 20, 2013



**OVERVIEW**

**INNOVATION**

An agroforestry adoption scheme that varied input cost-sharing and cash incentives to better understand agricultural technology adoption.

**EVALUATION**

1,330 farmers were offered an opportunity to join a tree-planting programme. Farmers were randomly assigned to receive various levels of input subsidies and/or outcome-based incentives for tree survival, which exceeded farmers' for leaving 70 percent of their trees alive for one season. Take-up, tree-planting and tree survival outcomes were used to measure adoption.

**RESULTS**

Overall, farmers showed high demand for the programme, with 82% take-up on average. At the end of the first year, there was a total of 18,400 surviving trees under the care of 300 participating farmers.

Higher input costs led to lower participation but do not affect tree-planting and tree survival.

Higher cash incentives led to increased participation, tree-planting and tree survival.

**POLICY IMPLICATIONS**

- Subsidising the price of inputs increases adoption without leading to wastage of inputs.
- Short-run incentives are effective for generating sustained adoption, and may be cost-effective if the fixed costs associated with adding additional farmers to a tree-planting programme are high.
- Financial incentives do not appear to attract the wrong "type" of farmer.
- We find no evidence that poorer or more marginalised households are unable to benefit from the programme.



**Encouraging the Adoption of Agroforestry: A Case Study in Eastern Province, Zambia**

Many agricultural technologies, such as tree crops, agroforestry and conservation farming practices, yield long-run benefits but come with short-run costs. Consequently, adoption rates by smallholder farmers can be low. Traditional efforts to increase adoption include training, information provision, subsidised inputs and cash incentives, but little clear evidence exists that breaks down the impacts and cost-effectiveness of these approaches.

The programme being studied is an agroforestry adoption scheme with smallholder farmers in rural Zambia. Variations in the programme illuminate the effects of cost-sharing and incentives on the adoption of mungu trees. This allows us to better understand whether upfront liquidity constraints or the lack of short-run benefits are a more important deterrent to the adoption of a new technology. It also makes it possible to measure how much waste occurs when farmers accept the subsidies but fail to adopt the technology.

**Mungu tree, known locally as mungu**

- Fixes nitrogen in its roots and leaves
- Loses its leaves during the planting season, providing fertilizer and allowing crops to receive sunlight
- Is native to Zambia, and grows extensively in Southern Province, but has been slow to take hold in much of the rest of the country.

**Researcher(s) led by**

Julian Jaki, Tufts University  
Pauline Olup, University of California at Santa Barbara

Elizabeth Walker, Harvard University  
Samuel Bazzi, Cornell University  
Shared Value Africa  
In partnership with the Trees on Farms Programme, implemented by Dunavant Zambia Ltd

Shared Value Africa  
In collaboration with  
Ministry of Agriculture and Livestock Forestry Department, Ministry of Lands, Natural Resources and Environmental Protection

**Key Funding From**  
International Growth Centre  
Climate and Development Knowledge Network  
Musika Development Institute





**OVERVIEW**

**INNOVATION**  
An agroforestry adoption scheme that varied input cost-sharing and cash incentives to better understand agricultural technology adoption.

**EVALUATION**  
1,330 farmers were offered an opportunity to join a tree-planting programme. Farmers were randomly assigned to receive various levels of input subsidies and/or outcome-based incentives for tree survival, which exceeded farmers' for keeping 70 percent of their trees alive for one season. Take-up, tree planting and tree survival outcomes were used to measure adoption.

**RESULTS**  
Overall, farmers showed high demand for the programme, with 85% take-up on average. At the end of the first year, there was a total of 18,400 surviving trees under the care of 300 participating farmers.  
Higher input costs led to lower participation but do not affect tree planting and tree survival.  
Higher cash incentives led to increased participation, tree planting and tree survival.



**Encouraging the Adoption of Agroforestry: A Case Study in Eastern Province, Zambia**

Many agricultural technologies, such as tree crops, agroforestry and conservation farming practices, yield long-run benefits but come with short-run costs. Consequently, adoption rates by smallholder farmers can be low. Traditional efforts to increase adoption include training, information provision, subsidised inputs and cash incentives, but little clear evidence exists that breaks down the impacts and cost effectiveness of these approaches.

The programme being studied is an agroforestry adoption scheme with smallholder farmers in rural Zambia. Variations in the programme illuminate the effects of cost-sharing and incentives on the adoption of miakanga trees. This allows us to better understand whether upfront liquidity constraints or the lack of short-run benefits are a more important deterrent to the adoption of a new technology. It also makes it possible to measure how much waste occurs when farmers accept the subsidies but fail to adopt the technology.

***Miakanga* acacia, known locally as *miakanga*:**

- Fixes nitrogen in its roots and leaves
- loses its leaves during the planting season – providing fertilizer and allowing crops to receive sunlight
- is native to Zambia, and grows extensively in Southern Province, but has been slow to take hold in much of the rest of the country.

**Researcher(s) led by:**  
Julian Jaki, Tufts University  
Pauline Oliva, University of California at Santa Barbara  
Elizabeth Walker, Harvard University  
Samuel Bell, Cornell University  
**Shared Value Africa**  
Innovations for Poverty Action

**In partnership with the:** *Tree-on-Farm Programme*, implemented by *Dunavant Zambia Ltd*, *Shared Value Africa*  
**In collaboration with:** Ministry of Agriculture and Livestock Forestry Department, Ministry of Lands, Natural Resources and Environmental Protection  
**With funding from:** International Growth Centre, Climate and Development Knowledge Network, Mozilla (collaboration partner)

**POLICY IMPLICATIONS**

- Subsidising the price of inputs increases adoption without leading to wastage of inputs.
- Short-run incentives are effective for generating sustained adoption, and may be cost-effective if the fixed costs associated with adding additional farmers to a tree-planting programme are high.
- Financial incentives do not appear to attract the wrong "type" of farmer.
- We find no evidence that poorer or more marginalised households are unable to benefit from the programme.



# Breakout Session A: Practical Lessons Learnt

Sam Bell  
Shared Value Africa  
Cornell University

## Encouraging the Adoption of Agroforestry: A Case Study in Eastern Province, Zambia



### THE TREES ON FARMS PROGRAMME: PRACTICAL LESSONS LEARNT

#### SUMMARY

A number of preliminary findings come out of this research collaboration between Innovations for Poverty Action and the Trees on Farms programme, that may be of practical use to programme managers and policy makers more broadly.

Initial adoption of the programme was very high and survival rates went up as the incentive payment increased. Incentive sharing was not found to impact survival rates for those who took up the programme, but cost sharing did suppress initial adoption by approximately 40% at full cost recovery if no incentive payments for survival were available. While extension support was provided as part of the programme to all participants, a subset of participants were visited regularly through the growing season in order to monitor farming practices and level of effort. Many of these farmers said they felt proud to be monitored, and tree survival rates in this group was significantly higher than average.

The yield extension structure of group leaders and 12-15 group farmers appeared to be important. Farmers who saw their YGL more than ten times in the year had significantly higher survival, and those working with Dunavant longer were more likely to participate. Holding all else constant, other factors that increased participation were less risk-averse attitudes, household size, and if the household was female headed.

Factors that increase tree survival rates include the use of fertilizer in the previous season, previous experience with musanga planting, years of education and participant age.



Research carried out by  
Kelsey Jack, Tufts University  
Paulina Oliva, University of California  
at Santa Barbara  
Elizabeth Walker, Harvard University  
Samuel Bell, Cornell University  
Shared Value Africa  
Innovations for Poverty Action  
in partnership with the Trees on  
Farms Programme, implemented by  
Dunavant Cotton Ltd  
Shared Value Africa  
In collaboration with  
Ministry of Agriculture and Livestock  
Forestry Department, Ministry of  
Lands, Natural Resources and  
Environmental Protection  
With funding from  
International Growth Centre  
Climate and Development  
Knowledge Network  
Musika Development Initiatives.



# Encouraging the adoption of agroforestry: Summary of research results

Kelsey Jack, Tufts University

in collaboration with: Paulina Oliva (UCSB)  
Elizabeth Walker (Harvard)  
Samuel Bell (Cornell)  
Dunavant Cotton, Ltd  
Shared Value Africa, Ltd

with support from IGC, CDKN, Musika

# Breakout Session B: In-depth Research Results

Kelsey Jack, Tufts University

INNOVATIONS FOR POVERTY ACTION 2013

## Encouraging the Adoption of Agroforestry: A Case Study in Eastern Province, Zambia



### IN-DEPTH RESEARCH RESULTS

#### SUMMARY

Many agricultural technologies yield long-run benefits but come with short-run costs. Examples include tree crops, agroforestry and conservation farming practices, many of which also provide benefits to the environment. Because of the long-run nature of the benefits and the fact that some of the benefits accrue to people other than the adopting farmer, adoption rates by smallholder farmers can be low. Traditional efforts to increase adoption include training, information provision, subsidized inputs and cash incentives, but little clear evidence exists that breaks down the impacts and cost effectiveness of these approaches.

The study focuses on the adoption of *Faidherbia albida*, also known as *musangu*, an agroforestry species native to Eastern Province that offers both long run private benefits to the adopting farmer, as well as global carbon sequestration benefits. *Musangu* fixes nitrogen in its roots and leaves and loses its leaves during the planting season. This biological trait ensures that crops receive fertilizer and sunlight when they need it most. Indeed, existing field trial evidence on the impacts of *musangu* on maize yields suggests that mature trees, when intercropped with maize, can double yields in settings where no additional fertilizer is used<sup>1</sup>. However, for the first 5-10 years of tree growth, these fertilizer benefits are minimal.



Research carried out by  
Kelsey Jack, Tufts University  
Pauline Olup, University of California  
at Santa Barbara  
Abdullahi Isah, Harvard University  
Samuel Adji, Cornell University and  
Shared Value Africa  
Innovations for Poverty Action

In partnership with the *Tree-on-Farm* Programme, implemented by  
Dunavant Zambia Ltd  
Shared Value Africa

In collaboration with  
Ministry of Agriculture and Livestock  
Forestry Department, Ministry of  
Agriculture, Forestry and Fisheries and  
Environmental Protection  
With funding from  
International Growth Centre  
Climate and Development  
Knowledge Network  
Musika Development Institute

**KEY RESULTS**

After one year of implementation, both input subsidies and short run incentives are positively associated with tree survival. Specifically, a one USD increase in the subsidy for seedlings increases tree survival by 11.3 percent, while a one dollar increase in the financial incentive increases tree survival by 2.3 percent. The larger effect of the input costs is due to lower participation in the programme at higher input costs. Incentives increase survival directly by increasing effort among participating farmers. At the end of the one-year study, 700 farmers were growing an additional 19,800 *musangu* trees in Eastern Province.



# Encouraging the Adoption of Agroforestry among Smallholder Farmers in Zambia

Innovations for Poverty Action (IPA), Dunavant Zambia Ltd., and Shared Value Africa hosted *Encouraging the Adoption of Agroforestry among Smallholder Farmers: A Case Study in Eastern Province, Zambia*. The event was in collaboration with the Ministry of Agriculture and Livestock and the Forestry Department of the Ministry of Lands, Natural Resources and Environmental Protection, and jointly funded by Climate Development Knowledge Network, International Growth Centre, and Musika Development Initiatives.

The event was attended by 64 participants, many of whom were high-level cross-sector stakeholders from the Zambian government, the private sector, the international donor and research community and leading non-governmental organisations.

Through this event participants explored questions surrounding the adoption of agricultural technologies that bring benefits in the long-term but come with short-run costs, such as agroforestry, tree crops and conservation farming practices.

Encouraging the adoption of agroforestry as a land use strategy is of vital importance to the success of REDD+ (Reduced Emissions from Deforestation and Degradation Plus). The case study of a [tree-planting programme in Eastern Province](#) with *Faidherbia albida*, a nitrogen-fixing species that improves soil fertility and brings long-run environmental benefits, was used to spark discussions around barriers to and determinants of adoption; impact and cost-effectiveness of providing input subsidies and short-run cash incentives; whether farmers that are attracted by cash incentives are less likely to follow through on the programme; and what type of farmers are most interested in agroforestry adoption and which are the most successful.

## Event presentations:

- Opening by Catherine Mungoma, Acting Permanent Secretary of the Zambian Ministry of Agriculture and Livestock.
- [Presentation of Key Findings](#), led by Dr. Kelsey Jack, Assistant Professor of Economics, Tufts University
- [Practical Lessons Learnt](#), led by Sam Bell, Director of Shared Value Africa, together with Dunavant Zambia Ltd.
- [In-depth Research Findings](#), led by Dr. Kelsey Jack

## Dissemination documents:

- [Project Brief 2013](#)
- [In-depth Research Results 2013](#)

- [Practical Lessons Learnt 2013](#)

### **Chipata, Eastern Province Event: March 27, 2013**

This event was similarly attended by a range of cross-sector stakeholders at the local level in Eastern Province, where the study took place.

The event also included a field visit with key government partners who met some of the participating farmers and saw a demonstration of the study's Tree Monitoring Survey using electronic surveying and GPS.

For more information on this project, visit the [project page](#).

### **City**

Lusaka

### **Country**

Zambia