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. Input cost 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 fertiliser in the previous season, previous experience with musangu planting, years of education and participant age.

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CONTEXT

This research project was carried out by Innovations in Poverty Action in the 2011-2012 farming season, as part of the *Trees on Farms Programme* (ToF) implemented through a partnership between Shared Value Africa and Dunavant. Dependent on funding, the research will continue to monitor the existing cohort of farmers and will address new questions as part of the 2012-13 scaling up of the SVA-Dunavant partnership

Including a research project in the Chipata district as part of the broader *Trees on Farms* programme provided an opportunity to identify successes and challenges to inform scaling-up and to share with other organisations undertaking similar activities. The research results also highlight some key factors that affect the practical aspects of programme design such as farmer perspectives, performance on key tree planting and care activities and the impact of monitoring visits.

The project used Dunavant's extension system of farmer groups to distribute inputs and provide training on tree planting and care which is key to scaling up the programme. The system involves groups of 12-15 farmers (YGF, Yield Group Farmer), each with one lead farmer (YGL, Yield Group Leader), with coordinators (YCD, Yield Coordinator Distributor) managing a number of lead farmers.

Table 1 below summarises the implementation of the Trees on Farms programme and key aspects of the research project in each of the farming seasons, and the following section details what has been learnt through this process to date.

Table 1. The Trees on Farms Programme

	2011-2012 Farming Season	2012-2013 Farming Season	2013-2014 and onwards
Partners	SVA and Dunavant partnership. IPA research.	SVA and Dunavant partnership. IPA follow-up research *[Contingent on funding availability].*	SVA and Dunavant partnership.
Location	Eastern Province.	Eastern, Central, Southern and Western Provinces.	As in 2012-2013.
Tree Species	*Faidherbia albida* (musangu) – relatively easy to care for and maintain but soil fertility benefits only accrue after 5-10 years.	*Faidherbia albida* (musangu) - core focus. *Gliricidia sepium* – according to demand. Higher planting density and maintenance, but faster growth results in faster soil fertility benefits. Can also be used for fuel and construction.	As in 2012-2013.
Farmers	Training and/or follow-up with 2,400 farmers in Katete and Chipata. ~1300 group farmers participating in research.	46 yield coordinators, 918 lead farmers and 2525 group farmers participating in Eastern Province. Over 8000 Dunavant farmers provided training in Central, Southern and Western Provinces (CSW).	12,000 farmers in Eastern Province including coordinators, lead farmers and group farmers already participating. 8,000+ farmers in CSW. In new areas, two group farmers selected by each lead farmer.

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Training	311 lead farmers trained directly by SVA at dedicated training session. 1446 group farmers trained by lead farmers with SVA present, at dedicated training sessions in Chipata. Group farmers *in research* collected 50 seedlings from lead farmers then took responsibility for the care of their trees.	Coordinators, lead farmers, and group farmers already participating in the programme in Chipata were trained by SVA. Dunavant provided training to lead farmers and group members in Eastern Province as well as CSW.	Lead farmers and two of their group farmers trained by Dunavant at dedicated training session, with support by SVA. Group farmers trained by group leaders through YIELD extension system in established areas.
Inputs	Lead farmers in general provided seeds and sleeves to create their own nurseries. Lead farmers *in research* provided with initial inputs of 2000 seeds and planting sleeves to establish nurseries and provide seedlings to members of their group. Incentives provided to lead farmers to establish and maintain the group nursery.	Coordinators, lead farmers and group farmers each provided with 65 or 125 seeds and planting sleeves. Inputs and training also provided to existing participants for the purpose of extending and gap-filling.	As in 2012-2013.
Input Costs	Varied randomly across farmer groups participating in the research. Four possible variations for provision of 50 seedlings: free provision, ZMR 4, ZMR 8, or ZMR 12. Free provision to all farmers not in the research.	Free provision.	Free provision currently planned. Possible adjustment based on research findings.
Seedling Nurseries	Farmers outside research managed their own nursery. Lead farmers *in research* responsible for managing a 2000 seedling nursery for their farmer group. Lead farmers paid ZMR 40 and offered a performance incentive of ZMR 60 in addition dependent on achieving 80% germination. Group farmers collected 50 seedlings from lead farmers.	Each farmer responsible for managing their own seedling nursery.	As in 2012-2013.
Tree Planting & Care	Each group farmer responsible for tree planting and care for their own seedlings.	Each farmer responsible for tree planting and care for their own seedlings.	
Incentives	*Only in research areas:* Cash incentives offered to individual group farmers at the start of the programme, either before or after choosing to participate. Incentive varied randomly for each farmer, from ZMR 0 to ZMR 150, to be paid dependent on at least 70% tree survival after one year.	No incentives.	No incentives currently planned. Possible adjustment based on research findings *[Contingent on funding availability].*

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Monitoring	Regular monitoring visits to one fifth of *research* farmers for data collection purposes: Weekly Jan-Feb, every other week March-June, monthly July-Sept. Regular programme monitoring through YIELD extension system to all farmers. Monitoring visit to every farmer that reported trees alive in the field, to collect data on the number, and GPS plot boundaries, as well as quality and size of trees *in the research* monitoring.	Gather self-reported information on tree planting and survival during field days and training sessions March-June, and through existing Dunavant YIELD reporting mechanisms. Targeted on-farm monitoring to collect tree survival details, GPS plot boundaries and information on tree management practices.	Learn from 2012-2013 and plan accordingly. Potential for additional studies to follow up on 2011-12 findings.

LESSONS LEARNT

Which types of farmers decided to take part?

Controlling for household characteristics, certain types of farmers were more likely to join the programme, including:

- Female-headed households.
- Farmers with less risk averse attitudes.
- Farmers with greater numbers of people in their household.
- Farmers that had worked for Dunavant for a longer period.

Which types of farmers achieved higher tree survival?

Although some characteristics, such as the amount of land that farmers cultivated, didn't appear to have an effect on tree survival, certain types of farmers were more likely to achieve higher tree survival outcomes, including:

- Farmers with previous experience of planting musangu, who had on average 5 more surviving trees than those with no experience.
- Farmers that used fertiliser in the previous season.
- Farmers with more years of education.
- Older farmers, and those farmers working for longer with Dunavant.
- Farmers with sandy black soil in their fields, followed by those with sandy soil, as expected.
- Smaller households and households with more land, when the cash incentive was lower (ZMR 75 or less).

How did farmer group characteristics affect the programme?

- Differences in take-up and tree survival were found at the group level, suggesting that factors affecting all farmers in a group, such as environmental conditions, centralised nursery success, YGL capacity and peer effects all affect programme outcomes.
- Within farmer groups, higher incentives offered to others had a positive effect on a farmer's own performance, controlling for their own incentive, showing positive spillover effects through encouragement and cooperation.

How did centralised nurseries affect the programme?

Effectively growing seedlings at the nursery stage is key to the success of the programme, and a lot was learnt by seeing the differences between centralised nurseries managed by a lead farmer, versus nurseries managed by each farmer that chose to participate.

- Incentives were offered to lead farmers to manage the nurseries dependent on germination rates, providing encouragement but increasing implementation costs.
- Some lead farmers followed the training instructions closely and grew seedlings well, though many others delayed and/or didn't prepare a large enough nursery, or achieved low germination rates due to poor management or poor quality, ungraded seeds.
- Group farmers were subject to knock-on effects for tree survival that were out of their control due to the capacity or commitment of their lead farmer.
- Group farmers had to collect seedlings from the lead farmer which is not always close by and led to some transportation problems.
- Successful lead farmers lowered the effort required by group farmers to grow musangu, by caring for the seedlings at scale.
- Seedling quality on collection from the lead farmers was good, overall. 762 farmers reported that the seedlings they collected were of good quality, with an average of only 6% of these reported as average or poor quality. 101 farmers reported that some of the seedlings that they collected were of poor quality, with 25% of these farmers' seedlings reported as poor quality.
- The quality of the seedlings collected from the lead farmers had an impact on tree survival after one year. Farmers that reported that all of their seedlings were of good quality had 5 more surviving trees, and if seedlings were all poor quality, 8 fewer trees survived on average.

How did farmers view the programme?

- Farmers were aware of the benefits of musangu, with 8 out of ten noting soil fertility as a benefit in the final survey after one year.
- Expectations of the work involved were fairly balanced. Overall, 34% farmers reported musangu as being more work than expected, and 28% reported it being less work.
- Farmers that watered the trees were more likely to state that musangu were more work than expected. 43% of those that watered the trees found it to be more work than expected, compared to 36% of those who did not water.
- 96% expressed, at the conclusion of the first year, that they would like to plant musangu again in 2012-2013.
- 75% remembered the tree planting threshold of 35 trees correctly a year later. 78% remembered their rewards correctly 4 months after training, but fewer said they knew their reward level just before the conclusion to the contract.

- A larger proportion of farmers stated that the reward was as expected if they found out the value of their reward after choosing to participate, compared to finding out before choosing to participate. In both cases though, it was most common for farmers overall to state that the reward was lower than they expected (driven only by those in the lower 50% of reward payment values), and that they perceived other peoples' rewards to be higher than theirs (this is true even for people whose reward was in top 50%).
- Very few farmers reported that a benefit of the musangu trees was getting paid, though the higher tree survival at higher rewards suggests that it did affect the effort farmers invested in the trees.

How did farmers manage the trees?

- Farmers planted musangu in fields amongst various crops. 66% intercropped with cotton, 14% with groundnuts, and 14% with local or hybrid maize. Recall that this is during the first year only, when the trees are still small and generate little fertiliser benefits. The training recommended planting amongst low-lying crops particularly in the first year of growth.
- The average number of visits by farmers to the plot where the musangu were planted was 53, over the course of the year, with some farmers visiting much more regularly. However, this did not have a significant effect on tree survival.
- Field care: 51% of farmers did weeding, 20% placed stakes, 20% made firebreaks and 8% put mulch.
- Watering was stated to be the most difficult activity, followed by transplanting the seedlings.
- The most stated reason for farmers having planted fewer than they collected was that the seedlings died whilst waiting to transplant, highlighting a potential issue with centralised nurseries.
- When farmers needed advice about the trees, 60% stated that they consulted their lead farmer, and only 6% asked a neighbour.
- The cash incentive didn't influence when farmers planted the seedlings in their field (this timing was most likely related to the onset of rains), but higher incentives did mean farmers planted more seedlings.
- Higher incentives increased the likelihood of self-reported mulching and weeding, but did not increase the likelihood of farmers staking seedlings (to protect from damage during weeding), building firebreaks or watering. Incentives didn't impact the likelihood of evidence of any of the above when monitored at the field.

How did frequent monitoring affect the programme?

- Farmers being monitored regularly by the research team had approximately 10 more trees surviving at the end of the year.
- Farmers perceived the monitoring positively, with 97% of those being monitored stating that they were proud to be visited.
- Support from the lead farmer was important. Farmers who reported having seen their lead farmer more than 10 times during the year had around four more surviving trees than a farmer who had seen his lead farmer less frequently.
- Cost of monitoring is high, especially frequent visits.

What were the cost implications of input subsidies and cash incentives?

- When farmers were charged ZMR 12 for 50 seedlings and no cash incentive was offered, take-up was 40% lower than with free inputs and cash incentives. Higher input costs meant that an increase of ZMR 100 in the incentive, increased take-up by 7%.
- For farmers receiving cash incentives, increasing input costs from ZMR 0 to ZMR 12 decreased take-up by 25%.
- When inputs are more heavily subsidised or free, incentives do not affect take-up.
- Input costs didn't affect tree survival rates, conditional on joining the programme.
- A 1 USD increase in the cash incentive increased tree survival by 2 percent, conditional on joining the programme.
- Cash incentives require accurate monitoring of each farmer, further increasing the implementation costs.
- Even for those farmers that earnt income from sources other than their main crops, such as fruit and vegetables, crafts, or piecework, offering cash incentives still increased tree survival.

NEXT STEPS FOR THE TREES ON FARMS PROGRAMME

SVA, Dunavant and Musika plan to scale up the programme in the coming years, and there is extremely high demand among farmers already participating to continue to be part of the programme, with 96% stating at the conclusion of the first year that they would like to plant musangu in the 2012-2013 season. SVA is seeking support for scale-up and registration under international climate change standards to strengthen programme sustainability. Further support for follow-up data collection in 2013 will allow IPA to track longer-term impacts of the short run incentives offered in 2012.

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