Breakout Session A:

Practical Lessons Learnt

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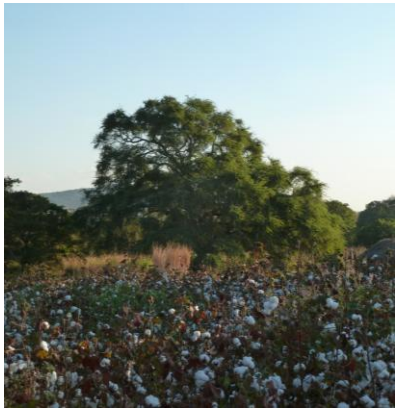
Session agenda

- Programme motivations and goals
- Research design and overall outcomes
- Results:
  - Farmer characteristics' impact on adoption, transplanting and survival
  - Implementation, extension & tree management practices
  - Effect of monitoring, input subsidies and incentives
- Tradeoffs in costs/outcomes
- Smartphones for surveys and field monitoring
- Future research questions
- Future programme goals

- Discussion throughout!

Trees on Farms Programme objectives

- Increasing agricultural productivity
- Enhancing farmer resilience to climate change
- Mitigation of climate change



HOW?

- Intercropping of Musangu
- Partnership model (Dunavant, SVA & Musika)
- Scale-up over 2-3 years across 100,000 farmers

Why Musangu (Faidherbia albida)?

- Reverse phenology, and very well suited to intercropping
  - Minimal competition with crops in growing season;
  - Active in dry season; pods for livestock (up to 1000kg/tree) and flowers for honey in time of scarcity (Barnes, 2003);
  - Nutrient cycling from deep soil, high biomass production;
  - Widespread evidence of yield increases;

- Environmental benefits: soil health & fertility, erosion protection, improve soil structure water infiltration, Climate mitigation
- Co-benefits - food security, resilience to weather shocks

Barriers to adoption

- Short run costs and long-run benefits
- Liquidity or resource constraints (land/labor)
- Limited access to inputs and extension
- Weak marketing of benefits
- Land tenure

Motivation for testing input subsidies & rewards

- Bridge the gap between short-run costs and long run benefits
- Positive externalities (erosion, flooding, climate)

Approach to analysis

- Timeline:

Training and takeup > seedling collection > transplanting > surviving trees

- Analysis of survival outcomes based on farmer characteristics, implementation
  - correlations (omitted variables can be important!)

- RCT experiment allows identification of causal links between treatments & outcomes

Characteristics included

- Household size
- Age of respondent
- Gender
- Female-headed household
- Years of education
- Months of food shortage
- Non-agricultural wealth
- Years with Dunavant
- Knowledge of Musangu
- Risk attitudes
- Private discount rate
- Total land holdings
- Number of fields
- Planted cotton last year
- Planted Musangu in past
- Used fertilizer last year
- Soil types
- Research design variables

Research design and mean outcomes

Contract: pays a reward for 35 or more trees

Randomly assigned treatments:

- Cost sharing of inputs (full subsidy to full cost)
- Reward K 0 – 150 for at least 35 trees
- Timing of reward announcement

Outcomes:

- Mean planted is 28 seedlings
- Mean planted is 43 for those planting > 0
- Mean survival is 17
- Mean survival is 23 for those planting > 0
- 1 out of 4 had at least 35 trees and received rewards
- 1 out of 3 had >35 trees from those who planted > 0

Which types of farmers signed up?

Take-up: Contract and input purchase directly after training.

- Female-headed households
- Farmers with lower risk aversion
- Farmers with larger households
- Those who had been working with Dunavant longer

Correlations may suggest:

- Female-headed HHs see Musangu as of greater benefit
- Labor availability may be important for take up;
- Extension relationships and trust important

Who collected seeds & transplanted?

(*of those who signed contracts*)

Seedling pickup

Months of food shortage
Total land holdings
Years with Dunavant
Previous Musangu planting
Soil type (sandy black soils)

Transplanting

Smaller household size
Age

Which farmers had better survival?

- Prior experience planting Msangu (+5 trees)
- Fertilizer in previous year (+3 trees)
- Years of education and age
- More years with Dunavant
- Those reporting sandy black soil, or sandy soil
- For smaller rewards (< K75), smaller households and those with more land

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Correlations may suggest:

- Survival rates are partly within control of farmer (experience matters)
  - some of this impact is due to transplanting higher numbers, suggesting that these farmers know to compensate for mortality
- Soil fertility matters (may also be proxy for wealth)
- Soil type suitability matter

Impact of farmer group structure

- Group level effects were significant
  - Local environmental conditions, centralized nursery success, YGL capacity and peer effects
- Higher average incentives within the group improved individual performance
- Differences between groups have a larger effect on survival compared to farmer differences (though this may be influenced by group-level nurseries)

What about group-level nurseries?

- Group leaders manage large nurseries in research
- Increases project costs
- Lowers nursery management effort of farmer but adds seedling transport
- Quality of seedlings collected overall was good.
- Variable success in centralized nurseries flow through to farmers.
- Quality of seedlings collected correlated with survival
  - +5 surviving trees if all seedlings were good quality
  - - 8 surviving trees if all seedlings were poor quality

Farmer contract perspectives

- Generally accurate recall
- 75% knew the 35 tree threshold for rewards
- 78% knew their exact reward 4 months after training, but fewer did a year after training
- Overall said reward drawn was lower than expected (driven by those in lower 50% of rewards)
- More likely to say their reward was as expected if after take up decision

Relative rewards

- Overall, perceived others' rewards as higher than theirs (true even for those in top 50% of rewards)
- Farmers with neighbors who are randomly assigned higher incentives *do better*
  - Controlling for farmer's own incentive
- Consistent with motivation spillovers – being near another farmer who is doing well (high incentives) results in higher own performance

Farmer feedback on work/benefits

- Expectations of work required were balanced
  - Overall 34% saying it was more work, 28% less work
  - If watered, fewer said work was as they expected
- When asked about the benefits of planting Musangu
  - Most farmers noted soil fertility
- Few farmers reported that a benefit of planting Musangu was rewards, but rewards still impacted survival
- 96% said they'd like to plant Musangu again in 2012

Tree Management Practices

- Intercropped with cotton (66%), g/nuts and maize (14% each).
- Field care: 51% weeded, 20% places stakes, 20% made firebreaks, and 8% mulched
- Watering was most difficult activity, then transplanting
- Seedlings mortality while awaiting transplanting biggest reason for planting fewer than collected
- Farmer visit fields 53 times on average
- Higher incentives did not increase likelihood of visible evidence of management practices during a final plot visit

Monitoring and YGL support

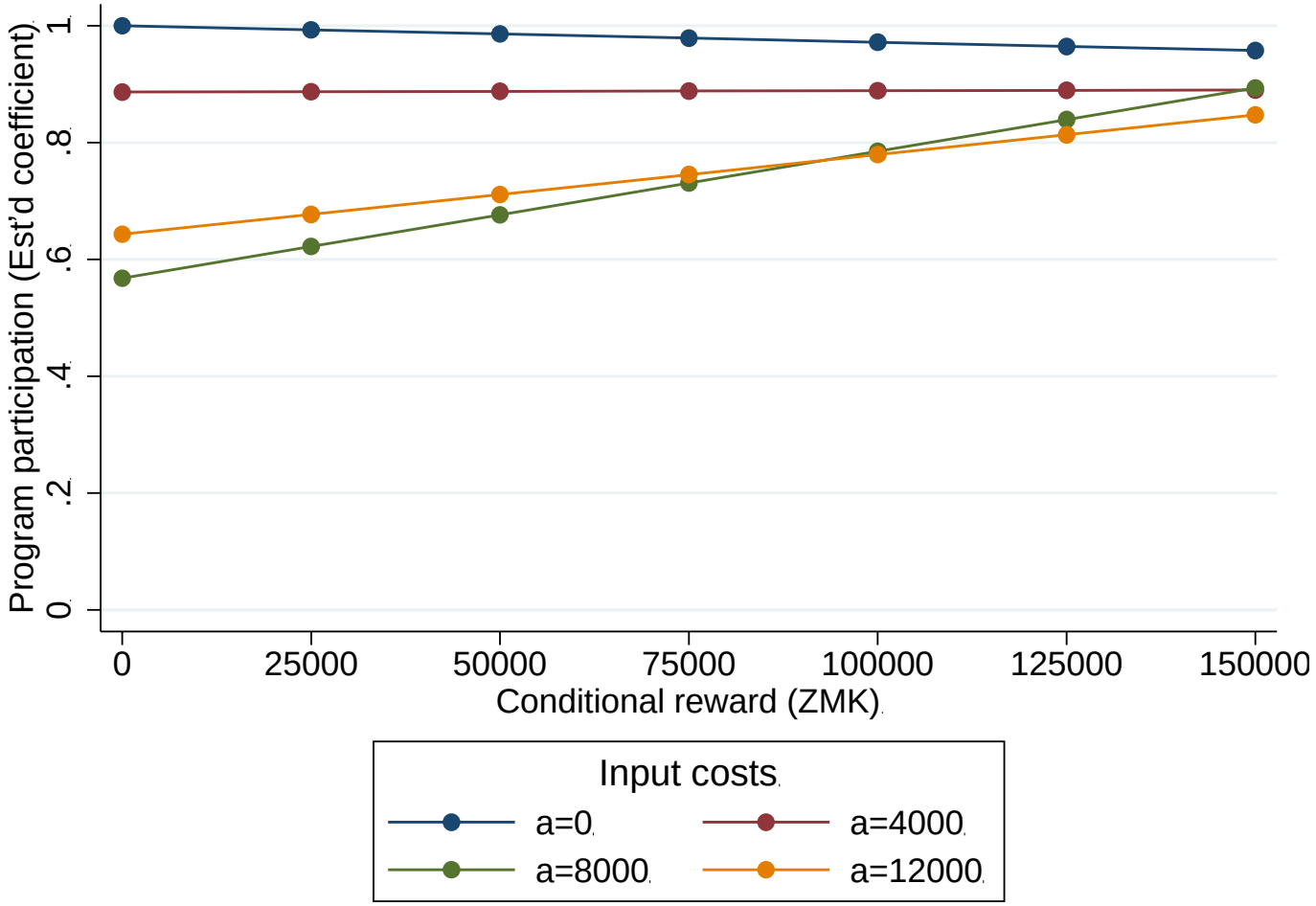
Intensive monitoring

- Farmers monitored frequently to track activities had 10 more surviving trees
- Response to monitoring positive: 97% of those monitored said they were proud to be visited
- Cost of monitoring this intensively is high

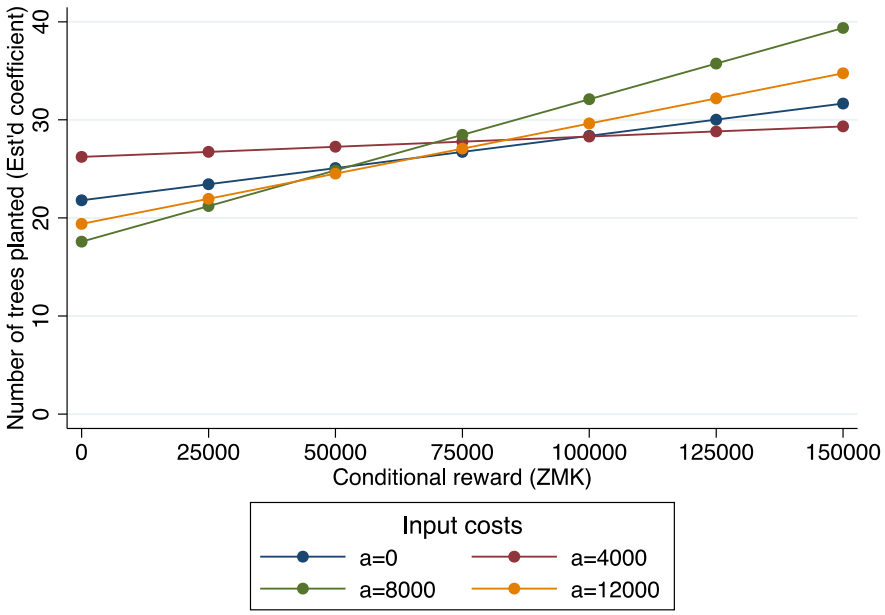
Lead farmer (YGL) contact

- When farmers needed advice: 60% of farmer consulted their YGL, only 6% said a neighbour
- Lead farmer support important: farmers who said they had seen their YGL > 10 times had 4 more surviving trees than otherwise.

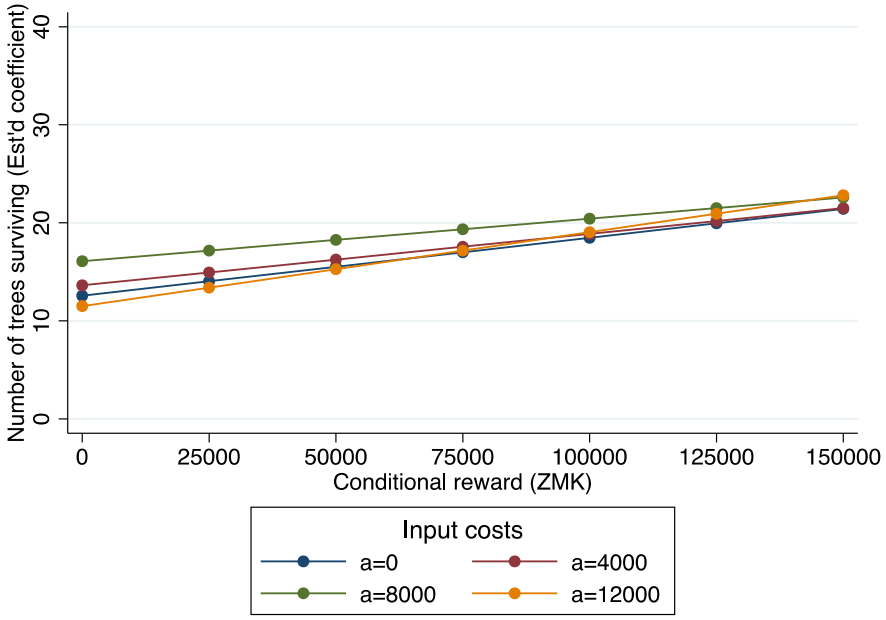
Program take up, by reward level



Tree planting and survival, by reward level



Tree planting



Tree survival

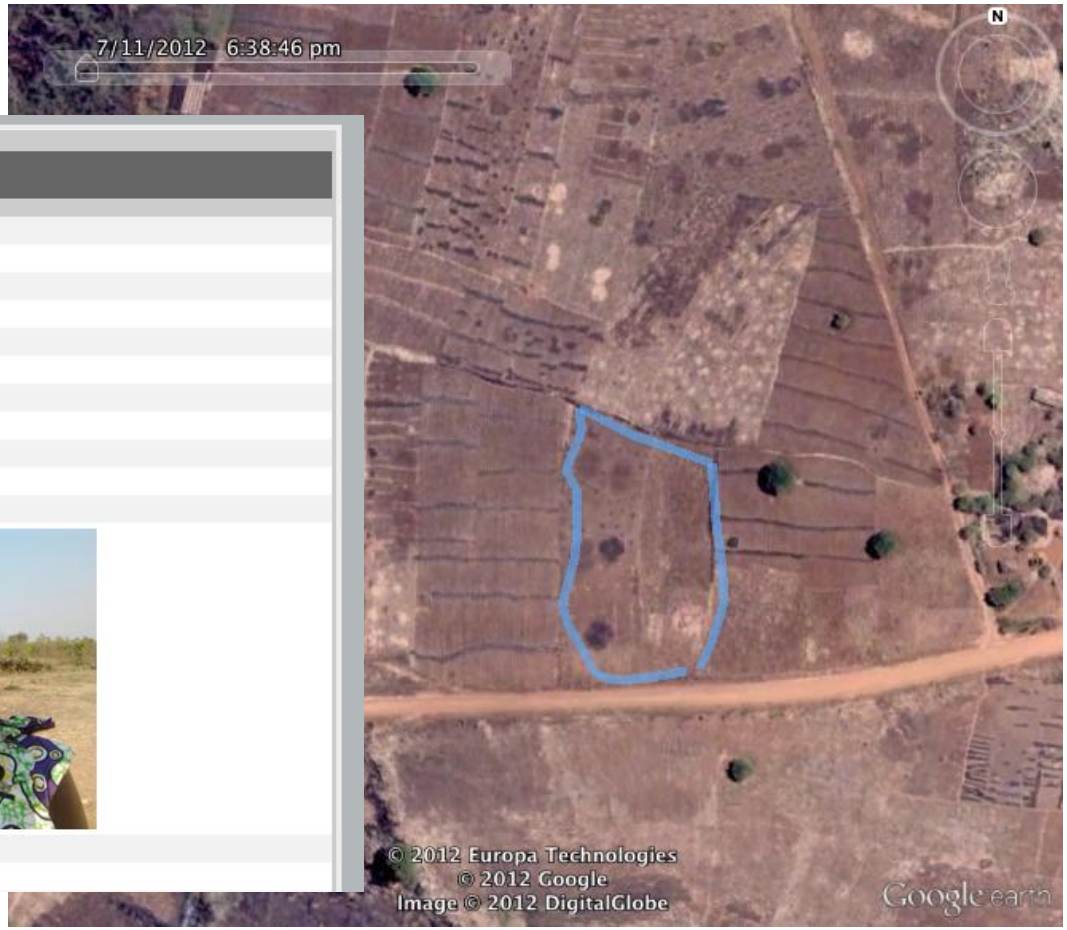
Cost effectiveness

- Per tree costs vary with participation rates, share earning rewards, per farmer program costs
  - Tradeoff between enrolling more farmers and more trees per farmer
- High fixed programme costs + low variable costs
  - Subsidize take up without incentives
- High variable costs
  - Cost recovery through inputs, pay incentives

Smartphones as M&E tools

- Real time data using mobile-phone based surveys
- Integrated GPS allows for plot geo-referencing
- Cost effective & user-friendly

Soil Health Management	
ID	186
Name	Catherine Phiri
NRC ID	314040/52/1
Phone Number	0
Primary Occupation	Farming on household's farm
Year Entered Mitengo Programme	2011
Dunavant farmer in 2012?	No
District	Katete
Village	Chmuseche
Shed	Katete
Attended a Conservation Farming Unit training?	Yes
Year of most recent CFU training	2012
Picture of Farmer	
What sort of livestock do you have on your farm?	Cows, Chickens, Pigs
Number of COWS	5



Summary of findings

- Input costs increase take up but not tree survival
  - No perverse impacts of subsidies
- Incentives increase survival conditional on participating
  - Selection into program because of incentives is minimal
- A diverse group of farmers joins the program and earns rewards
- Monitoring improves tree survival outcomes
- Lead farmers and peers matter, but do does individual effort
  - Higher rewards for neighbors has a positive spillover effect

Future research questions

1. What happens after rewards stop?
   - Persistent effects: Incentives motivate investments during difficult first year
   - Temporary effects: Farmers only perform to earn incentive
   - Proposal: Follow up survey in Oct/Nov 2013

2. Why does monitoring increase survival?
   - A number of plausible hypotheses: builds trust, reminder effect, accountability
   - How much monitoring is enough?
   - Proposal: A new study with current or new partners

Trees on Farms approach in 2013

- Implementation approach
  - Nurseries established by each farmer
  - Free provision of inputs, no rewards in general
  - Possible pilot with input costs and rewards based on simulated 'optimal contracts'
- Applying Dunavant Yield extension structure
  - Group leaders train group farmers
- Scale-up goals 2013
  - Group leaders and group farmers in established areas
  - Group leaders in new areas, with group farmers to follow in '14
  - Total of 10,000 farmers participating in 2013
- Registration in global climate change programmes