Ethiopia 2018 Tree Project Report

Farmers First

Trial Background & Set-up

In 2018 we conducted a tree project pilot in just 36 total kebeles of 3 woredas, all limited to the Amhara region, to test different potential tree production and distribution trial arms. The goal was to learn the impact, operational feasibility and SROI of each model and to determine whether any of the trial arms had good scalability potential for the future. All three woredas were in the same agro-ecological zone (mid-highlands) which is common across large parts of Ethiopia, but we chose them in order to represent different conditions we might encounter as we scale up in the future. The tree were: Banja, which has very high tree popularity and adoption because it is acidic and poorly suited to crops; Gonji, which has very low initial tree popularity because crop production is much more dominant; and Jabi Tehnan, which lies between the two other woredas in terms of initial tree popularity.

Zufari T3 Nursery, July 2018

Smallholder Lands Trial

1. We had a team of 1 JG4 lead, 3 JG2 Field Managers and 12 JG1 Field Officers overseeing work across 3 woredas, working with the government's Development Agents in the trial kebeles for implementation of training, mobilization and distribution to farmers
2. Tree types offered
    a. Grevillea robusta- timber tree, harvested after 8-10 years
    b. Rhamnus prinoides (Gesho)- leaves harvested 2 times per year, used like hops in local alcohol, attracts high price, can be sold annual from year 3 to year 16 after planting
    c. Acacia decurrens- charcoal tree, harvested after 4-6 years + N-fixing, soil improving
    d. Tree lucerne- forage tree + very fast growing on poor soils + N-fixing, soil improving, forage can be harvested and used from year 2 to 9 after planting, but currently very fewer farmers with tree lucerne actually bother to harvest and use it
3. Treatment arms:
    a. T1 (12 total kebeles): Provided individual tree kits with seeds and plastic sockets to farmers based on orders placed. They determined the preferred species mix and ordered materials for between 50-300 seedlings.
    b. T2 (12 total kebeles): Provided group-level tree kits with seeds, plastic sockets and some tools (watering cans, shovels, hoes) to 30-household development groups so that they could work together to make larger nurseries and share trees. Groups could order materials for between 300-9,000 seedlings of their preferred species mix.
    c. T3 (12 total kebeles): Identified and contracted with an out-grower (private individual or youth group), one per kebele, to grow seedlings based on collected farmer. OAF provided seeds, sockets and other tools (shovels, hoes, watering cans, wheelbarrows, soil sieves), reimbursement for local materials

purchased by the operator (compost, sand, grasses for shade). When trees were mature OAF paid a fee (market price minus 30% for materials) for seedlings successfully grown and then distributed them for free to farmers in the kebele.

d. Control (12 total kebeles): No intervention by OAF, but the same data was be collected on tree planting in these sites as in the treatment sites for comparison

4. Common training component
    a. In all three treatments OAF worked with the local Development Agents to provide the following trainings:
        i. Training on General agroforestry benefits + information about the 4 species (all farmers)
        ii. Training on Nursery establishment and management (individual farmers taking the kits for T1, groups taking kits for T2, nursery operators for T3)
        iii. Follow-up visits and assistance with nursery work (individual farmers taking the kits for T1, groups taking kits for T2, nursery operators for T3)
        iv. Training on hole digging and seedling planting when seedlings were ready (all farmers)

Communal Land Trial

1. Through a team of 1 JG4 lead and two JG1 officer we worked with woreda governments to identify degraded communal land areas that were underutilized and would benefit from tree planting and soil & water conservation works, plus to determine a diverse mix of tree and forage species to plant
    a. 60 ha across 3 kebeles in a woreda (Banja) chosen for the 2018 pilot
    b. 8 trees and 1 forage grass chosen for planting on the land
2. Conducted mapping exercises of the communal land areas and then help community meetings to create a scientifically-based, community-accepted tree planting plan
3. Grew trees to plant across the communal land area in a central nursery operated by OAF
4. Mobilized the farmers with a share in the communal land to plant trees according to the strategic plan
5. The impact vision is that:
    a. Trees planted will reduce soil erosion and help to improve soil fertility, pH and stability over a long-term horizon
    b. Farmers will follow a set of by-laws to decide a sustainable and fair method for harvesting the timber and non-timber products from a certain portion of the trees planted, while agreeing to leave another portion for permanent soil stabilization

Impact measurement methodology

We applied two different approaches to calculate impact:

- Standard approach
    - We took rigorous counts of trees grown in the T1 and T2 nurseries near maturity time and also of trees actually distributed from T3 and Communal nurseries
    - The M&E team visited farmers to ask and then count how many trees they actually planted, and we lowered the total produced seedlings by those actual % planted
    - We applied a further reduction to those trees of 50% assuming those would be the losses from planting the tree maturity; this number came from a 1-year survival survey done on grevillea seedlings that had been distributed by OAF in an initial, small project in 2017 (a project which did not include any close follow-up assistance by OAF at or after planting)
    - We then multiplied the number of calculated trees expected to survive per species by the expected impact per tree numbers, which came from a market survey conducted with farmers and vendors plugged into the OAF Global Agroforestry impact model
- Treatment vs. Control approach (Smallholder land trial)

- At the time of Smallholder lands trial set-up we randomly selected an equal number of kebeles per woreda for each treatment arm and the control arm
- We managed to get an even spread of the different arms such that each of the 12 OAF officers was in charge of work in 4 different kebeles, one of each treatment arm or control (though they did very little work in the control, beyond some simple data collection)
- We used baseline data from all the kebeles in the woreda to ensure that sample for each treatment and the control and the kebeles not chosen were not statistically different on any important metrics (i.e. suitability of climate for trees, water abundance, distance of the kebele to the woreda capital, tree demand per household, baseline level of tree cover, strength of the Development Agent)
- At the time of tree planting an independent team of M&E enumerators conducted visits with random farmers who received OAF materials in the Treatment kebeles and random farmers who signed up as interested for trees in the future in the Control kebeles to do physical counts of the number of seedlings planted in 2018
- Statistical analysis was conducted to determine the difference in seedlings planted of each species and total for the different treatment arms and the control comparatively

- Treatment vs. Control approach (Communal lands trial)
  - At the time of trial design we decided together with PRB and Global M&E not to randomly select treatment vs. control sections of the communal land area, because we worried it would be too difficult to execute and this was not the key trial of interest for 2018
  - However, we ended up with a bit of a natural experiment:
    - We originally intended to serve 60 communal land areas across 5 kebeles and conducted detailed mapping exercises in all 60, but then close to the end of the season we learned that the government had an alternative plan to provide trees for communal land sites in 2 of those kebeles through their own Sustainable Land Management (SLM) project
    - We thus decided to provide our seedlings only to 35 communal land sections in the 3 kebeles without SLM
    - When we had M&E enumerators come to do planting visits and tree counts we assigned one to visit the "treatment" sites served by OAF and one to visit the "control" sites served by SLM, to see if there was any difference
  - Statistical analysis was then conducted to determine the difference in seedlings planted in 2018 as well as the difference in tree species diversity across the OAF vs. SLM sites

Description of Impact Surveys

- The Program team conducted a number of surveys throughout the season and then the M&E conducted several at the end of the season which were used to calculate impact
- The major surveys included a tree planting survey shortly done by M&E shortly after tree distribution and a marketing surveys conducted to project future market value of the planted trees
- For more details on these and others surveys see the APPENDIX
- Brief description of the Tree Planting Survey for the private land trial:
  - 30 M&E enumerators surveyed 50 farmers per site in all 48 treatment and control sites (12 kebeles each for T1, T2, T3 and Control), achieving a total sample of 2,613
  - Farmers in each treatment kebele were surveyed and compared against Control farmers who were from completely separate kebeles were the treatment was not even offered
  - Farmers for the survey were selected randomly from lists gathered via the following methods:
    - **For T1:** Of individual farmers who took the tree kits from OAF when distributed in February
    - **For T2:** From members of the groups who had taken the tree kits from OAF when distributed in February; but note that we asked all group leaders in June to tell us which members of the group actually participated in making the nursery and those were the names included on the list
    - **For T3:** Of farmers who took seedlings on the distribution days organized in July

- **For Control:** Of farmers who signed up as interested in getting trees from OAF in the future, after M&E enumerators and DAs organized meetings to explain that we might offer free seedlings in the future and explained the 4 species. This was done in June 2018 but in a manner similar to how we did it for treatment sites in December 2017.

- The survey included physical counts in the field with farmers of seedlings planted in 2018, as well as a few supplementary questions on planting practices known and used, sources of seedlings, etc.

Impact & Trial Results

2018 Tree Project Summary Results Table

Impact metric	Parameter	T1 Individual tree kits	T2 Group tree kits	T3 Kebele nursery	Communal land, OAF nursery	TOTAL or Weighted Avg
General results	**Kebeles served**	12	12	12	3	**39**
	Avg nurseries per kebele	209	13	1	1 for all 3	**n/a**
	Farmers served	1,399	1,211	5,931	1,194	**9,735**
	Trees ordered, planned to grow	652,700	841,500	967,900	600,000	**3,062,100**
	Trees grown & distributed	327,620	330,593	703,609	254,475	**1,616,297**
	Success rate- grown out of planned	50%	39%	72%	42%	**52%**
	OAF Total Costs	-$47,433	-$46,550	-$102,236	-$56,596	**-$271,917**
	OAF Cost per adopter	-$33.91	-$38.44	-$17.24	-$47.40	**-$27.93**
	OAF Cost per seedling planted	-$0.21	-$0.19	-$0.18	-$0.28	**-$0.22**
Standard metric, based on total trees	**Total trees planted**	227,926	239,528	567,230	202,088	**1,236,772**
	Total trees expected to survive	113,963	119,764	283,615	101,044	**618,386**
	Trees planted per farmer	163	198	96	169	**127**
	Trees will survive per farmer	81	99	48	85	**64**
	Impact per farmer	$147	$293	$125	$213	**$160**
	Total impact	$206,082	$355,327	$740,027	$254,445	**$1,555,881**
	SROI	4.3	7.6	7.2	4.5	**5.7**
Treatment vs. Control metric	**Total trees planted over control**	39,913	55,997	201,180	7,139	**304,228**
	Total trees expected to survive, over control	19,957	27,998	100,590	3,569	**152,114**
	Trees planted per farmer, over control	28.5	46.2	33.9	6.0	**31.3**
	Trees will survive per farmer, over control	14.3	23.1	17.0	3.0	**15.6**
	Impact per farmer	$76	$107	$78	$16	**$73**
	Total impact	$106,554	$129,515	$460,085	$18,655	**$714,809**
	SROI	2.2	2.8	4.5	0.3	**2.6**

- Overall our total tree project this year generated the following results
  - 9,735 total farmers served
  - A cost per farmer served of $27.93 and cost per seedling planted of $0.22
  - 1,616,297 total trees grown (T1 & T2) and distributed (T3 & Communal)
  - 1,236,772 total trees planted

- 64 trees planted per farmer, though 31.3 trees over control
- Weighted average impact per farmer was $73 or $160, depending on the impact metric used
- Total impact of $714,809-$1,555,881, depending on the impact metric used
- An SROI of 2.6-5.7, depending on the impact metric used

- There was a big difference in total trees planted and trees planted above control, with the latter only 25% of the former. There are several points that help explain this:
  - If you break the sample down by kebele there is a higher significant difference in all treatments over control when you look only at Gonji and Jabi Tehnan compared to Banja, because in Banja trees are so popular overall that control farmers also have high numbers of trees. In the other two woredas the OAF trees were in many cases the only sources of trees that the farmers received in 2018, but this was very rare in Banja.
  - Decurrens was the species that accounted for the largest number of bulk seedlings planted, at 577,633, but there was no statistically significant difference between control and treatment farmers on the number of Decurrens, so this went into the impact calculations for metric 2 as "0"
    - These numbers were driven largely by results from Banja, where Decurrens is a highly popular and easy-to-find tree. Many farmers gather seed and grow it themselves or buy from myriad small local nurseries. Decurrens is easy to grow and has a high success rate (even we saw losses of only 11%, far lower than for other species) which contribute to its ubiquity in Banja.
    - Thus, treatment farmers took their Decurrens from our nurseries and did not need any more, while control farmers needed Decurrens from another source and had no trouble finding it.
    - This might suggest there is no value-add to OAF supporting Decurrens production or it might indicate that the Decurrens grown from other nurseries were just taken by other farmers and the OAF nurseries still contributed to the total amount of Decurrens seedlings taken and planted in a kebele, so impact metric 1 might be more appropriate
  - In the T1 and T2 sites our treatment farmer lists included all those who received nursery input materials but some of those people ended up failing to plant their own nurseries. If we narrow the sample to those who actually used the materials they took to make nurseries then the number of trees over control is much higher
- Our surveys and our trial suggests that Ethiopian farmers have the desire and capacity to plant high numbers of trees, much larger than in many other OAF countries:
  - From the baseline survey the stated number of trees each farmer wanted on average was 1,271
  - We only allocated enough materials for farmers to have maximum 300 trees per person, but then after losses in the nursery we ended up with even less than that.
  - All seedlings grown and of good quality were taken by farmers and most were planted, so if we had supplied more there is a strong indication that they would have been planted and taken as well
  - The small difference between treatment and control numbers is partially because OAF seedlings represented a small portion of the total tree portfolio of farmers (only 39% of 2018 seedlings and 10% of all seedlings including those planted in past years). If we made an effort to get 500-1,000 seedlings distributed per farmer then our trees would represent and bigger part of the portfolio and we'd likely see larger treatment vs. control differences
- Based on the trial results, we concluded that T3 was the best of the 4 trial arms because:
  - This treatment had the highest total impact under both metrics, with many more farmers reached and trees produced than in the other treatments
  - Losses from planned seedlings (on which nursery materials distributions were based) to seedling production and distribution were lowest, at 72%
  - Total costs were highest for this treatment, but costs per farmer served and per seedling were lowest.
  - The T3 arm does not always look best on SROI and trees per farmer, but this is because:
    - More farmers were attracted to take the free T3 seedlings, so there were as a result fewer seedlings per person. If we used resources to plant more seedlings this could easily increase
    - T2 numbers were inflated because we supplied enough materials for 30 group members at 300 trees each, but in the end the average group size was around 8 people only

- We found that T3 was also easier to implement for several reasons:
    - There were far fewer touch points at the time of seedling growth, just 1 nursery to visit per kebele instead of 209 in T1 or 13 in T2. An officer could visit each nursery more often and stay to help longer.
    - We exerted more control over selection of T3 nursery, so they all had good access to water and other suitable characteristics and this made them more successful than the average T1 or T2 site
- We also concluded that the T3 trial arm met the Burden of Proof targets to be scaled up:
    - Impact per farmer was $78 even under the more conservative metric, compared to our goal of $50 per farmer and our minimum to scale up of $25 per farmer.
    - Cost per seedling planted was $0.18 versus a $0.20 maximum to scale up, and we have a clear path forward to reduce this further
    - SROI was 7.2 under the more liberal metric and 4.5 under the more conservative T vs C metric, while the minimum was 2.5 to trial again and 5.0 to scale up
    - Trees planted over control were 33.9 and this was statistically significant, compared to the Burden of proof goal of 30 more to scale up

Operational Learnings

- Some difficulties which we intend to correct in future years which should help us decrease cost per seedling and increase SROI include:
    - Some seed (especially grevillea and gesho) had very low germination, because we were in a hurry to begin the project and did not have time to do our own quality testing before purchasing from suppliers
    - Material were distributed too late (February) so nurseries were established too late (March-Feb), when the ideal planting time under the given agro-ecological conditions is November-December of the previous year or January at the latest.
        - This particularly affected us in the Communal lands nursery, which is in the colder, wetter Highlands agro-ecological zone and thus required more days for seedlings to reach maturity
    - We were very generous with the package for the nursery operators, including covering all tools and local materials costs, paying prices for all seedlings that had any growth, even those that were too small, and agreeing to prices per seedling only shortly before distribution, which caused us to accept higher-than-desired prices. With stricter contracts from the beginning, we believe we could have received the same production outcomes with much lower costs.
    - In T1 and T2 sites there were high losses because some farmers took inputs who were not very serious and either didn't plant any or all of their trees or didn't take care of them well
        - The main problem was lack of adequate watering, though poor weeding and late planting of seeds also made a difference
        - We spent 3 months on very close follow-up, visiting every nursery 2+ times and assisting farmers, and this helped somewhat but not fully and it was highly expensive
        - Dropping to T1 and T2 and focusing on just T3 will save us a lot of time and 1 field officer will be able to cover more kebeles
    - Sockets supplied were too large and of non-uniform size, not all were pre-cut, so operators (for T3) or OAF warehouse staff (for T1 and T2) had to spend a lot of time and money cutting them. We will get pre-cut sockets from the supplier next year to reduce these time and money costs
- Local government partners also preferred the T3 model and actually encouraged us to work towards privatizing it in the future, i.e. offering lower monetary support over time and having the nurseries sell seedling to farmers instead of having OAF but them through an outgrower model
    - We want to cautiously test this in 2019 with a subsidized farmer sales trial arm in some nurseries
- We plan to make things more efficient by eliminating the seedling ordering step:
    - A lot of staff time and effort was spent on gathering orders for seedlings in December to guide materials allocation and tree planting, but then at distribution time we decided together with the local DAs to just throw the order list out the window and serve farmers who showed up to take seedlings on distribution day.

- Serving farmers without reference to the list was faster and more feasible on distribution day and didn't lead to any major problems, so in future years we don't think it will be necessary to collect orders in advance and fulfill them. Instead we can use quick baseline surveys and/or DA and nursery operator input to plan the needed number of seedlings per species in each kebele

- We found that T3 not only had better cost and total impact results, but it was also easier to implement for several reasons:
  - There were far fewer touch points at the time of seedling growth, just 1 nursery to visit per kebele instead of many. An officer could visit each nursery more often and stay to help longer.
  - In order to reach as many T1 and T2 nurseries as possible we were forced to ask the DAs for help, which was expensive (in terms of training per diems expected) and did not yield much success because frequency of the DA visits turned out to be low. In the future would prefer not to rely on DAs but only to use our OAF staff for crucial follow-up measures, which is possible with the T3 model but not the T1 and T2 models
  - We also exerted more control over selection of these nursery sites, running a selection process that included site visits before signing the contract with the T3 nursery operator, which meant that those sites all had good access to water and other suitable characteristics. By contrast, a sizeable proportion of the T1 and T2 sites did not have good water resources or other important suitable features.
  - Because they were working toward selling the seedlings to OAF the nursery operators had a higher incentive to follow our rules and recommendations than the T1 and T2 farmers who were just growing the seedlings for their own purposes.
- Our tentative conclusions about tree species were
  - Gesho:
    - It is probably the most impactful of the species that we tested at $5.46 per tree if we assume that only 50% are harvested. This is a very conservative assumption, since the farmer market survey showed that 90%+ is harvested each year, it's just not all sold on the market but instead much is used at home
    - It was by far the most popular tree across all 3 woredas. Many farmers claimed that they came to our distribution day just to take Gesho and while they were present took some other species and got out training.
    - It also had the highest rate of planting, at 90% in the T3 sites versus around 70-75% or the other species.
    - The problem with Gesho is that it is as hops (i.e. an agent for bittering flavor and to kill bacteria) in local alcohol, and OAF might want our impact to be generated based on alcohol production. However, most Gesho is used in a type of local drink called Tella that is only 1-3% alcohol by volume on average
    - Another issue with Gesho is that the seed has a short shelf-life and is very highly demanded, so getting access to large quantities of good quality seed is very difficult
    - We still want to trial Gesho further in future seasons but might not be able to ever scale it up very far, need to find other impactful species to drive our impact numbers
  - Decurrens
    - It was highly popular in Banja but not in other sites
    - Its main benefit is that it is easy to grow in the nursery, with seed that is cheap and has high germination consistently.
    - It has quite low impact at only $0.84 per tree
    - We want to reduce emphasis on this species in the future in favor of more impactful species, though we might not want to cut it completely because it is so fast and easy to grow and can be harvested after just 4 years.
  - Grevillea:
    - It is quite impactful at $4.55 per tree, even taking into account that it will only be harvested after 8-10 years (at standard Global Impact model discount rate of 7.5%)
    - Farmers have moderate interest in planting it, especially in Jabi Tehnan

        - The main problem is that the seed is very expensive and germination and purity is low.
        - Generally if OAF can find good quality seed and supply it to farmers then this represents a great value add because farmers cannot get it on their own
        - We plan to put more effort into promoting Grevillea in the future, though because it provides benefits only after 8+ years we always want to supplement it with other trees in the portfolio that provide benefits sooner
    - Tree Lucerne
        - If farmers could be convinced to harvest the forage from this tree and use or sell this tree then it could be highly impactful, but currently very few people harvest the forage.
        - With an estimate that only 5% of trees are harvested each year impact is only $1.06 per tree
        - The tree was not popular among farmers and had the lowest planting rates
        - We saw substantial problems in the nursery with these seedlings, with many reaching maturity quickly and then dying back before distribution. We might improve this in the future with better timing of planting, but it would take more planning and coordination time
        - It might be worth revisiting this tree in the future, but we plan to drop it for now because we can save time in convincing farmers to take an unpopular tree, a much harder goal, and spend that time on producing more of the species that they already want
    - Wanza
        - This is also a timber species, one that is considered high quality for use in furniture, wooden flooring and other value-added products
        - Unlike Grevillea and Eucalyptus, Wanza is an indigenous timber tree, which fits into the government's goals of promoting more species that are indigenous. The only other indigenous tree on our list is Gesho.
        - We did not include this species in the 2018 trial, but we want to add it for 2019
        - When we do a preliminary impact model it seems to potentially have the highest impact of all the species at $10.61 per tree, though this benefit is only realized after 14 years
        - In our baseline survey this species was just as popular/demanded as Grevillea and its demand is highest in Gonji where currently the only other popular species that we are offering is Gesho and we want to offer farmers a more diverse package of trees they can be convinced to plant

	Summary by species		
Species	**Impact (NPV) per tree**	**Variety was offered in 2018**	**Variety will be offered in 2019**
Wanza	$10.61	No	Yes
Gesho	$5.46	Yes	Yes
Grevillea	$4.55	Yes	Yes
Tree lucerne	$1.06	Yes	No
Decurrens	$0.84	Yes	Yes
Eucalyptus	$1.16	No	No

APPENDIX

Data collected throughout the season that we used for the impact analysis included:

- Baseline survey of kebele characteristics
    - Data was collected by HQ staff from Development Agents across 81 kebeles in the 3 woredas

    - Data was used to check the sample balance of the treatments vs. control kebeles after random treatment assignment at the beginning of the trial
    - Some key variables were also included as covariates in regression analysis of final tree planting results
- Baseline survey of farmers:
    - Data was collected from farmers by OAF enumerators across 81 kebeles in the 3 woredas
    - The sample size was 4,018 farmers
    - Data was used to help with selection of targeted species and the number of trees to offer per farmer, as well as to help check on sample balance between treatment vs. control kebeles
- Market survey of farmers:
    - Data was collected by the M&E enumerators in June 2018
    - The enumerators spoke to key informants (DAs, vendors, etc.) to get a list of farmers who had a history of producing a selling each target tree species and then visited those farmers
    - Enumerators asked farmers their self-reported estimates of % trees sold and value they could earn at each age, plus some information about production costs, and then also to physically visit their most mature tree stand of that species to measure height and circumference and spacing so that we could use those metrics to compare with products of the same size sold by vendors
    - The total sample size was:
        - Eucalyptus: 153 farmers (spread evenly across the 3 woredas)
        - Gesho: 156 farmers (spread evenly across the 3 woredas)
        - Decurrens: 97 farmers (all in Banja, because this tree is not common in the other woredas)
        - Grevillea: 60 farmers (with half in Jabi Tehana, and half in a nearby non-treatment woreda, South Achifer)
        - Tree Lucerne and grevillea: 0 (we were unable to find farmers with high numbers of these trees and experience with sales, at least in the first round of this survey)
    - Data from this survey was used to:
        - Calculate the opportunity cost of land in the impact model, using the % of each land type farmers said that would use for their tree planting
        - Calculate the costs of tree establishment and maintenance for the impact model (materials and labor)
        - Determine the year of timber sales to put into the impact model, based on the most common year farmers claimed to sell
        - Calculate a market price for timber sales (for most trees) and annual leaf sales (for Gesho) based on farmer-reported value per year, which was also later triangulated and adjusted with vendor data
- Market survey of vendors:
    - The M&E team attempted to identify vendors in key market centers who sold products of the target species, and both enumerators and supervisors helped to visit and survey those vendors
    - The survey included measurement of the size of any wood products sold (circumference and height) and asking the vendor for both their purchase and sales prices of each product. We later tried to match up age of tree from the farmer survey with vendor price by using the timber size
    - The survey also included questions about how the vendors purchased the tree products, i.e. if in bulk then what price did they pay per qadda of trees or kg of gesho, did they or the farmer cover harvest and transport costs, etc.
    - Unfortunately we had a lot of difficulty finding many vendors in our targeted areas; in future seasons we might need to identify other woredas in Amhara with a higher number of each species so that we can do more surveys in those areas
    - Sample size was:
        - Eucalyptus: 16 surveys by M&E
        - Gesho: 17 surveys by M&E
        - Decurrens: 8 surveys by M&E

        - Grevillea: 13 surveys by M&E (note- this was from a supplementary survey, done 1 month after the first survey which got only a sample size of 2; it included vendors in other woredas like Mecha and North and South Achifer)
        - Tree Lucerne: 0 surveys by M&E, 2 surveys earlier by the Program team
    - Data from this survey was used to:
        - Triangulate and adjust the timber sales price calculated from the farmer survey
        - Triangulate and adjust the ETB/kg price for Gesho calculated from the farmer survey
        - Determine the timber sales year and rough price for Grevillea
        - Determine the number of bundles of forage that could be produced from a Tree Lucerne tree per year and the years of production
            - Note that for the price per bundle we did not trust the data from the 2 vendors because it was very inconsistent. Instead, we added questions to the M&E planting survey mid-way through to ask all farmers whether they had ever purchased or sold forages and if so what the price was. The sample size for these data was 647.
- Nursery establishment survey:
    - This survey was conducted by the Program team from February through April 2018
    - We visited farmers from different groups to create a stratified sample:
        - Random farmers from the list of farmers who took OAF nursery inputs
        - Random farmer from the rest of the population in the treatment sites who did not take inputs
        - Random farmers from Control sites
    - The sample size was 3,036 total farmers
    - Key data taken from this survey included:
        - % of farmers who took OAF inputs in T1 and T2 who actually established nurseries
        - % of farmers in all three stratified groups who made nurseries on their own or with OAF inputs, and numbers of trees in those nurseries
        - Information on training received and practices followed in nursery establishment
- Nursery follow-up and counting survey:
    - In May-June 2018 the Program team visited OAF T1, T2 and T3 nurseries to check final seedling production numbers at the end of the season, as well as to gather more information on practices implemented, problems encountered, and seedling quality
    - The sample size was 1,374
        - We reached 1,199 of the T1 nurseries, or 53%
        - We reached 146 of the T2 nurseries, or 98%
        - We reached 12 of the T3 nurseries, or 100%
    - We used the total numbers of each seedlings type counted in these surveys, divided by the % visited, to estimate the total number of seedlings grown in T1 and T2. These seedlings numbers were used in the calculations for the Standard Impact metric (later deflated by % planted and % survived)
    - For T3 seedlings we originally used seedling counts from this survey to help with the T3 distribution planning, but then during distribution we counted the actual numbers taken by farmers and this is what was used for the Standard Impact metric calculations (also later deflated by % planted and % survived)
- Smallholder land tree planting survey:
    - 30 M&E enumerators surveyed all 48 of the treatment and control sites, reaching on average 50 farmers per site
    - The total sample size was 2,613
    - Farmers for the survey were selected randomly from lists gathered via the following methods:
        - For T1: Of individual farmers who took the tree kits from OAF when distributed in February
        - For T2: From members of the groups who had taken the tree kits from OAF when distributed in February; but note that we asked all group leaders in June to tell us which members of the group actually participated in making the nursery and those were the names included on the list
        - For T3: Of farmers who took seedlings on the distribution days organized in July

        - For Control: Of farmers who signed up as interested in getting trees from OAF in the future, after M&E enumerators and DAs organized meetings to explain that we might offer free seedlings in the future and explained the 4 species. This was done in June 2018 but in a manner similar to how we did it for treatment sites in December 2017.
    - Key data from this survey included:
        - Physical tree counts for all seedlings planted in 2018, by species
        - Self-reported numbers on total OAF seedlings received and what was done with each (planted, sold, thrown away, died, etc.)
        - Questions on knowledge of recommended practices, plus self-reported and observed application of those practices
        - Questions on land-holdings, demographics, assets, education, past trees, etc. to be used as covariates in our regression analysis
- Communal land tree planting survey:
    - 2 M&E enumerators conducted these surveys in August 2018 after planting
    - The unit of randomization was "communal land section" and the main respondent on questions was the lead farmer in charge of the communal land group
    - The sample size of this M&E survey was 34
        - This included 19 from Treatment and 15 from Control
        - This covered a bit over 50% of the total communal land sites in the target area
    - The Program team had collected data in advance which was merged with the final M&E data before analysis:
        - The number of households sharing each communal land section and the name of the lead farmer
        - A mapping survey of each of the 60 communal land sections (treatment and control) which included measuring the total area of the section with GPS as well as estimating the % of the section which was suitable for tree planting.
        - A count from distribution of the number trees of each species given to the group for each communal land section
- Survival survey from 2017 project
    - In July 2017 OAF Ethiopia ran a small pilot project on trees in which 40,900 grevillea seedlings (purchased from an outside supplier) were given for free to 409 farmers in two kebeles in South Achifer
    - Two Program officers conducted planting surveys in the month after distribution and reported that 99% of those seedlings had been planted
    - In August 2018 an OAF staffer returned to those kebeles and surveyed 202 farmers to ask about their survival rates of those Grevillea trees, and also did physical visits of 44 fields to count surviving trees
    - The survival rate found at this time (so 1 year after planting) was 47%.
    - Because these trees were planted with weaker trainings and no follow-up visits to help farmers with planting we think it should be possible to increase this survival rate in our 2018+ tree project areas. However, we will still use a conservative 50% survival rate for the impact models based on this finding.