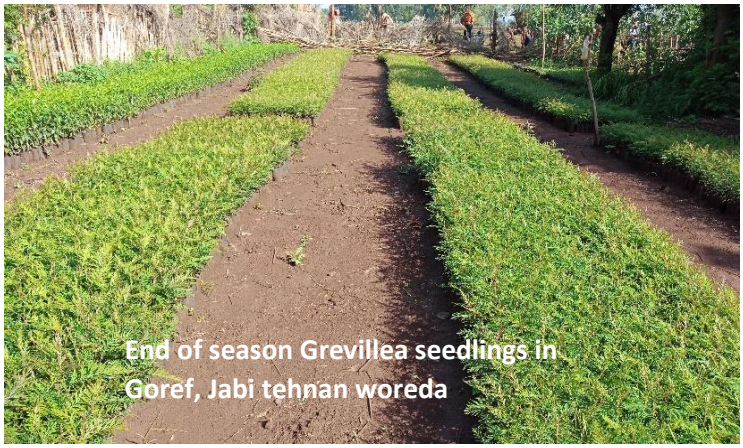
Ethiopia 2019 Tree Project Report

Farmers First

Background & Objectives

One Acre Fund Ethiopia operated its "core" tree program for the second year, in the season running from September 2018 to August 2019. This season we scaled up the "Treatment 3" (T3) decentralized nursery model from the 2018 season to cover 64 total kebeles in 4 woredas, because that model had been found to lead to the highest adoption, total tree numbers, total impact, and SROI. We had several goals of the 2019 program, with further details available in the 2019 Burden of Proof document:

Mid-season nursery at Lideta, Banja woreda



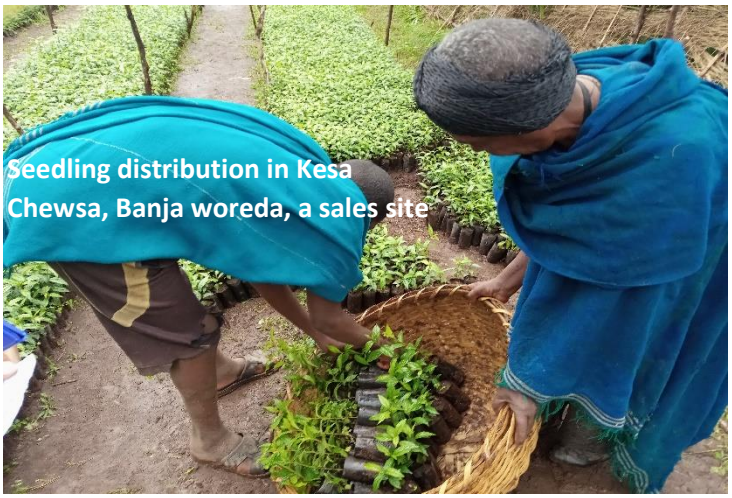
End of season Grevillea seedlings in Goref, Jabi tehnan woreda

- Deliver 3.5 million+ seedlings to 25,000+ farmers
- Generate impact of $2.75 million+ with an SROI of 3+
- Significantly improve nursery success rates when compared to the 2018 season, which were around 30% in the T3 nurseries that season
- Reduce costs, ideally to $20/farmer served (taking all costs into account including 80% of country overhead costs) and $0.05/seedling planted by farmers (using just program-related costs, not overheads)
- Test subsidized sales of tree seedlings to farmers (instead of free giveaways) for the first time, to measure the effect of a sales program on % seedlings delivered, adoption levels, costs (per farmer and tree seedling), impact and overall SROI, to determine if we can shift the tree program in a market-based direction in future years. The goal SROI was 3 but the minimum to scale up a trial arm was 2.5.
- Strengthen our systems for procurement, logistics, field management and team development to set the program up for successful scaling up in future years

The trial which we focused on as a component of this year's program was the "tree sales" trial, and we focused on this for several reasons. First, buy-back costs for the seedlings were by far the single largest budget item in 2018, and so if we could reduce those costs by having farmers cover some of the seedling price then this would greatly improve our site economics and SROI. Second, the Amhara regional government is very interested in seeing us move to a tree sales model, as they worry that indefinite free tree giveaways distorts the market and crowds out private multipliers, which they are trying to promote. There are already fairly developed markets for some tree seedling species, including eucalyptus and gesho in most of the region, and decurrens in some woredas. The government suggested it would be realistic to sell seedlings since farmers are already used to buying these species, and it would help to further stimulate markets in the future. Finallly, we hypothesis that farmers may put more effort into doing proper planting and management of seedling that they have to buy, which will lead to higher planting and survival rates and ultimately higher SROI. With our trial design this year we sought to test these questions.

Program & Trial Design

Tree Nursery Operator (TNO) Model


Seedling distribution in Kesa Chewsa, Banja woreda, a sales site

In every kebele we conducted a selection and picked 1 TNO, which could be a private household or a group (often a youth group) which signed on to the terms of a set Memorandum of Understanding (MoU) with One Acre Fund. The general terms of this MoU included:

- OAF responsibilities
    - Provide sockets and seed to grow agreed upon number of seedlings per species
    - For new TNOs, provide tools (soil sieve, watering cans, hoes, shovels, rakes) and 0.10 ETB per seedling in cash to cover TNO costs for local materials and/or labor, with those payments divided into 50% at MoU signing and 50% after the seedlings were planted
    - Provide trainings and weekly visits for support throughout the nursery growing season
    - Work with government Development Agents to mobilize farmers to come take seedlings, lead the distribution day events and take official seedling counts
    - Pay back the TNO for all seedlings which met quality standards (10 cm+, 4 healthy leaves) and were distributed to farmers, according to a chart of prices, set by woreda
        - General these prices came from reported market prices minus 20% for the value of OAF-provided materials).
        - If it was a Sales sites, the buy-back price was split between OAF and the farmer, with the farmer's share roughly 50% of the market price, though this varied by woreda and species depending on reported demand
        - Prices were set during a meeting with woreda experts at the beginning of the season
- TNO responsibilities
    - Use OAF inputs to plant the agreed-upon number of seedlings per species on the planned timeframe
    - Take on the risks of seedling production, as OAF would not compensate them for any seedlings which failed to grow or reach minimum quality standards, even in the case of natural disaster
    - Work cooperatively with OAF to receive trainings, implement recommendations, follow advice
    - Cover most local costs of materials including soil, compost, sand (for potting mix), bamboo, wood and grasses (for shade) and any labor costs incurred (often for socket filling)
    - Assist with seedling distributions at the end of the period, including being present for all events and providing workers to help load seedlings into farmer baskets

Free versus Sales Trial

- We ran two different treatment arms this season, and compared them both to "control" sites.
    - The full body of sites from which we pulled Free, Sales and Control sites (80) first had to have been designated by the woredas as suitable for the tree program, and baseline data on factors like HH size, distance from the woreda capital, number of seedling grown in the previous year, and strength of the local Development Agents were collected

    - We then assigned 16 sites to be Control, 16 to be Sales, and 48 to be Free sites, with mostly equal representation of each across the 4 woredas, and we checked to ensure that average baseline variables were statistically equal on average between the 3 groups
- Control sites received no intervention, but the OAF M&E team conducted tree planting surveys in those sites at the end of the season
- Free sites received an intervention very similar to what was done in the 2017-2018 year:
    - We calculated trees to plant in nurseries assuming roughly 60% HHs would take free trees in these sites
    - We set targets of seedlings to plant in nursery per adoption HH. These numbers assumed nursery losses of 30%, meaning we needed to plant extra buffers, and otherwise were based on expected local demand by species and some priorities based on impact and priority species:
        - Decurrens: 160 in Banja, 16 in other woredas
        - Wanza: 38, except for the 13 sites in Banja where AEZ doesn't work and no Wanza was grown
        - Grevillea: 60-95 depending on the woreda, lowest in Banja and highest in Jabi Tehnan
        - Gesho: 30-37 split by woreda
    - This led to nurseries of 95,000 seedlings on average
    - Farmer were mobilized in the 1-2 weeks leading up to the distribution event, and they were asked to come out on one particular day for their specific sub-kebele
    - Prior to the distribution day the OAF FO worked together with local DAs, the TNO and kebele administrators to count the total quality seedlings, estimate interested farmers by species, and divide to set maximum numbers per HH that could be taken
    - Kebele administrators and DAs were asked to be present at the distribution days and were tasked with helping to identify any farmers from the wrong kebele, or people who had already taken trees before, and turn them away
    - On the day of distribution farmers were supposed to bring a basket, receive a planting training, and then pick up their free seedlings up to the designated maximum
    - Several weeks after the conclusions of distribution, when all Distribution sheets were data entered and checked, OAF would then pay the buy-back price agreed in advance times all distributed quality seedlings to the TNO
- Sales sites intervention differences included:
    - Nurseries were smaller because we assumed lower adoption from the beginning, coming in around 53,000 seedlings on average
    - To get the seedling numbers per nursery, we assumed the same trees per adopter as for Sales sites, but 30% of HHs adopting only, so half of the rate of Free sites
    - TNOs were informed in their MoU of three different seedling prices:
        - Set fixed farmer price for each seedling type
        - The price OAF would pay in addition to that, for every seedling successfully sold to farmers
        - A back-up price, which OAF would still pay to the TNO for any seedling meeting the quality standards if they failed to sell those seedlings to farmers by a set deadline
            - We were pressured to include this back-up price because of woreda official, DA and field team fears that they would not find TNOs to join the program without this guarantee. Many of them were worried that sales would be very low for all species other than Gesho and didn't want to take the risk
            - This price was set at a level lower than the total farmer + original OAF buy-back price (meaning there was still an incentive to do sales the normal way) but higher than the OAF buy-back price alone

        - The plan was that any seedlings purchased in this way through "Plan B" would be given by OAF for free to communal land areas near the end of the planting season, in August, with DA support
    - We tried to mobilize farmers, teaching them about the benefits of our tree species, informing them of purchase prices, and convincing them to buy, about 1 month before seedling distributions. The strategies can be found in the Marketing Plan document
    - OAF FOs worked with TNOs, DAs and kebele admins to count final tree seedling numbers and compare to farmers who were expected to want seedlings to set any rules that they wanted, like maximum or minimum seedling numbers by type. In many cases the TNOs chose to only allow farmers to buy Gesho if they bought some of another type of seedling as well.
    - In all woredas we also set "unit size" rules, to round up the price of seedlings to the nearest ETB instead of a partial ETB. So, for example, in Gonji the farmer price of a Grevillea was 0.3 ETB so the unit size set was 10 for 3 ETB. Farmers had to order in units of 10 only (10, 20, 30, etc.)
    - On the distribution date farmers, after receiving their planting training, would go to a cashier counter, tell their desired order, make readjustments with the cashier based on the "rules", the cashier would calculate the money they owed, the farmer would pay immediately and receive any needed change and a receipt showing their order and payment. They would carry that with them to the nursery to get their seedlings. A second copy of the nursery was kept in a bag by the cashier. Generally the "cashier" included one TNO representative, since they were receiving the money, and 1 OAF staffer or DA to assist and double check calculations.
    - The idea was that several weeks after distribution, when all final Distribution sheets were data entered, OAF would then pay its share of the seedling buy-back price to TNOs for all distributed seedlings, paid to their bank accounts
    - Like with Free sites, we aimed to have the Sales distributions all take place as a big event across 2-3 days, though we told farmers they could come any day they wanted in that period instead of dividing by sub-kebele
    - After the first sales day events, however, only an average of 10% of seedlings had been sold, so we had to readjust our marketing and distribution plan. We allowed farmers to come and take seedlings for roughly 8 full weeks, for all of June and July.
    - Other mid-distribution sales strategy adjustments included pushing TNOs to drop their tied sales rules for seedlings, doing additional mobilization of farmers especially 1:1, doing a "Persuasion skills" training for our FMs and FOs to improve their skills in convincing reluctant farmers to buy trees, and generally leaving the nurseries open every day.
    - Plan B distributions of unsold seedlings in sales sites for free to communal lands did end up happening in several sites, roughly during the last week of July and the first week of August

Locations & Staffing

- We worked in the following woredas in 2019:
    - Jabi Tehnan
        - 16 sites, 7 which had been in program the previous year
        - 75% in Wet Weyna Dega AEZ, 25% in Moist Weyna Dega, so warmer and drier
    - Gonji
        - 15 sites, 9 of which had been in the program the previous year
        - All sites in Wet Weyna Dega AEZ
    - Banja
        - 16 sites, 8 of which had been in the program the previous year

        - 3 sites (19%) in Wet Weyna Dega AEZ and the other 13 (81%) in Wet Dega, so higher altitude and colder
    - Hulet Eju Enesie
        - 16 sites, all completely new as this woreda was not in the 2018 program
        - 13 sites (81%) in Wet Weyna Dega AEZ only, 3 sites (19%) including some Wet Kolla, meaning lower altitude and hotter
- In every one of the 4 woredas we selected 16 kebeles for the intervention, 4 of which were Sales sites and 12 of which were Free sites
- We also tried to keep Sales and Free sites geographically separated, with at least one Control sites a buffer between them, to prevent a situation in which farmers from a bordering Sales site would walk over to the Free site to take trees
- We had a staff of 16 Field Officers, 4 per woreda, each in charge of TNO follow-up and other activities in 4 kebeles
- Generally, we tried to divide it so that every FO had 3 Free site sand 1 Sales site under their supervision
    - One exception was in Gonji, where because the woreda is small it was not possible to do this and also maintain a physical buffer site between Free and Sales locations. In Gonji we instead gave all 4 Sales sites to a single FO (Yinebeb) and the other 3 FOs had only Sales sites. This served also as a kind of side trial, as we saw whether having only Sales sites made Yinebeb's work much harder or not
    - Another exception was an FO named Shegaye in Gonji, who was assigned 4 sites originally (all Free) but had trouble with one of her TNOs during planting and they dropped out, so she only had 3 sites for most of the year and through distribution of seedlings

Impact & Trial Results

As shown in the table below, a total of around 4.93 seedlings met the minimum quality criteria and were distributed to farmers through the program this season, which means we exceeded our goal of distributing 3.5 million seedlings. The successful distributed trees were around 90% of those originally planted in the nurseries, so losses in the nursery were 10%, which was much lower than the previous year's losses of 30%, so we achieved the goal of reducing nursery losses significantly.

Farmer organizing his received seedlings, Kuni, Jabi tehnan woreda

We served 33,741 total households across the 63 sites, meaning that we exceeded our goal of serving 25,000 households. We served 78% average households in free sites and 28% in sales sites. The difference in adoption was in line with the hypothesis, and our estimate of 30% adoption in sales sites was pretty accurate, but our estimate of 60% adoption in free sites was much lower than reality, so the adoption gap between the two treatments was greater than expected. Trees per adopter was slightly higher in sales sites, at 185 per HH, compared with free sites at 138 per HH; this was a bit of a surprise, as we expected trees per adopter to be roughly the same for both free and sales sites, but it is likely related to the relative shortage of trees in free sites for the large number of households who came; if we had grown more than trees per adopter would have likely been equally high as in sales sites.

Unfortunately, the actual trees planted was only roughly 66% of those planted, with an estimated 3.23 million trees actually being planted. These data come from an M&E team survey done in October-November 2019, and specifically from the self-reported OAF trees that farmers said they actually planted, divided by the total that we have them on record as

taking in the Distribution Sheet database (with any coming it at over 100% reduced back to 100%). We had to rely on self-reported data for this because the physical tree counts were done on total trees and did not specify a difference between trees from OAF and trees from other sources. Also note that generally these planting percentages were lower than those we found in the first M&E planting survey done in July-August, and those done at the same time of the year in 2018. This was surprising, as we expected planting rates to go up with the later survey, but it is possible that farmers were more honest in the later survey (in the first one maybe they were going with intention to plant and new it could not be physically verified so they exaggerated) and/or perhaps they were already taking into account any early tree deaths and only stating the trees that they had planted which were still alive.

We did succeed in reducing costs per HH and per seedling compared with 2018, but not as much as we had hoped. The cost per adopter was $24 (close to the $20 goal) for Free and $48 (far off the goal) for sales sites, showing that the much lower adoption in Sales sites had a larger negative effect on this parameter than the cost savings from lower buy-back costs. Similarly, we achieved $0.12 per seedling department costs in Free sites (close to the $0.10 goal to scale but not the $0.05 ideal goal), and Sales sites were even higher at $0.16 per seedling. Buy-back costs were lower in Sales sites so this should have helped keep those costs relatively low, but sales sites had far fewer total trees, because of low adoption expectations, and so the fixed costs were divided across a smaller number. This suggests that the best model for the future to achieve our cost goals needs to look different than both the Sales and Free models used this year.

Aggregate Results

Parameter/Result	Free Sites	Sales Sites	TOTAL
Total HHs took trees*	30,055	4,305	33,741
% HHs served on average	78%	28%	65%
# Total Seedlings distributed	4,136,072	797,042	4,933,114
Average trees per HH	138	185	146
OAF Tree department costs only	$488,754	$126,889	$615,643
Total costs to OAF, with 80% country overhead	$718,532	$205,111	$923,643
Cost per HH adopter, including overhead	$24	$48	$27
Cost per seedling distributed, just department costs	$0.12	$0.16	$0.13
# sockets had been planted in the nurseries	4,589,140	863,235	5,452,375
% Seedling distributed out of trees planted in nurseries	90%	92%	90%
% Seedlings actually bought through Plan A (Sales only)	n/a	77%	n/a
% HHs took Gesho	75%	19%	61%
Gesho per adopter HH	24	60	26
% HHs took Grevillea	75%	21%	61%
Grevillea per adopter HH	46	77	48
% HHs took Decurrens	63%	12%	50%
Decurrens per adopter HH	68	73	68
% HHs took Wanza	53%	9%	42%
Wanza per adopter HH	17	31	18
% Gesho planting rate	83%	76%	80%
% Grevillea planting rate	57%	59%	58%
% Decurrens planting rate	50%	46%	49%
% Wanza planting rate	41%	51%	45%
Estimated total trees planted by farmers	2,688,447	541,989	3,230,436

*For this number we deleted all duplicate names found in the Distribution Database (HHs who took trees more than once) though the full database was used for tree number totals. This also does not include those served by plan B, since it was difficult to get an accurate count and there was likely a lot of overlap in those served through Plan A and B so we risked double counting

Impact and SROI Estimates

Data in the first chart below comes from analysis of the M&E planting, survival and marketing surveys conducted this year (talk to Vasundhra Thakur and Ajaw Abere for more details). They show that per surivived tree Wanza is by far the most impactful, followed by Gesho, and that Decurrens is by far the last impactful. It also shows that Wanza is expected to have the lowest survival rate (though this just a guess, not measured yet since OAF did not distribute wanza in 2018) and that Decurrens had a slightly lower survival rate than Gesho and Grevillea which came in around 60% in the 1 year survival survey.


Grevillea supplied by OAF in 2018, 9 months after planting

The data also show that when compared to control sites, free sites did not lead to significantly higher gesho planted, but Sales sites did, at 25-26 over control. For Grevillea in all sites the treatment led to significantly higher planting than control, but the difference was much larger for Sales (51) versus control (24-27). Wanza was also always significantly higher for treatment versus control, though with a much smaller margin. Sales and Free sites had similar results at 2-3 over control. Finally, for Decurrens the results varied widely if Banja woreda was included or not, since there is such high numbers of Decurrens trees planted in Banja even in control areas. There was no significant difference in treatment vs. control planting for Banja alone or for the whole sample when Banja was included, whereas when you look at the 3 other woredas without Banja in Free sites 2.5 more trees were planted over control and in Sales sites it was 11.6.

Species Results for Impact Calculations

Parameter	Source	Gesho	Grevillea	Decurrens	Wanza
NPV impact for tree surviving to maturity	Global Agroforestry Impact model, filled by M&E using updated 2019 market survey results	$6.35	$3.05	$0.69	$11.06
Survival rate from planting to maturity	M&E survival survey for 2018 trees, measured in 2019. *Wanza not measured, is a guess	60%	60%	55%	40%
Treatment vs. Control planting difference, Free sites all woreda	M&E Planting survey “re-do” in Oct-Nov 2019	-0.8 NS	24.4 ***	-245.9 NS	2.0 **
Treatment vs. Control planting difference, Sales sites all woreda	M&E Planting survey “re-do” in Oct-Nov 2019	25.1 **	51.0 ***	-233.4 NS	2.3 **
Treatment vs. Control planting difference, Free sites without Banja	M&E Planting survey “re-do” in Oct-Nov 2019	-2.9 NS	27.7 ***	2.5 **	2.1 ***
Treatment vs. Control planting difference, Sales sites without Banja	M&E Planting survey “re-do” in Oct-Nov 2019	26.0 *	51.3 ***	11.6 **	3.1 ***

Using the results shown above, both from the Aggregate Results table and the Species Results table, final impact and SROI calculations were made as shown in the chart below. As we did in the 2018 report, we show two different versions: a) the "standard" method, if we take credit for the impact of all trees planted, assuming that there is no competition with other sources and every additional tree distributed creates additional impact and b) the Treatment vs. Control method, which is more conservative and only allows us to take credit for tree that we plant over control trees. In all cases the OAF costs are the same (total Extension department costs for the season + 80% overhead costs for the full country) and tree survival and impact rates are the same, a weighted average of that for the 4 different species.

Results show that with the more liberal measure we generated $6.3 million in total impact and an SROI of 6.9, while with the more conservative measure we generated $2.2 million in impact and an SROI of 2.4. If you use the first method it looks like SROI is actually higher for Free sites than sales sites, though the opposite is true if you use the Treatment vs. Control method. This is because in the Treatment vs. Control method there was an insignificant difference for Gesho planted over control, so the Gesho numbers do not count toward the final impact at all, while in Sales sites the Gesho difference was significant and it counted. By contrast, if you just use the "standard" method then all trees planted count toward the total and more total trees were planted in Free sites given the costs incurred. The Burden of Proof goal SROI was 3.0 and minimum to scale up was 2.5, so this suggests the Sales trial passes the standard and the Free trial does not, though both were very close to the edge.

Final Impact & SROI Calculations

Calculation method	Parameter	Free sites	Sales sites	TOTAL
Standard method, counting all total trees toward impact	Trees planted, total	2,688,447	541,989	3,230,435
	Trees will survive, total	1,513,846	305,190	1,819,037
	Total impact	$5,273,809	$1,063,195	$6,337,004
	Impact per HH served	$175	$247	$188
	SROI	7.3	5.2	6.9
T vs. C method, counting only trees significantly higher for treatment over control	Trees planted, over control	788,944	334,197	1,123,141
	Trees will survive, over control	444,249	188,184	632,433
	Total impact, over control	$1,547,637	$655,580	$2,203,217
	Impact per HH served, over control	$51	$152	$65
	SROI	2.2	3.2	2.4

Qualitative & Operational Learnings

We learned a number of things through study of the results above as well as an additional TNO survey conducted to measure profits and satisfaction, and many qualitative stakeholder debriefs with the team, TNOs, and government stakeholders. The main learnings and recommendations for the future include the following.

- In future we need to try a "hybrid" model with some species sold and others free
    - Neither the Sales nor the Free model had great outcomes versus Burden of Proof goals

OAF FM + FOs doing transplanting training

    - The major weakness of the Free model is the high costs due to expensive seedling buy-backs, while the major weakness of the Sales model is the low adoption
    - In surveys of TNOs, 90%+ were willing to sell gesho to farmers without an OAF buy-back guarantee, and as the most expensive seedling this could be a huge cost savings for OAF if we moved in that direction
    - After many discussions we decided to sell gesho without any buy-back support, sell Grevillea with a subsidizes price, and give Decurrens and wanza for free, all in the same site
    - The hypothesis is that by combining these elements we can get adoption of 60% on average while also dropping costs per farmer significantly because of the buy-back cost savings
    - See appendix documents, especially the 2020 Hybrid Model for more details
- We can afford to reduce buy-back costs and this will be the major way to decrease costs per seedling
    - We found that overall TNOs earned profits of 80,000 ETB in free sites and 54,000 ETB in sales sites compared with 2,000 ETB for control nurseries. This suggests that we can afford to reduce TNO profits while still giving higher benefits than the status quo
    - Buy-back costs constituted the largest part of the profit model. Gesho was a large part of this and will be reduced by the decision to have TNOs sell directly to farmers. But even for the other 3 species we decided to cut back on buy-back costs
    - We checked the estimated TNO production costs per seedling, which came in at 0.17 ETB in the TNO profit survey, and just made sure that every species would earn some margin over that. This led to decisions to have buy-back costs around 0.3-0.4 ETB, which we got stakeholders and TNOs to accept after some discussion
- We need to adjust our marketing strategy to increase tree sales without undue time burdens
    - In 2019 we spent up to 2 months selling the seedlings in sales sites and still only managed to sell 77% of them via plan A, giving the rest away through Plan B
    - For the future we anticipate again needing to keep the sales window open for more than just a few days, like for the free distributions, but we plan to reduce the window of time to 2-3 weeks to save time for the TNO and the field team, allowing them to focus on other things (like supporting on quality planting of trees)
    - We noticed that several major problems led to the difficulties with sales in 2019:
        - Getting prices wrong: in a few cases, particularly the Banja sites with the worst sales results, the set Gesho price in the MoU ended up being higher than the market price. This was also true for Decurrens across much of Banja. But we could not change our price mid-way through the sales period without causing major anger among farmers who bought early on.
        - Shortage of human resource focus: Our FOs covered 4 total sites, so around 3,300 households to whom they could market. It was unrealistic that the FO alone could reach all these people for good marketing, so we relied on DAs to help them. But the DAs didn't take the task very seriously, in fact most of them canceled the first scheduled mobilization events we had planned with them, and as we lengthened the window of time the FOs had to get more engaged in doing the marketing themselves. Yinebeb, who had a fairly high rate of success on sales adoption, also did a higher rate of direct marketing himself early on. We hired FAs (1-3 per site) to help reduce the FO work burden but only for 1 month during and after distribution, and they were not planned or trained to also help with marketing.
        - Lack of persuasive mentality: DAs and our field staff tended to just announce the tree prices and sales dates when doing mobilization, they did not proactively try to

understand farmer interests and reasons for hesitations to buy trees and then try to address those interests and concerns to convince the farmer to buy the trees.
        - Rules that disincentived purchases: We allowed and even encouraged the TNOs early on to set distribution rules for the trees including tying sales of gesho to purchase of another species, but later we had to push them to relax these rules so that at least gesho would be purchased.
        - Adverse incentives because of Plan B: TNOs and DAs knew from the beginning of the season, from the MoU agreement, that OAF would pay for any unsold seedlings, at a fairly good price for the TNO, and OAF planned to distribute those seedlings for free in communal land areas in the same kebele. It seems that this might have led some DAs not to push sales very hard, or possibly even to discourage sales, since one of their performance targets is getting seedlings planted on their communal land areas. They might have preferred these seedlings to those sold to farmers for their private lands. When we notices this potential adverse incentives we tried mid-season to change the rule, saying that unsold seedling would be brought to a different kebele for free distribution, but the messages didn't get out perfectly and they were not strictly enforced.
    - Changes for 2020+ on marketing to overcome these problems:
        - We tried to eliminate problems with getting prices wrong by giving TNOs the option to select their Gesho and Grevillea prices themselves based on local market conditions
        - We decided to hire 1 FA per kebele for 4 full months instead of just 1, starting in May, so that they can focus from early May until distribution time on doing intensive tree marketing
        - We decided to offer marketing training that focuses more on persuasion techniques, and to offer this not only to FOs but also to the FAs who will help with marketing
        - We plan to push TNOs not to set any rules tying sales of Gesho and Grevillea to one another or to taking the free tree species; since the less popular Decurrens and Wanza are free this should also reduce the desire by TNOs to tie them to Gesho sales like they did in 2019 sales sites
        - We eliminated Plan B entirely for Gesho and said that for Grevillea we would OAF would still purchase unsold seedlings, but at a price no higher than the normal 0.4 ETB buy-back (in 2019 it was higher). There might still be some moral hazard from DAs, but it should be reduced, and since FOs and FAs will have a larger responsibility than DAs for marketing that will also reduce the effect of any moral hazard created for DAs
        - We tried to reduce the time burden by setting much earlier deadlines for the end of distribution, and we plan to stick to this (though if sales are lagging there might again be a temptation to lengthen the window)
    - Other things to consider in the future:
        - Either in 2020 or possibly in a future year it might be a good idea to do a formal trial of different marketing methods or materials to see the relative effect of each on adoption rates
        - Possible trial arms could include elements like the following:
            - Bonuses for FOs, TNOs, FAs, DAs or others based on sales results
            - Involving DAs still in the sales plan, including inviting them to a formal TOT (this was done in 2019 but we think it was not very useful; it is not in the formal plan for 2020)
            - Increased banners, signs or T-shirts to have more visual marketing in the kebele

        - Incentives for farmers like bulk discounts for purchasing a high number of trees or discounts if a farmer convinces another farmer to buy trees (though this would be very hard to follow up on and measure)
        - Establishing demonstration plots of the seedlings to serve as a model plantation and a focal point for marketing for farmers skeptical of a given species
        - Involving farmers more who are already convinced about or have experience with a given species to do testimonials in meetings (last year we had a testimonial video but it was not widely shown, and in person testimonials were recommended but not done systematically); possibly including a budget for incentives for these testimonial farmers to increase their participation
- Seedling quality standards were easy to reach and we can be even stricter with them in the future
    - With 90% of seedlings meeting quality standards and average height closer to 15 cm than the 8 cm minimum we set, we decided that in future years we should raise the quality standard
    - In the MoU we made 12 cm minimum the new standard, though we kept number of good leaves as 4 at minimum
    - We also added stricter rules in the MoU about seedlings being thinned back to only 1 seedling, weeded, root pruned and hardened off in advance.
    - This was because we observed many seedlings on distribution days without these actions done, and some TNOs tried to do the root pruning and thinning on the day of, which can damage seedling health and is too late to make an improvement on seedling health
- We need to adjust the planting timing for Decurrens and wanza
    - Originally HQ pushed for all planting to be done by end January. This was pushed back slightly when the field team told us it was too early, but we still tried to pressure the team and TNOs to plant all species quickly
    - In the end, Decurrens and especially wanza which was planted on the earlier side actually suffered some problems in the nursery including die-back before distribution and overgrowth that led to them rooting in the ground and/or a major amount of time spent on root pruning
    - Based on our observations, we agreed to make the new deadline for Decurrens planting in 2020+ the end of February and the deadline for Wanza the end of March
- We need to adjust the transplanting and root pruning timing for all species
    - We did not train on transplanting until March and and root pruning until early May, but it turns out that both of these activities needed to start earlier
    - Experts have told us that instead of 5 cm minimum for transplanting the better height is 3 cm. Also, some warmer areas like in Jabi Tehnan will reach this stage earlier than others, so the team needs to be ready to train on transplanting as early as February for Gesho
    - Roots started to grow out of sockets for the earlier planted seedlings and in the warm areas as early as February, so we moved the training on this topic from NMT3 to NMT2 and also plan to roll it out with the team in February so that they are prepared as soon as they need to teach farmers
    - In 2019 root pruning scissors were distributed in April but in 2020 we distributed them in November together will all other inputs
- We should consider dropping Decurrens, at least in Banja, but perhaps not do so immediately
    - Decurrens has by far the lowest estimated impact per seedling, but we are still not convinced we should drop it yet because it has other benefits which maybe we are not fully capturing and quantifying yet. This includes the highest suspected positive impacts on soil, because it is nitrogen fixing, and the fact that it requires the least maintenance to get the highest survival (this has not yet showed up in survival rates, but might with more years of data)

- Furthermore, we know that there is a shortage of smallholder private land for tree planting and a much larger amount of available communal land areas. All our other species require more maintenance than Decurrens so will not do as well on communal lands. We might want to maintain Decurrens in the portfolio just to keep something that can fill the communal land niche
- There was no significant effect on planting for Decurrens in Banja, where it is already popular, but there was a significant impact in the 3 other woredas. This suggests maybe we should consider dropping support of Decurrens in Banja but keep it in the other areas, where it is new and less popular
- For 2020 we ended up maintaining Decurrens even in Banja for simplicity sake, so the program model was identical everywhere, but we can reconsider dropping it in Banja or all areas in 2021+
- Another thing to consider for Decurrens is maintaining it in the program but cutting back costs by changing to a smaller, cheaper socket for this species and further reducing buy-back costs

- We will avoid Banja-type woredas in future years
  - We had expected that since Banja woreda has mature existing tree markets that we would have the best sales performance, but in reality we found the opposite to be true
  - It turns out in the case of Banja that part of the problem was that the tree markets are so mature that seedlings, especially Decurrens, were over-supplied compared to the land available for planting (the government surprised us and limited some areas to not be available for tree plantations, which really drove down demand) and many farmers grew seedlings for themselves and were not in the market to purchase more
  - We might revisit the idea in 2021+ but we decided that for 2020 we would avoid expansion to any new woredas that already have very developed tree markets and high numbers of existing trees
  - We also tentatively decided that we would drop Banja itself from the program as soon as we area able, which will be after the current Tree Regional Agreement expires at the end of 2021
- We should reduce government TOTs and general reliance on DAs
  - In 2019 we paid for 4 TOTs for DAs: a November kick-off meeting (and time to coordinate on TNO selection), a February planted-tree management training, an April marketing training and planning session (for Sales sites only) and end May distribution and planting training and planning session.
  - We found that these TOTs constituted one of our larger expenses, and by reducing t hem in half we could significantly reduce costs. We decided to do this, since only the November and May trainings were deemed absolutely crucial for getting DA and kebele admin support
  - Related to this, we found that one of the most helpful local stakeholders is not the DAs but the kebele administrator. We observed during TNO selection and problem solving with problematic TNOs that the kebeles with an engaged kebele admin had much better results. Because of this observation we decided to invite kebele admins to the distribution training in May, and give them a formal job at distribution day to turn away people from the wrong kebele or sub-kebele

Farmer planting training at Ginb, Gonji woreda

or who had already taken trees. Observations from the team suggested they were very helpful and crucial to successful distribution days.

- Because of the experience with kebele admins in the distribution training, we decided to also invite them to future TOTs. But this makes it even more imperative to limit the TOTs since paying for 3 total stakeholders at each event is pricier than when we previously just paid for 2.
- We were very disappointed with the performance of 50%+ of the DAs in delivering the planting training at distribution; many of them skipped important sections or taught entirely different information, and they in particular did not respect our plans for getting high audience participation. We decided that in 2020 we will likely have our own FAs lead the planting trainings instead and give the DAs other responsibilities during the distribution day. The FO will still lead and oversee the full process of the day like they did in 2019, that worked quite well.