

Proceedings of the Trees for Food Security Project Review in Uganda



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List of Abbreviations

ACIAR	Australian Centre for International Agricultural Research
CAP	Coalition Against Poverty
CIMMYT	International Maize and Wheat Improvement Center
CRP	Consortium Research Programme
FTA	Forests, Trees and Agroforestry
ICRAF	International Centre for research in Agroforestry
NaFORRI	National Forestry Resources Research Institute
NARO	National Agricultural Research Organization
NFA	National Forestry Authority
RRC	Rural Resource Centre
SD	Science Domain
T4FS	Trees for Food Security
VIP Project	Value chain Innovation Platforms Project

DAY 1

Mbale Rural Resource Center

Session 1: Brief history of the Center



Hillary Agaba and Joel Buyinza gave a brief history of the Mbale Rural Resource Centre (RRC) stating that it all began through a sketch Hillary drew on how he visualized the Center. Through collaboration between the National Forestry Authority (NFA) and National Forestry Resources Research Institute (NaFORRI) the Center was established in October 2015. NFA provided the land where the Center is based whereas NaFORRI offered technicians to train farmers and nursery attendants so as to support seedling production,

nursery maintenance, establishment of demonstration plots and long term trials on behalf of the local community. As a result, the Center commenced its activities but had to stop its activities as the project came to an end.

In order for the Trees for Food Security (T4FS) Project to fulfil one of its main objectives, the NaFORRI team, headed by Hillary, offered the Centre to the project to carry out its activities. Courtesy of funding from the Australian Centre for International Agricultural Research (ACIAR), the Centre's structure was fully completed and facilities introduced or amended as was the initial plan. The Project currently supports technical backstopping on seed and seedling acquisition and delivery and has facilitated posting of interns and volunteers to the Center, who work directly with communities to link them with its activities. The Centre's complete structure and facility comprises of: 1 training room, 3 offices, 2 stores (seeds and equipment), tree nurseries, shade net to nurture seedlings, propagators for grafting and budding, and seed stands.

The project has a number of components and one primary to the Centre is fodder, whereby farmers receive fodder trees, channelled through the District and local government. Operating in two sub-counties, i.e. Butta and Namabya, the Centre collaborates with the parish and sub-county chiefs to coordinate the supplies. Despite the change in personnel due to government transfers, the Centre has not experienced any challenge as the new officials have always been supportive. In addition to coordinating the supplies, the officials collaborating with the Centre also assist in mobilizing farmers for field days and other relevant activities. The supply and coordination is made possible by other supporting bodies such as Local Council 1, which is directly linked to farmers at the grassroots level hence ensures smooth transition and coordination in the entire process.



Session 2: Introductions & Opening Remarks



Clement Okia and Hillary welcomed all present and urged them to feel at home. Participants then got to introduce themselves and Tony Bartlett expressed his interest in learning as well as seeing the progress made thus far. He also pointed out that it was Melissa Woods' idea to fund the nurseries at the Centre as well as initiate funding for the next phase of the project. Catherine Muthuri also expressed gratitude to Tony and Melissa for providing the funding and guidance throughout the project implementation as

well as to the Uganda team for carrying out all the ground work, ensuring she doesn't experience management issues.

Additionally, she noted the support accorded by NaFORRI, noting that it is quite rare to gain such support in terms of providing technicians, linking the project to partners as well as a complete building. Furthermore, Catherine noted that farmers from Uganda are well educated and versed with their work, making it very easy for the project team during field visits as they express themselves eloquently, and this minimizes distortion of information through interpretation. Ian will also be a partner in the second phase of the project, in terms of scaling up the impacts of T4FS. She concluded by assuring participants of the Projects' support where needed. Jeremias Mowo expressed his desire to see the Centre replicated across the other counties as RRCs are 'centres of change'.



Session 3: Tour around the RRC



Christine, an RRC technician, took reviewers through the facilities of the Centre, beginning with the structure where the team got to see the offices, seeds and equipment's store. The next stop was the tree nurseries where seedlings are raised, potted, pricked and grafted. The Centre harbours 11 species of seedlings, both wood and fruit. The most popular tree seedling is the *Eucalyptus grandis* due to its numerous wood benefits. Hillary pointed out that trainings, workshops and participatory trials are carried out at the Centre at

specific intervals whereby farmers gain deeper insight as to the most suitable species, or those which will accrue more benefits as well as income. Furthermore, seedlings purchased and grown at the Centre are based on the needs of the farmers and this facilitates the rates of adoption in the County. Catherine added that, when participatory trials were carried out, farmers proposed the *False Mvule* which the project took up and ensured to supply from then on.

The next stop was a farmer who was preparing potting tubes (as shown in the figure), and reviewers got to learn the local process in preparing the tubes. The shade net was the next stop where grafting of the seedlings takes place. A farmer was in place grafting mango seedlings where the reviewers got to see the process as well as ask questions in comparison to past experiences as well as other sites. The parts used for grafting are usually gotten from improved 'mother' trees i.e. from 'mother' gardens within the Centre. Once the seedlings are grafted, they are transferred to humid chambers where favourable conditions (white polythene covers) ensure that a 99% survival rate is achieved. The humid chambers host the seedlings for three weeks and are then transferred to another chamber for an additional two weeks and finally transferred to the final chamber for hardening. The shade net also contains seedlings grafted by farmers and are labelled with orange bands, bearing each farmers name. The success rates of the same have also improved courtesy of the trainings undertaken at the Centre.



Question:

Melissa - Where do the seeds come from?

- The Centre purchases seeds from The National Tree Seed Centre where viability of the seeds is tested and selection done. The seeds are then transported to the Centre where they are grown and later on distributed to farmers for free, based on their preference and past experiences, having grown them in their farms.
- Additionally, through trainings carried out at the Centre, the farmers gain more knowledge on the best practices so as to achieve the desired results.
- How many seedlings are given to farmers?
- It usually depends on the farmer as some take between 20 and 100 seedlings whereas others take in small amounts, due to farm sizes. In other cases, the farmers receive the free seedlings in large quantities and later on purchase more from the Centre.

Melissa - As the chief of Namabya sub-county are you involved in the above process?

- Yes I am. Once the seedlings are brought to the Centre, I work alongside the team to ease the distribution process as well as play a facilitators role during the trainings.

John - Why is the Centre issuing seedlings for free?

- The purpose is to ensure farmers grow the right species which have been tested. Once they plant the seedlings in their own nurseries then it's upon the farmers to grow more from the supply issued by the Centre, and later sell to other farmers so as to gain income.
- Different trees have different grafting techniques. Which ones do you apply for the species in the nurseries?



- For the oranges, both budding and grafting techniques are applied; whereas the saddle graft technique is applied in the case of mango seedlings.
- Where did you learn this?
- Through trainings conducted at the Centre 13 years ago and I have managed to perfect the skill over the years.
- Are other technicians or staff at the Centre learning from the farmer who does the grafting?
- Yes they are and are slowly practicing on what they gain from him.



Catherine – why do you blow air into the tubes?

- Putting in air makes the potting process easy for farmers. If this is not done, farmers tend to spend more time trying to open, which delays the process and this translates to fewer potted plants in a day. This is one of the innovations or local knowledge the Centre introduced to address the challenge initially faced.

Ian – how long do the seedlings stay in the potting tubes before they are grafted?

- Seedlings take between five to six months in the tubes before they are grafted
- Does the grafting process apply the split or saddle graft?
- The farmers in charge of the grafting process usually use the saddle grafting technique.
- What is the survival rate of the grafted seedlings?
- The Centre is proud to state that survival rates are between 90% and 99%. *(The team got to confirm the same as they toured the rest of Centre)*

Haile – whom within the Centre confirms that the parts used for grafting are the correct ones?

- When the Centre was established, researchers from Agroforestry organizations planted various species hence the Centre technicians are assured that the parts gotten from these species are the right ones for the grafting process.
- Additionally, the researchers provided maps and information on the same hence the technicians have vast knowledge of the same, ensuring the process is smooth and correct procedures are adhered to so as to achieve the desired results.

Jeremias – how many months does it take from grafting to when the seedlings are planted?

- The entire process takes six weeks
- Based on the great job and amazing success rate of the seedlings, the Centre should re-consider

issuing out free seedlings to the farmers and instead sell so as to generate income which will in return sustain the Centre's activities.



Tony – the set-up of the Mbale RRC is different from that of Ethiopia which is private. Are there plans to make the Uganda RRC private?

- The idea of this RRC is not to go private, rather to empower farmers who later on set-up their own private nurseries in their farms or as a group. Thus far, this approach has proven to be effective.

Session 4: Visit to *Alnus acuminata* and *Bathedavia javanica* long-term trials



The reviewers visited the *Alnus acuminata* and *Bathedavia javanica* long-term Trials at the Centre. Joel highlighted that the two species were chosen as they are new in the region and the project is interested in understanding their performance and appropriate management practices. *Alnus* has already been introduced in South Western Uganda (Kabale) with similar conditions as the Mt. Elgon region, and its performance is convincing. The species were established at varying spacing i.e. 3mx3m and 3mx6m for *Alnus*, and 4mx4m and 5mx4m for *Bathedavia*. The

3mx6m for *Alnus* was adopted from Rwanda, while the 3mx3m was introduced as an innovation by the project. A bean crop was also introduced in the 2 trials and the yield potential will be established during harvest. The parameters measured from the trials include height, survival and collar diameter.

The project obtained *Alnus* seeds from Rwanda. One of the reviewers, John Okorio was concerned as to why the project was not collecting seed from Kabale instead of importing it from Rwanda. It was however clarified that communities in Kabale are not collecting the seed. The project team will however follow-up to establish if there are any *Alnus* seeds in Kabale.



Session 5: Interaction with Chief Administrative Officer, Manafwa District



Hillary introduced the team to the Deputy Chief Administrative Officer, Mr. Situma Aron, while Mr. Michael Mwangale, the District Forest Officer, gave a brief background of the project and its area of operations, noting that the main objective of the project in the area which is tree planting, in a bid to curb soil erosion and restore river banks, as well as contribute to other benefits the environment has to offer through trees. Some of the activities that have been carried out so far are capacity building of farmers mainly on tree planting and management at farm level,

in Namabya and Butta sub-counties. These activities have provided exposure to farmers on a wide range of farming techniques at Mbale RRC.

The RRC has brought a huge sigh of relief to the District as trainings could only be carried out in Mukono, which is no longer the case since the Centre was established and the T4FS project came in. The suitable location of the RRC has facilitated more trainings and also reduced costs of travel and accommodation as farmers are able to attend trainings and still travel back home in time. The project has also been carrying

out various long-term experiments, which will in the end provide the required knowledge on the suitable tree species as well as conducive conditions for the same, as well as crops. Catherine expressed gratitude to the District office for the support they have accorded the project thus far as so much wouldn't have been achieved if it were not for the collaboration.

In his opening remarks, the Deputy Chief Administrative Officer thanked the project for the fruitful collaboration they have had with the District so far. Furthermore, he noted that this review will provide an opportunity for more partnerships with the community so as to scale-up the project activities. He also pointed out that a number of activities have been achieved and through the trainings carried out by the project, not only have farmers gained from them but the District officers can also attest to the benefits gained. For instance, the officers are now able to handle change of attitudes as this proved to be a huge challenge whereby the community would not take up new ideas despite their benefits. The project has therefore cultivated positive attitudes in farmers, encouraging even more farmers outside the project scope to take up the practices.



Courtesy of the project, the officers and farmers have the knowledge on the right tree for the right place. For instance, arable coffee was performing poorly but since the project came in, yields have increased. The



District is now working towards streamlining, strengthening and consolidating the project activities and achievements, in that, farmers who are benefitting from the project, will also receive coffee to plant to ensure multiple benefits. The chief administrator stated that the Value Chain project is welcome and the team will be accorded the necessary support as has been for the T4FS project. Tony announced that the T4FS project will soon kick off the second phase in January 2017, having been approved by ACIAR, and will run for four years.

Session 6: Visit to Mr. Namunyu's farm in Butta sub-county & interaction with other farmers hosting participatory trials

Joel welcomed all present and highlighted that the Project applies the lead farmer support initiative model, whereby a key farmer in the area is selected and accorded support by the project. Other farmers around the area then get to learn from him/ her, and so far 600 farmers in Butta sub-county have benefitted from the Project. The lead farmer in the Sub County is Richard Namunyu, who is currently hosting various participatory trials such as fodder banks, tree diversity, trees for shade and food, firewood, boundary planting as well as the sap flow biophysical experiments. Joel pointed that due to time constraints, the team might not get an opportunity to visit all the farmers carrying out other trials and activities, such as the sap-flow experiment hosted on *Albizia coriaria* of another farmer, Mr. Wamayeye Wilson.

The first site was where *Calliandra Calothyrsus* is grown as a boundary at the edge of Namunyu's farm where he explained that he cuts the tree at 20cm instead of the recommended 50cm since when *Calliandra* is cut at a higher height, it tends to lose its lower leaves, and the trees' chances of sprouting again are decreased and it also tends to dry up. His technique therefore advances to a lower height of 20cm as the tree continues to grow and allows other parts of the tree to sprout.



Namunyu added that he has introduced another innovation to his farm whereby he has reduced the spacing between the trees, applying a space of 1ft between the trees, prior to the recommended spacing of 2ft by the project. This innovation came about when he realized wide spacing translates to a bigger stump and being in a garden, it proves to be a challenge when it's time to uproot the tree due to its big roots. However, with a smaller stump courtesy of the smaller spacing, once the tree is mature, the farmer doesn't experience any challenge when uprooting and no extra labour or machinery is required for the same, thus cut on costs. Through trainings conducted by the project, Namunyu has also successfully set-up his own nursery. Some of the species on his farm in addition to *Calliandra* are: *Maesopsis eminii*, *Bathedavia javanica*, *Eucalyptus grandis*, *Mahogany*, *Cordia africana*, *Melia volkensii*, *Neem*, *Alnus acuminata*, *pine* and *Leucaena*.

The next stop was a section on the farm where the team got to compare and contrast the effects of plants under shade of trees and those that weren't. A clear distinction was that crops planted under shade were green and healthier whereas those not under shade were not very healthy, dispersed and portrayed yellow leaves. Additionally, trees provide mulch for the plants under them, causing them to flourish more than the other plants. Other benefits Namunyu has enjoyed include fruits from the trees he has, charcoal which he uses for home consumption, and also to support climbing plants such as yams.



Namunyu showed the team the sap-flow machine installed on *Cordia africana*, noting that three people manage it: him as the host, a lady hosting the power source at her homestead and Joel who provides the technical expertise. From his experience since the machine was installed, Namunyu noted that as farmers, they rush to plant trees without the knowledge of how they behave towards other crops. However, the machine will bring about a difference, as they will now know the right tree for the right place in terms of water consumption for example. Two workshops have been held twice where Namunyu got deeper insight as to how the machine operates. Based on this knowledge, he was able to explain to the team the functionalities of all the wires and logistics of the same.

Joel then took over stating that data is collected through an external hard disk or USB after being inserted into the machine. From this data, he will be able to analyse the baseline scenarios on the tree behaviour as well as crops around them. So far, he has managed to download data for 5 months and has observed the following: during the rainy season, the tree hosting the machine would use up to 7 litres of water per hour whereas during the dry season, the tree would only require 2 litres of water. On average therefore, the tree would store up 100 litres per day during the rainy season and 5 litres per day during the dry season.



The situation however is different in the case of *Albizia* as it tends to store 70 litres of water per day during the rainy season and 2 litres during the dry season, recording lower rates compared to *Cordia*. Additionally, Joel noted that later on, the project will conduct further research as to the differences between the two as they may be influenced by the environment in which they are located. Furthermore, the project has allowed the farmer to continue with the same practices on his farm despite the machine being there.

Namunyu as well as farmers around the area usually assist Joel with monitoring how the trees are leafing in both dry and rainy seasons. From Namunyu's observations, which he does once in a month, it's noted that the leaf fall in *Cordia* is not synchronized, giving an example of two trees in the farm where one was leafing and the other wasn't. The project is therefore considering studying this further so as to determine the reasons behind it. The situation is however different in the other farm where the sap-flow machine has been installed on *Albizia*. The farmer notes that the leafing of the species is synchronized. Joel is working with Catherine so as to develop an appropriate technology and treatments they can apply for example, installing the machine on an evergreen tree species so as to compare with *Cordia* and *Albizia*.



The number of experiments that will be subjected to the trees hosting the machines include: pruning, behaviour of the crops around them, water usage of the tree, and in the end note if the species is appropriate for crop integration or not. This will enable the project to advise farmers on the right species to incorporate in their farms, the management required in terms of pruning and also the distance between the tree and the crops for maximum results.

Catherine stated that the greatest advantage the project has in terms of scaling up is that *Albizia* and *Cordia* are common species in all the project sites hence will guide the project on the next steps. Additionally, comparisons in the project have also been cutting across other farms with *Albizia* and *Cordia* so as to note the dynamics of the species for instance, if it would be advisable to plant when the trees are out of leaf and benefit from reverse flow, whereby the tree brings up the water to the level of the crops hence they benefit, or vice versa. Catherine also pointed out that the project will plant *Cordia*, *Albizia*, and other species popular with farmers at the RRCs farm to compare the findings from that farm with that of the farmers. She also thanked the farmers for taking it upon themselves to secure the machines and solar panels since its common to have theft cases in the area due to other pressing needs of farmers who may not see the actual purpose of the machines.



The team then got to view where the power source (solar panel) was mounted. Namunyu explained how the wires are interconnected. Catherine noted that the source was purchased from Australia, courtesy of funding from the project, and powers three trees in Namunyu's farm. The advantage of the house where the panel is hosted is that the roof is positioned in a way maximum sunlight is captured hence no interference in the readings has been experienced thus far by the project. Clement highlighted that thus far the project has not experienced any theft with the solar panels because they are well protected in both homesteads where they are hosted. For instance in the case of one of the farm, the homestead is fenced hence no intruders can come through without the knowledge of the farmer.

Along the farm Namunyu explained that he uses his own innovation of spacing *Melia* species at 2 metres since it is a fast growing tree and he will require it for various uses therefore when pruning he wouldn't want the process to interfere with the next tree. Furthermore, Namunyu explained that he doesn't want this to be all about the project, as he would like to enjoy, earn some income as well as benefit in other ways before the project comes to an end.

The last stop was the coffee plantation where Namunyu has also incorporated trees such as *Maesopsis eminii*, *Cordia africana* and *Albizia coriaria*. The pattern is in such a way that where there is *Cordia africana*, he has also planted *Maesopsis* and where there is *Albizia* he has planted *Maesopsis*. Namunyu noted that with *Cordia*, one shouldn't manage when the tree is still young, rather wait for a certain period otherwise you will end up destroying it. He has therefore come with this as part of his innovations. However, prior to the project, Namunyu had already planted *Maesopsis*, and are now four years old. Moles have however presented a huge challenge in some parts of his farm especially in sections where there are no coffee plantations.



Namunyu also got to show an extension material published by ICRAF where a photo was captured of him in his farm back in the day when he used to work for VI Agroforestry. He concluded by thanking the project for the support it has accorded him as well as considering him to carry out the participatory trials. He further noted that since Agroforestry is a broad component, the project can consider introducing other activities in addition to tree planting, so as to avoid going back to tree cutting once the community realizes so many trees are available, just like the case of forests. The activities can include bee keeping, poultry, zero grazing, amongst others, for the sake of other farmers since he has advanced and is able to carry out most of them.



Hillary thanked the farmer for being a great example to the rest of the community who have emulated him, and looks forward to working more with him. Tony also thanked Namunyu for hosting the team and expressed his amazement at his vast knowledge on all he is doing at his farm. He also thanked him for accepting to host farmer field days, seedling collection as well as hosting the participatory trials. Tony also thanked Namunyu for being a great model farmer; noting that based on his experience, it's better to have a team of good farmers than good researchers, in terms of impacts.

Tony got to announce to the team that two projects will now be operational in the area, one focusing on trees and the other markets to improve the returns and livelihoods of farmers. He also noted that the T4FS has been approved for its second phase, which will commence in January 2017. Ronald Nakhaima, the Butta Sub County chief thanked the project for the support, noting that communities learn better from project activities rather than government related activities. He therefore requested the team to hold discussions with the government so as to influence the policies introduced.

Questions/ Discussions

Haile – the project should consider taking up the innovation whereby *Calliandra* is cut at a lower height and conduct research in comparison to the recommended height so as to find out the most suitable practice and recommend the same to other farmers

- What is the motivation or incentive for the house owner to host the solar panel based on the fact that she doesn't have power for her consumption?
- Joel explained that prior to installing the panel, the project had negotiations with farmers in the area and in the end came into an agreement with the lady currently hosting it, whereby 250,000 Uganda shillings (80USD) is given to her annually.



John – *Calliandra* should be grown across to form a boundary but in this case, Namunyu has grown it the other way. Why is this so?

- Namunyu explained that since that part of the farm is near the edge of his land he would like the tree to form a hedge and also clearly define the entrance to his compound.
- Since you have a very big farm, do you maintain it with your family or hire casuals to assist you at a certain fee
- In most cases I do it with my family but when I have some money I hire people to assist me
- When using *Calliandra* as fodder, do you use it alone or add other components?

- I usually combine *Calliandra* and *Elephant grass* which I also grow on the farm
- Once the Project gives farmers seedlings does it dictate where they should be planted on farms?
- Farmers gets to decide where they would like to plant the seedlings unless it's the case of participatory trials where farmers and the team decide on the most suitable section on the farm to carry out the trials.
- Where did you get *Melia volkensii* seedlings?
- I got them from Masaka and Tanzania
- How many trees have you planted in the past year?
- I have received seedlings from the project in 2 phases, five hundred in each phase hence I have planted 1,500 trees on my farm. However, the project came in during the dry season, which translated to poor success rates. In addition, we planted quite a number of trees expecting the rains, but this was not the case thus the low yields. The trees which did well are as a result of the shade provided by the other plants and trees which were already in existence.
- When does the tree shed its leaves?
- It usually depends on periods on the tree maturity. For instance, out of four *Cordia* species in Namunyu's farm, three have sap flow machines installed. Two machines were installed in November where one tree was shedding whereas the other was leafing, and the other two trees were leafing. Later on, the tree without leaves had now recovered while the rest were now shedding. Namunyu stated that he has been taking note of the periods in which the tree sheds the leaves
- What do other farmers say when they see you doing all these things?
- They are impressed by all the work I do hence say I that I work a lot! Some comment that I have more than enough, why adds more? Namunyu's response has however been that he is not satisfied, and since he has the energy and the land, there is no reason to stop.
- Will the new project overlap with the current one in terms of intervention areas to address some of the concerns raised by Namunyu?
- Tony and Catherine responded by saying that the new project will have components dealing with dairy and fodder to enhance milk production, since milk is one of the value chains as well as coffee.



Catherine – what are the benefits farmers gain from *Calliandra*?

- *Calliandra* hasn't been a famous species around the county but I, courtesy of the project, have enjoyed numerous benefits such as fodder for his livestock, mulch for my other crops, firewood and nitrogen fixing in its roots. I also know milk productivity from my livestock will increase with time
- What are the benefits of the *Leucaena* species?
- I use it to support the banana trees (*Matoke*) as well as extract firewood
- How come there doesn't seem to be any competition between the trees and coffee?
- What I have made sure of is that for instance with coffee, the top branches should not be close to the tree branches/ leaves. This ensures there is no competition hence both the tree and plant grow as they should and maximum results are achieved.



- In Rwanda, research shows that coffee grown under trees is of much higher quality than those not grown under trees and that's one of the things this project will test later on.
- Is there a personal benefit you have gained from the project and its activities?
 - I have six children and I pay their school fees through income I receive from my farm. The burden has been much lighter since the project came in as none has been sent home for lack of fees
- At how much do you sell the beans?
 - I sell at Uganda shillings 1,000 per kilo and during the harvesting period I sell at Uganda Shillings 200,000 per kilo. There are 2 harvesting seasons in a year: April and September.
- How big is your land?
 - Over 20 acres



Ian – will you collect seeds from the tree to grow more seedlings?

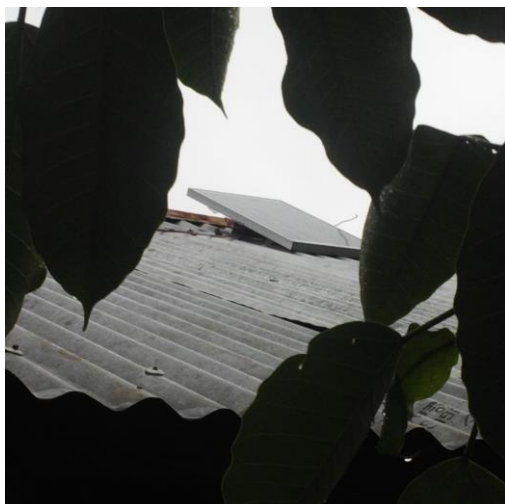
- Yes I will definitely do so because I am proud of the project and I have gained so much from it in terms of skills and knowledge.
- I also plan to expand these practices so I can sell the seedlings to other farmers and earn some income

John – when you cut down one tree for charcoal, how many trees do you plant to replenish?

- It's my policy that when I cut 1 tree for charcoal I should plant 10 more and that's what I have been doing
- Have you experienced any challenges hosting such an innovation (sap flow machine) in this area?
 - It has been a challenge as some considered the trees with the machines as bad. It has therefore taken me time to go around homesteads and Local Councils informing them of the benefits of the machines, which will guide them in future, on the suitability of each species on the farm.

Jeremias – do you make charcoal for sale or house consumption

- I do it for personal consumption through sustainable harvesting, where I cut branches rather than the entire tree. If I did it for sale, then I would have destroyed all the trees on my farm
- There needs to be mechanisms or laws in place to regulate the cutting down of trees in the area as it is too much. This can be achieved through the local leaders such as chiefs
- How many types of crops do you have on the farm?



- I have *Matoke*, bananas, beans, coffee, yams and arrow-roots.
- As part of the challenge hosting the machines, have you had cases where farmers have taken you for a magician?
 - Not necessarily as none has approached me directly on that matter. However, I have noted that some come to the farm when I am away and open up the foil covering the machine so as to investigate what I am really doing on the trees. I therefore have to do frequent checks so as to restore the foil as it should be.
- Another challenge has been illegal power connection in the area as some farmers saw this as a source of wires.

At one point, the sap flow machine wires were cut, but since they had been installed deep into the ground, only two metres was cut since they could not retrieve the rest. With the help of Joel, the wires were restored immediately.

- The project should consider installing another solar panel at the lady's house hosting it as part of motivation since she makes sure the community does not tamper with the panel or the wires. Alternatively, the project can enquire from the host if she would like to have power or keep receiving the annual amount.
- Catherine however pointed out that it should not only be about the money or the power but the knowledge the farmers receives from these experiments, ensuring long term sustainability of appropriate farm practices and the joy of the knowing that they have been the beneficiaries of a successful project and experiment (ploughing back the results to the community).
- Since you have a very big piece of land, do you rent out the sections where you have minimal activity? Did you purchase it yourself or inherited from your father?
- Yes I do rent it out to farmers who have minimal spaces in their homesteads. Part of the land is inherited from my father and the other I managed to buy, which comprise a bigger portion.
- The farmer shouldn't cultivate close to the gullies as he will lose a lot of soil. He should consider planting trees, bamboo and nappier grass
- Nappier grass is good but it attracts the moles.
- Do you sell some of the firewood you harvest? Can you give a rough estimate on the amount you receive from woodlots in the entire farm
- Yes I do and that money helps me pay for school fees. On an annual basis I can get an income of UGSH 3 million (1,000 USD) from the sale of timber

Melissa – how much do you harvest from the beans?

- It all depends with the season since during the dry season, I harvest 5 kilos but in the rainy season, I harvest 100,000 kilos per sack.



DAY 2

Field Visits

Session 1: Visit to Elgon Trust Women Group in Manafwa



At the group nursery, the team members introduced themselves, and Caroline, the group leader gave a brief history of the group, noting that it was established in 2014 with 18 members. However, some members pulled out as they considered the nursery work to be too much especially during the dry season as they would have to fetch water down at the river with jericans, whereas others pulled out since their husbands felt being at the nursery was a waste of time.

She noted the projects support has reversed the above named challenges through increased income from the nursery and the group is hopeful that things will get much better with time. She thanked Michael (an intern at ICRAF Uganda office) for the technical support he has accorded the group, to Catherine for the support she has given them from a managerial position and especially as a lady, and to Hillary for organizing a workshop which the group attended and can attest to the benefits they gained from it.

George, another member of the group went on to add that as a group they have noted the benefits of trees in that it curbs soil erosion which was a huge problem that area. Additionally, courtesy of project and support from Michael, the group can easily access seedlings which was a challenge before. George went on to add that the community did not see the effects of cutting down trees despite the penalties the government had in place. The group has therefore made it their responsibility to teach them on the benefits of the same and can attest to positive changes in the area for instance, farmers are now planting the trees in their home rather than cutting those in the forest.

Clement noted that the group not only gets seedlings from the project, but also from other local organizations such as Mbale Coalition Against Poverty (Mbale-CAP) and NFA. However, the team has noted that farmers' demand is still very high despite supplies from all these organizations, and this is a problem that will need to be addressed. So far the government has been approached and is keen to have more trees planted hence are willing to address the need. Clement highlighted that the Project gives farmers free seedlings as incentives to get them learning the best practices and also have a great start to these ventures with quality seedlings. With time however, the project shall investigate if the farmers are now self-reliant and do not necessarily depend on project supplies.

Questions/ Discussions:

Melissa – what's been the most beneficial support you've received from the project that has made the group successful?





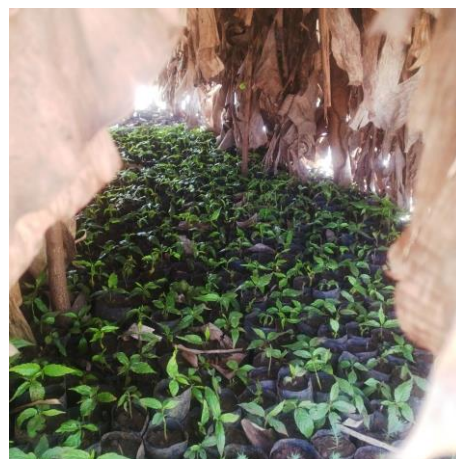
- The group has acquired knowledge through trainings and workshops; provision of seeds and when the seeds failed to germinate, the project went further to provide seedlings; provision of farming materials such as wheelbarrows, nails, watering cans and polythene tubes.
- Additionally, the youngest member of the group can now pay his own school fees from income he has accrued over the months. His parents could not afford school fees and that's when he

joined the group but will now leave for a while to resume his studies. The group also earns income from the nursery through the sale of seedlings and this has benefitted members through loans and support when one is bereaved or ailing.

- When you sell to your customers, do you also provide knowledge on tree planting, Silviculture and management of the trees? And if so, where did you get the knowledge?
- We do provide seedlings as well as knowledge on how to plant and take care of them. We have also acquired knowledge through training conducted in Mbale and Manafwa (by the National Tree Seed Centre) as well as booklets, which advise on the proper spacing required for each species. Certificates are usually issued to farmers when they successfully complete the training courses, which certifies that they have the approval to start their own nursery. Additionally, technicians from the sub-county teach farmers how to space the trees through simple techniques of counting footsteps from one tree to another whereby after the fifth step, the next tree can be planted.
- Do you prefer the seedling or the business work?
- We prefer both as we gain satisfaction through both activities as well as income
- Does the group operate like a cooperative whereby each person who gets to work here earns some income?
- Yes it does. For instance, the youngest member for the group used to collect seeds elsewhere and when he brings them in, we would give him some money. The shares allocated therefore depend on whether its group or individual effort. In other instances, members inform the others of opportunities to work in coffee farms where they require women to pot and they get income from that too.

Ian – how have the activities in the group empowered the women?

- The women are able to sustain themselves and not borrowing money from their husbands all the time. For example all the women are smartly dressed, have neat hair and still have some income left to cater for personal needs. Additionally, since its women's role to fetch firewood, its' much easier now as we have them readily available in our farms hence don't have to travel distances for the same. Furthermore, we get to sell the firewood or poles to other farmers and earn some income to take us through some days or so. Caroline went on to add that the poles are usually in demand after harvesting periods as they are used for drying beans. Moreover, the women get to make charcoal from the trees they have planted on their farms and earn income through the





surplus. Women no longer have to necessarily rely on husbands to meet all the household needs such as paying school fees.

- On whose land is the nursery located?
- We are currently renting it.
- How do you determine the price for each tree?
- There is a standard market price for various species and those are the prices we adhere to
- Do you sell all your trees?
- At times we may not be so successful in having all the trees bought and in such cases we root prune the remaining ones and use them in the next planting season. In other instances the trees are

shared among the members to plant in their farms

- How much time do you spend in the nursery?
- Since members have their personal farms, we have allocated 3 days in a week where all members report to the nursery. I however as the group leader, come every day to ensure all is running well
- Is the nursery location secure?
- Seedlings are stolen from time to time but not often, and this has not discouraged the group from continuing its activities.
- Have all these trees been pre-ordered?
- Not all but *Cordia* and *Eucalyptus* have been pre-ordered
- In the case of *Eucalyptus*, the good seeds are high up in the tree. How do you access them?
- We get young men to climb the trees and harvest the seeds for us

Jeremias – does the price you sell seedlings at match up to your operational costs?

- Yes it does for instance we sell *Eucalyptus* at UGSH 100, False Mvule Uganda Shillings 300, *Key apple* UGX 200, *Cordia* 300, and *Grevillea* 200.
- How much do you pay for rent?
- We are currently renting it at UGX 100,000 per season.
- Is the nursery making enough money to sustain the rent?
- Yes we do
- Since all members have farms, the group can consider having a volunteer farmer to host the nurseries to cut down on rent costs

Haile – what is the link between people who buy from the nursery and the project?

- The group keeps records of people who purchase from the nursery and then the project does follow-up on the same
- When a client comes to purchase the first time, does he or she come back once they realize these are quality seedlings?
- They usually come back and even make orders prior to their arrival so that the group prepares their specific request

Clement – who are your main buyers?





- From our observation, farmers are the main buyers. However we do get orders from NGOs through the Community Based Organisations (CBOs).

John – how many seedlings do you produce in one year?

- We have not been keeping records of this rather base it on knowledge on the number of trees produced. However, this is bound to change since the workshop we attended where we got to learn how to do record keeping. Additionally, the training of nursery operators conducted by the Trees for Food Security Project at the Mbale RRC enabled the farmers to know how best to arrange the seedlings in a nursery so as to make their work easier when

taking stock of what they have or have sold

- There should be mechanisms in place to regulate the free supplies of seedlings so as to provide an opportunity for farmers to sell and generate some income from it. If we continue with the free supplies from all these organizations, then it will beat the logic or objective of what we are working towards. Alternatively, these organizations can assess the areas that really require free seedlings and those that don't require so that free seedlings are only given to those who can't afford to buy.
- How do you collect seeds and how do you know that specific seeds belong to a certain tree?
- We compare the seeds on the tree and those that have fallen on the ground. If they match, then we know the specific species to which the seed belongs to
- The project can provide some training on seed collection so that farmers don't pick seeds on the ground that have already lost their viability

Catherine – who recommends you to sell seedlings to other NGOs and how much have you been selling through that channel?

- We get recommendation from the District Forestry Officer and we usually sell 5,000 seedlings. The least they can ask for is 1,000 seedlings

Tony – how often do you water the seedlings?

- Twice a day, in the morning and evening and more often when we are pruning as they require more water
- Since the group is doing very well, members can spare some money from the nurseries' income to purchase a water storage tank and a pump to get water from the river
- The group has been considering that as an option, preferably a more permanent tank i.e. concrete to avoid theft



Session 2: Interaction with Samuel Wamono, an innovative/ break-out farmer



Joel gave a brief history about Samuel, noting that he used to work for the Elgon Trust Women Group as a casual and later on realised that he can do the same activities on his farm. The most unique aspect about this farmer is that he came up with ways to pot the trees since he could not afford the polythene tubes. He would therefore set out on specific days and goes round bars in the area, collecting beer sachets which he used as potting tubes. Additionally, before potting *Eucalyptus* seedlings, Samuel collects banana leaves, places them on the soil (mixture of dung and sand

from the river bed), burns them and later on uses them as a covering for the nurseries. This innovation ensures all his seedlings germinate. Noting his efforts and interest, the project came in to support him by providing the polythene tubes. He is also lucky to have the river right next to his land making watering much easier.

Questions/ Discussions:

Melissa – is this your land or are you renting it?

- This is my land
- Where does the soil come from?
- At times I get soil from the river banks and mix it with dung from my goats.
- How did you gain the business skills?
- I gained the skills through trainings

John – did you ‘steal’ these seedlings from the women group nursery?

- Not at all!
- Do you do all the work alone or are assisted by your wife?
- I work alongside my wife.

Ian – where do you get your seeds?

- I move around the community and when I spot mature trees, I climb up and get the seeds
- As you collect the seeds, have you noted whether different trees have different times to mature and how do you know when to collect the seeds?
- I have noted the symptoms of mature trees hence will plan accordingly as to how and when to collect the seeds.

Tony – how many seedlings do you produce in one year or how much money have you made in one year?

- At times I get over UGSH 500,000 or UGSH 1 million in a year but this depends with the season and demand from the projects/ organizations, which make orders.
- Aside from the nursery do you have any other activity that earns you income?
- This is my only source of income



- What activities have you been able to do with the income, that you couldn't do before establishing the nursery
- I have four children whom I enrolled in a private school, which is way more expensive than public schools, and I haven't lacked fees at any one point. I also get to purchase household items and sustain my family's needs.



Catherine – what challenges are you experiencing?

- There are quite a number of pests that attack my seedlings and this has proven to be a huge challenge for me. Additionally, some clients like purchasing on credit and may take a while before paying back or even avoid paying all together.

Session 3: Visit to Namunyu's farm, a champion farmer



Joel gave a brief overview of the area noting the biggest challenge to be soil erosion whereby farmers are planting shrubs such as *Calliandra* to curb the problem as well as incorporating the species onto their farms. *Calliandra* also serves as a source of firewood, timber and fodder for livestock in the area. John Wasike, the champion farmer in Namabya sub-county, welcomed all present to his homestead.

Having his farm on a sloppy area has translated to severe soil erosion in the past but courtesy of the trainings, farmers in the area have gained ideas on how to address the issue. Additionally, the project has introduced farmers to appropriate tree species that restore nutrients to the soil, which were depleted due to soil erosion. Furthermore, these trees serve a supportive function to other trees such as the elephant grass so as to stop the erosion. John showed the team a clear distinction of a coffee plantation under trees and one growing without the shade of trees. Those under shade were very healthy and had green leaves whereas the other section portrayed yellow leaves and unhealthy coffee. Furthermore, those under shade produced high quality berries compared to the other plantation.

On one farmers' farm, the trees have been planted along strips on a hill, which has been divided into four categories. One category has natural vegetation, which the farmer initially had; the other section has *Alnus* integrated with *Calliandra*; the other *Calliandra* integrated with *Maesopsis*; and the last strip has fruit trees (mango). The same pattern has been replicated down the hill to the lowest point.

Some of the species taken up by farmers in the area include *Calliandra*, *Albizia*, *Bathedavia*, *Alnus*, *Maesopsis*, *Eucalyptus*, *Mahogany*, *False Mvule*, *Cordia*, mangoes and oranges.



However, *Alnus* did not perform so well as when the project supplied the seedlings it was during the dry season (towards the end of the year). Those, which survived, are however doing very well hence the project can consider supplying the seedlings in April or May to give ample survival time. The newly established mango orchard, comprises of three strips with a spacing of eight metres.

Hillary thanked the farmers for their devotion and great work as portrayed by the numerous activities the team got to explore on John's farm. The vast knowledge of the other farmers is also one to reckon with and they should keep it up. The project will keep supporting the farmers and they should bank on this opportunity to learn as well as improve their livelihoods. Catherine highlighted that there is another orchard down the hill comprising of oranges and mangoes hosted by another farmer, and based on its success, the project felt the need to introduce another orchard nearby (John's farm) for ease of access. She also emphasized the importance of curbing soil erosion as it translates to improved water quality, nutrients, crop productivity and yields.

Haile noted that the efforts the farmers are putting right now are beyond them and they should keep at it as they owe it to themselves and to the generations to come. He added that he will include the findings he has seen so far in his book when he heads back home, and transfer the same knowledge to his students so as to have the same impacts in Ethiopia. Tony noted the great achievements in Uganda having merely implemented the activities in two years hence he looks forward to greater successes as the project begins its second phase of four years. The farmers also got to baptize Melissa the name Nahumitsa, meaning the sowing season, having visited them during the planting season.

Questions/ Discussions

Ian – the trees planted very close to the edge should be transferred deeper to the farm to allow proper root formation since soil is easily washed off.

- All farmers should be very proud of what they have achieved thus far and should keep at it

Melissa – is this your land?

- Yes it is. Part of it acquired through inheritance and the other I bought.

John – how big is your land?

- 4 acres



DAY 3

Review Meeting in Entebbe

Session 1: Project Overview



Clement welcomed all present and gave them the opportunity for self-introduction. He also thanked the NaFORRI team for the supported they have accorded the project team. Thus far, the project can attest to great successes despite some challenges, which were highlighted by the farmers, and various mechanisms have been put in place to address them. Clement also highlighted that the project initiated a steering committee which fast tracks the procurement of materials such as seeds as well as monitoring the field activities.

Tony also thanked the Uganda team for the excellent organization in terms of logistics, enabling so much to be achieved in such a short period of time. He went on to clarify that reviews are conducted as part of a standard process by ACIAR whereby partners choose suitable external reviewers with vast knowledge of the areas as well as the project. The review process is therefore one to note the achievements, activities that had been set out but haven't been achieved yet, lessons learnt along the way, views of the stakeholders and reviewers, benefits that have come out of the project as well as propose recommendations on ways to achieve the desired results.

Tony highlighted that there were some discretions as to having the review before the project ends or after, and in this case the management felt it best to do it at this point in time as they had received approval on the second phase of the project. It also provides ample to time to develop the design of the second phase as well as incorporate the feedback from the review process. It is noted however that carrying out the review at the end of the project would have been more appropriate as the team will have completed all the activities but that would have translated to lateness in receiving the recommendations from reviewers hence the management fails to tailor an appropriate design for the second phase.

Jeremias then gave an overview of the project stating that activities are being implemented in four countries, starting off with Ethiopia and Rwanda, and later scaling out to Uganda and Burundi, in collaboration with various District, Regional, National and International partners. The project sought to address various challenges such as: land fragmentation due to increased population, poor cultivation practices, floods, soil erosion, drought and water crisis, free grazing, poor tree management and design on farms, high demand for tree products and services, limited availability of tree seedlings, poor enforcement of bylaws, tree tenures, land ownership and gender, markets, poorly developed tree value chains, information and knowledge sharing, just to name a few.

Jeremias highlighted the project has a managerial steering





committee which meets twice a year and its main role is to coordinate activities in the four countries as well as address any operational decisions. Additionally, the committee coordinates field visits, providing learning opportunities for all. To discuss the progress made thus far. The committee comprises of relevant Science Domain leaders i.e. SD1 and SD2. CIMMYT has also been a substantive member of the committee due to its operations in Rwanda and Ethiopia but it became challenging as they would not attend meetings in Uganda,

rather preferred to send a representative from Rwanda. As part of the committee's operations, work package leaders are usually consulted. Tony gets to attend one of the two scheduled meetings physically and virtually for the other one due to the distance.

Catherine pointed out that when they introduced the committee, they realized that each country had unique management issues. With advice and approval from Tony, country steering committees were introduced and chaired by the country coordinator. Members included other partners like World Vision and CIMMYT and this partnership eased field activities as well as provide a synchrony whereby each organization complemented the other. This move has eased quite a number of issues as the team meets frequently and decisions that don't require Catherine's approval are easily dealt with at the local level. However, matters beyond their scope are usually communicated to her and Tony for further action.

Questions/ Discussions:

John – what is the total number of members in the managerial steering committee?

- The committee comprises of Tony Bartlett, Catherine Muthuri, Fergus Sinclair, Jeremias Mowo and representative members from each country office and partner organizations.

Haile – what value has the steering committee added to the outputs of this project?

- If the steering committee was not there, the project would not have achieved the success it has so far. This is because the committee was a form of structure that kept the project in check, and constant feedback is given to Tony via Catherine
- Catherine added that work packages cut across countries and each leader has an overarching understanding of project activities in each site. Therefore, to ensure quality control and everything cuts across, the overview of all countries can only be done at that higher level. However, the steering committee meetings help the team capture unique things at the country level. The committee is therefore consultative enough, ensuring the theories, principles and focus of the Project across the region is maintained
- Hillary mentioned that the committee provided an avenue to harness opportunities such that the best sites were chosen so as to achieve maximum results in a short period of time
- Was the committee insinuating the desires of ICRAF as an institution?
- This has never been the case as the committee comprises of other partners not only ICRAF hence the views and opinions of





all were well represented through the team. The committee therefore pushes the agenda of the country and not that of a specific organization

Ian – were there any instances where the steering committee had to police certain partners in terms of delivering on their outputs/ activities and who would deliver it?

- Tony highlighted that at the beginning of the committee, there were a few issues which wouldn't be considered as policing,

rather open discussions when the issues arose.

- Catherine added that the sub-contracts signed by each partner are clear on what will be required of them in terms of deliverables since after every six months, the project has to report to ACIAR and this has kept the team on toes. Furthermore, field visits have made her appreciate the circumstances and challenges on the ground. For instance reasons as to why there are low survival rates of tree seedlings; is it as a result of the drought or the team is not working hard enough?

Melissa – are there any linkages between the project and the upcoming CRPs, as well as any leveraging opportunities in terms of monetary support for this project and the future one?

- Every new project has to consider how its activities will link and map to the CRPs and in the case of this project the main CRP focuses on forest trees and agroforestry trees and is headed by Fergus. Proper mapping ensures complementary funds are allocated to the project. The CRP on Agroforestry Systems therefore maps perfectly to this project, and the project is mapped to a number of CRPs. The more CRPs a project is mapped to, the more it gains bilateral funding from them.
- Catherine also stated that co-location of activities contributes to the same in that the project considers other projects already carrying out their activities in a certain country or site, and if they are mapped to a certain CRP closely related to the T4FS Project, then the activities are co-located to those sites to consolidate databases, information and the outputs of one enhance the other. Additionally, FTA has over the years been keen to partner with this project as it is very well mapped hence will visit the project sites in Ethiopia.
- Is the Project connected to the site integration in Ethiopia?
- Yes it is especially with the upcoming projects in Ethiopia since when the T4FS Project started, CRPs had not yet been introduced. However, CIMMYT and ICRAF were determining factors as to where the project will carry out its activities. For instance under ICRAF the following projects are well mapped in the Ethiopia such as Africa Rising and DryDev, hence can leverage on the projects' databases.



Session 2: Presentation on Uganda



Clement gave a brief overview of the project with a focus on Uganda and also to add on to Jeremias presentation. A number of challenges as highlighted by Jeremias led to this project and the main concern in the northern areas was river bank stabilization; in midland areas the concern was diversity in the tree species as they already had some trees in their farms; and in the uplands, the issue was soil erosion control where farmers were interested in hedge rows and grass-bands to curb the challenge. Farmers in northern areas were

keen to receive *Eucalyptus* seedlings to ensure riverbank stabilization but knowing the effects of the species, the team distributed a few seedlings as well as other different species such as *Bathedavia* and *Alnus*, which have the potential to address the issue. Additionally, the team has been taking measurements on the spacing between the trees to ensure effective soil erosion control at the river banks, hence are trying to work with the farmers to enforce that as well as introduce contour banks incorporated with fruit trees.

The project was introduced in Uganda in 2014 and thus far 170,000 seedlings have been distributed to farmers. Aside from seedlings planted through participatory trials, those planted by farmers were only undertaken once farmers attended training sessions at the RRC so as to acquire the right skills and knowledge pertaining to the seedlings. Quite a number of trainings and participatory trials have been carried out under the project and protocols developed for the same through expertise from ICRAF scientists (Nairobi). For instance, protocols on spacing between trees were developed whereby, farms in which *Maesopsis* was grown adhered to wider spacing since the tree eventually grows up to be very big and will provide ample shade in a certain section of the farm. This protocol proved suitable for farmers with small pieces of land who were interested in taking part in the participatory trials. The protocols were also based on advice given by farmers as these innovations mainly came from them and were later taken up by the team once they proved to be most effective.

At the start of the project, the team noted that farmers would only feed their livestock nappier grass or banana leaves and this was an opportunity to introduce farmers to the trees which can provide fodder for their animals, when mixed with the other components at certain rations, so as to increase the milk production. Findings from the project show that *Bathedavia*, *Maesopsis* and *Eucalyptus* are fast growing trees and have gained popularity with farmers for that reason. Therefore, when farmers are informed of another appropriate species, they tend to compare it with the fast growing nature of *Eucalyptus*.

Additionally, a number of surveys have been carried out including: extension systems surveys, market surveys, local knowledge surveys, and seeds and seedling surveys. Findings from these surveys are being incorporated in a policy brief, which the team will develop once a policy dialogue is held. A business portal is being developed, currently being referred to as tree seeds and seedling supply systems, in a bid to influence policies and scale up national programmes. So far the project has collaborated





with students from various universities: 1 PHD and 5 MSC students.

The project is also in partnership with NFA who have a community planting project and through them the project can find out the number of seedlings and species planted by farmers which will in turn contribute to the projects' supply systems and procedures; Mbale CAP which has been undertaking a 1 million tree campaign later upgraded to a 10 million campaign and this has been taken under consideration for the second

phase of the project as they have proven to be a strong partner; a cooperative farm handling coffee plantations has also expressed interest in the trees they would like integrated with their coffee. Additionally, the Project is also partnering with other five different satellite nurseries.

NaFORRI has also been a key partner as it provides trucks or vehicles to ferry seedlings to farmers whenever the project has to deliver large supplies. The organization has also expressed commitment to continue with the participatory trials and experiments even after the project comes to an end. Furthermore, the organization is keen to making the RRC a satellite Centre as well as introduce smaller satellite centres in the sub-counties.

Session 3: Sap Flow Experiments

Joel highlighted that there are six sap flow machines in Uganda: 3 have been installed on *Albizia* in one farmers land and the other 3 on *Cordia*. Data is collected at certain intervals whereby a USB is inserted in the machines, though another remote sensor approach is being introduced. During the entire process, farmers is involved as there are key aspects that require their observation since Joel may not have the opportunity to visit the farms as often. Some of the observations include the leafing and shedding of leaves and changes in crops around the trees if any. One other area of interest to the farmers is how a computer can be connected to a tree and one gets to know the water intake easily.

In the last 5 months, Joel has been noting the water uptake in these species as well as their similarities and differences. For instance, the shedding of leaves is not synchronized in *Cordia*. The sap flow rate in the tree is measured per hour and the findings so far reveal that the volume in *Albizia* is 70 litres of water per day whereas that of *Cordia* is 100 litres per day. Through his study, Joel is trying to link the uptake of water to the seasons as well as shedding and blossoming of the leaves, so as to see the connection between the two. Another finding is that there is less sap flow rate during the rainy season and it increases during the dry season.

Some seeds cannot be acquired locally such as the *Pine* and other exotic species. However, farmers have expressed the need to have more indigenous than exotic species as they are readily available and easily accessible. The project is working towards influencing policies that will regulate the establishment of tree nurseries because there are no regulations to this, permitting just anyone to set-up one and





run the way they deem fit. The policy dialogue mentioned by Clement will hopefully set a platform for this to be addressed. The feedback Joel has received from farmers is tremendous and the project has been applauded for availing indigenous species to them since earlier other projects and organizations only promoted exotic species.

In addition to the trainings Clement mentioned, farmers are also taught the distinction of a good pot from a bad one, whereby a bad pot has wrinkles whereas a good one

doesn't. This observation therefore enables them to make informed decisions as well as improve their potting techniques. Demonstration sessions are also carried out at the RRC and farmers get to have their practice sessions once the technician concludes the demo.

Another key finding by the team is that communication and dissemination of information is a key component to achieving the desired outcomes. The Project therefore has been applying various approaches such as the lead farmer initiative, whereby the farmer trains the other farmers on various aspects related to the project activities; and coordination meetings whereby the project gets to meet with the local leaders and exchange ideas as well as reports that have been published through the project. A visit to Rwanda organized by the management was an eye opener for Joel whereby he interacted with other PHD students undertaking sap flow experiments as well as scaling up project activities.

In his concluding remarks Joel stated that seedlings theft in the area calls for scaling out the project to other areas as more farmers have expressed interest in the project activities but currently don't have the privilege other farmers have i.e. access to seedlings. The innovations introduced by farmers are also been taken up by the team and comparisons will be carried out in order to verify the best mechanisms. Additionally, a nucleus of farmers visit the RRC frequently to give the team feedback on the trials in their farms. Based on the positive feedback and successes of the experiments, Joel requested additional funds be allocated towards the venture so as to scale up the experiments to other species as well as other locations.

The project is also working towards streamlining other project activities being carried out in the area and Manafwa District leaders have accorded them immense support by linking those activities to the project, having noted that the project incorporates diverse activities. Additionally, the District leaders have also instructed the sub-county chiefs to avail comprehensive lists of all farmers in order to have all supplied with the appropriate species the project is promoting in the area.

Question/ Discussions:

Ian – it's impressive what the team has achieved in such a short period of time

- The VIP project does not include trees value chains as is the case of Zambia where the project is carrying out its activities. Bearing that in mind, what tree based value chains are you developing in Uganda?





- The value chains that have been promoted in Uganda are coffee, dairy and honey. The VIP project therefore will provide an avenue to scale up these value chains especially through coffee, honey, and fodder for dairy
- It's intriguing that farmers actually conceptualize the functions and purposes of the sap flow experiment, but how will you use the experiment to recommend spacing as well as other aspects such as agroforestry systems within the life of the next project as well as consider the social aspect which farmers can relate to beyond the scientific aspect?
- Catherine highlighted that sap flow use in Africa is not quoted. Therefore, the project will use that to

determine densities for long-term trials for example on *Cordia*, which is not common in Uganda as it is in Ethiopia, Tanzania and Kenya. On the social aspect for farmers, they will be able to know the implications of when a tree sheds its leaves in relation to the nutrients, i.e. what the tree provides and how much water intake takes place hence when to optimize planting or not, and also the appropriate crops to plant. Additionally, the partnership with NARO and other universities will help the project in determining the right spacing of trees.

John – since farmers are keen on acquiring *Eucalyptus* seedlings, the project needs to consider avenues where the species can be compared to others during participatory trials, so as to promote them more over *Eucalyptus*.

- Are you planning to expand the sap flow experiments?
- Catherine stated that the experiments have been dependent on funding availability and the project has allocated a certain percent in the second phase of the project, in a bid to double the sap flow machines in each country, which currently stands at six. This will be an opportunity to investigate more trees as there is knowledge gap on water uptake in trees
- Joel added that it would also be good to know the best trees to incorporate in farming systems, which will be accomplished if the machines are increased, as well as arrangement of these species on farms

Haile – there seems to be a negative reaction to established laws, for instance when it comes to boundaries used to stop soil erosion. Why is this the case?

- Clement mentioned that when the boundary system was introduced in the country during colonial times, it was through force and farmers would be punished if they didn't adhere to the set rules. With time however, there was rebellion from the farmers, as they no longer wanted to act upon the forced practices, rather introduce their own practices that will benefit them more. However, farmers are slowly realizing that when they clear their banks they are losing nutrients in the soils hence are working on redeeming their lands to counter the prior effects





- The project should consider scaling up elephant grass in the upland areas, where new land is being reclaimed, as this will form an avenue to capture indigenous knowledge. The trials introduced by the project are therefore tailored in a participatory manner whereby when the project recommends a certain tree species, the farmer resonates with them as they explain the benefits they have noted with that species. This system has made them feel part of the process and have quickly taken it up. This captured the attention of District officers who at one time took the Uganda team for a drive around the areas and requested them to work with farmers all over by introducing the same

practices so as to reclaim as much land as possible. The project is therefore working on organizing demonstrations whereby farmers can learn and replicate the practices in the affected areas

- There seems to be a lot of experimentation being done by farmers to the trees, crops or land management practices. The diversification is good but there need to be an intensified consolidation or streamlining of these experiments/ innovations. Additionally, some farmers are planting quite a number of different crops. The project can advise on the best crops based on the market needs, which the farmer can focus on so as to achieve maximum profits or returns.
- Catherine responded by stating that at the beginning of the project, there were a number of participatory trials being carried out and some are ongoing but are yet to be synthesized. However, when the project does so, it will be able to clearly demonstrate such attributes like growth rates, changes in livelihoods, farm stabilization, since most of the areas have been geo-referenced. Additionally, there are a number of work packages that can analyse the statistical or bio-physical data which the project will then use to synthesize the data since there is ample data on when the trees were planted as well as the measurements. The tricky aspect however is on erosion control since indicators of the control will be required such as soil sampling. Photos are indeed very powerful as they clearly reveal the before and after effects of trees but the soil samples will provide deeper insight as they will clearly indicate when and where the changes took place.
- The views of Namunyu with regard to honey and milk production should be taken up in the second project as well as the upcoming value chains project.
- There are 2 categories of farmers: those who are well sensitized and versed with all they do whereas some don't have as much information or skill. Knowledge dissemination techniques therefore need to be enhanced and diversified to reach all farmers at equal levels.

Prossy – the project can come up with a communication package that will contain extensive information on the various tree species since the main concern for many as well as farmers has been the production of annual crops. Through this, existing extension systems can be complimented mainly on annual crops and animals, as well as integration of trees on farms.

- Hillary added that the same will also serve as



capacity building opportunity for the national government extension officers as they will learn all that other experts from other countries come to teach them. It will now be an opportunity for Uganda to send out its own experts for instance the PHD and MSC experts. The same can also be considered for the NaFORRI team and other national partners since they play key supportive roles.

Session 4: Regional Project Overview



Catherine introduced an overall view of the project, giving a summary that cut across the four countries. It all begun with a two day workshop where baselines were designed with the support of partners as well as representatives in Burundi and Uganda where the project later scaled out to. Despite Burundi and Uganda being scaling out countries, they equally benefitted from trainings thus a better start-up compared to Ethiopia and Rwanda.

Through the workshop, sites were determined as well as the samples to be collected from each based on the funding. The project settled on 600 households in Ethiopia as well as 600 in Rwanda. A land degradation surveillance framework was also developed and has so far been used in in 2 zones for both

Rwanda and Ethiopia. Market, extension, seeds and seedlings systems surveys were also carried out in all the four countries. In Ethiopia and Rwanda tree inventories were done by MSc students who collected data on tree diversity and the number in each species? Papers on the findings are currently in the pipeline and will be distributed.

One of the main challenges Uganda faces includes: how to harness water at the household level by using gutters as well as other rain water harvesting techniques; soil erosion; poor farming practices; tree diversity and management. Compared to the other three countries and the magnitude of challenges, Uganda proves to have a very good and enabling environment when it comes to tree planting as well as capitalizing on their products and markets within a shorter framework.

A land fragmentation surveillance mechanism was carried out and a comprehensive guide has been published, containing information on soils and vegetation maps for example. In Burundi, the project managed to successfully develop vegetation maps which have been integrated to Eastern Africa vegetation and are available online. Based on findings from the project, there are similarities in organic carbon cover in Ethiopia and Rwanda. However, more work needed to be done so as to increase the carbon whereby the project encouraged farmers to grow more shrubs. The approach was however not effective in Rwanda as farmers felt shrubs required more labour and effort hence the project reduced the number of shrubs to be planted and widened the scope.





Local knowledge surveys were also carried out and a PHD student carrying out studies in both Ethiopia and Rwanda, will enable the project to develop individual and comparative manuscripts. Through the local knowledge approach, the students get to live with the farmers in a span of 2 to 3 months, so as to develop a personal relationship with them, as they later open up about their genuine concerns. Based on all the surveys, it is clear that the agro-ecological conditions have an effect on agroforestry. Additionally, in the poor

households, Farmer Managed Natural Regeneration (FMNR) seems to be more convenient and consistent. This was revealed when research was carried out to investigate the number of trees planted in the last three years by farmers in the semi-arid areas. The research revealed that there were no trees planted within the stated period, rather farmers opting to do natural FMNR practices based on their own knowledge. Through project interventions, the semi-arid areas are picking up very well as farmers are planting more trees.

Institutional and policy arrangements are also critical to project implementation. Additionally, livestock grazing proves to be the most critical hurdle, which the project has to overcome in Ethiopia, in order to scale up adoption of trees on farm. Trees in all the four countries are therefore adopted based on different circumstances and sects. Is there complementarity or competition between trees and crops? Yes there is as not all species are competitive and it therefore depends on the species you integrate with plants, the management of the trees, seasons, and the age of the tree. *Cordia* is a popular species among farmers and is most appropriate for the wet areas.

To prune or not to prune? An experiment done by the team reveals that it all depends on the season and water intake of the tree. For instance, there are negative effects when *Faidherbia albida* is pruned. Furthermore, root pruning is not favourable to farmers as they say its hard work for minimal benefits. Climbing beans are popular in Rwanda and the yields are very high, and Uganda needs to take this into consideration by introducing it to farmers since the management and planting is similar to that of the normal beans.

There exists in each country tailored extension structures, whereby both group and individual extension methods are carried out. In Uganda, the farmer-to-farmer extension method has proven to be the most effective. A term however needs to be developed for situations where farmers learn from a group setting, then break out to start their individual nurseries for example Samuel. The success of the RRCs is dependent on the contexts. In Ethiopia for example, the RRC is business oriented whereby farmers get to start their businesses at the Centre and operate from there. In Uganda, trainings are the strongest component, which the RRC has focussed on.





One key finding is that for a project to be successful, it is important to ensure community ownership. Additionally, fruit and fodder trees are more popular. In Uganda, timber trees are of more priority to farmers but the project is encouraging farmers to also take up fruit trees as they seem to be doing well in the country.

Implications of free seedlings is not clear in terms of sustainability since some are given for free whereas others are sold. The RRC is also a platform for pure learning, income generation and capacity building as portrayed by the farmer grafting many mangoes in a short period of time as well as the lady farmer who pots 3,000 seedlings in a day. Water harvesting

structures have been established in Ethiopia and the same will also be considered for Uganda through the VIP project.

Experiences from one country can be scaled out to another as explained by Joel who visited Rwanda and based on the learnings, he has already introduced spacing techniques applied in Rwanda at the Uganda RRC so as to compare between the two. In terms of communication, as a project leader, face-to-face meetings and field visits are the most effective as one gets to appreciate the challenges and needs of the farmers and team on the ground. The Uganda team has also made Catherine's work easier and she doesn't need to micro-manage the team. The mid-term reviews have enhanced the performance of the project as well as Tony's availability in attending at least one each year and the immense support he accords the team cannot be taken for granted.

In her concluding remarks, Catherine thanked the Uganda team for their great work and support, as well as to Tony and Melisa for according the project the necessary support and funding, and she couldn't ask for a better donor. Additionally, she thanked Jeremias for his support on a regional level and to Fergus for his technical support from an SD perspective.

Session 5: Feedback from Reviewers

Tony – the Uganda team is impressive having achieved so much in a short period time and is certain more will be achieved in the next phase

Ian - There are great extension systems in all the four countries and the project can develop a conceptual framework that categorizes the methods based on what works best for which country and what can be scaled out to another country. In phase two therefore, the team can put effort into developing the framework focusing on the financial, social and intellectual elements that accompany each technique, and how to make the maximum use of it.





- The Uganda team organized an excellent tour that provided an opportunity for the reviewers to gain a feel of most activities being carried out by the farmers in just two days.
- The mix in terms of the partner organizations involved in the project has ensured successful implementation of activities
- The project has a great opportunity to carry out more studies with students in the next phase for instance on the

rates of adoption by farmers (build on knowledge and experiences of the first phase)

- The scientific impacts are interesting and the project can go a step further to modify farming models
- The project has managed to mobilize so many students as well as build their capacity and this is very impressive

John – a key role that the RRC can play is ensuring farmers get quality germplasm. This can be achieved by collecting, cleaning, testing and packaging quality seeds and later storing them. This will not only benefit farmers in the project but the wider community since farmers are currently picking any seeds they can find

- The project should also map out good and quality mother trees with the help of farmers. Additionally, the farmers should also be encouraged to conserve the trees rather than cutting them down for firewood and other uses.
- The project needs to build the capacity of farmers on the right trees to plant depending on the products he or she would like to acquire or generate in the end.
- The project can introduce simple RRCs in the sub-counties
- The project has done so much in a very short period of time
- Strong partnerships have been forged in Uganda and this will translate to successful impacts at the end of the project
- Climbing beans can be introduced in Uganda as they have been successful in Rwanda
- For farmers to grasp things beyond the life of the project, farmers can be organized into groups so as to have table banking and other financial activities, which will sustain them in future. This can be introduced through the VIP project.
- The project should document success stories such as the break-away farmer, as well as publishing them in local newspapers or magazines.

Haile – the project has been taking a very interesting part in long lasting effects on the role of trees to enhance livelihoods, something that other development organizations have not been keen on.

- The systems are also simplified that have encouraged smooth uptake by farmers





- Addressing issues on land management is not an easy task and I commend the project for its persistence and taking up the views of farmers (listening to them).
- There are greater demands from farmers in terms of improving tree seedlings, something the project should consider in the second phase. Additionally, the desire expressed by the youngest farmer (Derick Mityero), speaks a lot on the interest of the

younger generation, which is key as it will mean a secure future in generations to come.

- In most cases, the top down approach is usually applied by most projects but this project has opted for a bottom up approach, involving local governments at the grassroots level and that is very impressive. The project also needs to appreciate them for their support so as to sustain its activities in the second phase
- Farmers are very keen on being visible hence the project can do short films/ videos that will showcase their work as well as influence activities in the next phase
- Carbon sequestration is an aspect that has been side-lined by the project and this should be addressed as it is now a key global issue
- Based on the great successes of the project, and through the Ethiopia PHD and MSC students, I will foresee the development of case studies on the successes of the project for others to leverage on
- The project has clearly revealed that it is possible to address the common global challenges

Jeremias – NaFORRI should take advantage of the partnership with ICRAF to develop good proposals

- The Uganda team has made the project proud and should keep it up.

Hillary – NARO has appointed him to scale out and manage impacts of the project hence will use it as an opportunity to address some of the comments raised by reviewers. Catherine has been an excellent leader and has held the project together thus far



Annex 1: Meeting Programme

Day 1, 19/04/2016 travel to Mbale and visit to field sites departure 6am		
Time	Activity	Presenter / moderator
7-11 am	Travel from Kampala to Mbale (4hrs drive)	ICRAF office/ Kato/Jane
11:00- 11:30 am	Break tea at the Mbale RRC	Evelyn Nabukwasi
11:30 – 12:30 noon	Tour around the RRC and NFA offices	Joel and Clement
12:30 – 1:00pm	Visit to <i>Alnus acuminata</i> and <i>Bathedavia javanica</i> long-term Trials in Mbale	Joel and Clement
1:00 – 2:00pm	Check in at Mbale Resort and Lunch	ICRAF office/ Kato/Jane
2:00-3:30 pm	Travel to Manafwa district headquarters and hold a brief interaction with district leaders (Chief Administrative Officer and LC5)	Mwangale/Joel
3:30 – 5:00pm	Travel to Butta Sub county and Visit participatory trials (Fodder, tree diversity, trees for shade and food, firewood and Biophysical experiment on Mr. Namunyu's farm). Interaction with other farmers hosting participatory trials (riverbank restoration, woodlots, boundary planting), and district and sub county leaders.	Namunyu (project beneficiary) and Joel
5:00 – 6:00pm	Travel back to Mbale Resort	ICRAF office/ Kato/Jane
7:30- 9:00pm	Cocktail offered by Director NaFORRI	NaFORRI/Joel
Day 2, 20/04/2016 Field trip to Manafwa sites continued and travel to Entebbe		
7:10- 8:00am	Breakfast at Mbale resort	ICRAF office / Kato
8:00 -10:00 am	Travel to Manafwa and interact with a women group (Elgon Trust Women Group) running a tree nursery.	Joel and Clement
10:00 -11am	Visit a participatory trials (soil erosion control using Calliandra and a Mango orchard) Interact with other farmers hosting participatory trials and sub county leaders	Joel and Clement
11:00am – 12:45pm	Travel to Mbale and lunch	ICRAF office/ Kato
12:45- 7:30pm	Travel from Mbale to Entebbe (minimum 6hrs drive due to traffic jam)	ICRAF Office/ Kato
Day 3, 21/04/2016 review meeting in Entebbe and transfer to Rwanda		
7:30-7:50 am	Presentation on strategic issues and key project outputs	Project team
7:50 – 8:30am	Questions and reactions from reviewers, project stakeholders and team	Project team, Tony and Reviewers
8:30 – 9:00 am	Remarks from Reviewers	Reviewers
9:00-9:30 am	Remarks from Tony	Tony
9:30 – 10am	Break tea and transfer to Airport for Rwanda	All

Annex 2: List of Participants

Name	Title	Institution
1) Dr. Hillary Agaba	Director	National Forestry Resources Institute (NaFORRI)
2) Mr. Jude Ssekutuba	Programme Leader, Agroforestry	National Forestry Resources Institute (NaFORRI)
3) Prossy Isubikalu	Lecturer	Department of Extension & Innovation, School Agricultural Sciences, Makerere University
4) Jonathan Masette	Field Officer	Mbale Coalition Against Poverty (CAP)
5) Robert Mubokhisa	Sector Manager West Bugwe/Mbale	National Forest Authority (NFA)
6) Mr. Situma Aron	Deputy Chief Administrative Officer (ACAO)	Manafwa District
7) Ms. Sarah Bisikwa	Natural Resources Officer/District Environment Officer	Manafwa District
8) Mr. Michael Mwangale	District Forest Officer	Manafwa District
9) Modesta Nambuya	District Production Officer	Manafwa District
10) Ronald Nakhaima	Sub/County Chief (Senior Assistant Secretary)	Butta Sub/County, Manafwa District
11) Evelyn Nabukwasi	Sub/County Chief (Senior Assistant Secretary)	Namabya Sub/County, Manafwa District
12) Robert Kisenge	LC 3 Chairperson	Namabya Sub/County, Manafwa District
13) Sylvia Lusike	Community Development Officer	Namabya Sub/County, Manafwa District
14) Namunyu Richard	Model Farmer	Butta Sub/County, Manafwa District
15) Caroline Musuya	Chairperson, Farmer group	Manafwa District
16) George Nasimolu	Chairperson, Farmer group	Manafwa District

17) Samuel Wamono	Nursery farmer	Manafwa District
18) John Kapere	Model Farmer	Namabya Sub/County, Manafwa District
19) Samson Wakwabubi	Parish Chief (Assistant Secretary)	Butta Parish, Butta Sub County, Manafwa District
20) Dison Wesonga	Model farmer	Butta Sub county, Manafwa district
21) Maike Patrick	Model Farmer	Namabya Sub county, Manafwa district
22) Sirajje Nabutanyi	Grafting specialist attached to Mbale Rural Resource Centre(RRC)	Mbale Rural Resource Centre, Mbale District
23) Amuge Richard M	Nursery attendant at Mbale RRC	Mbale RRC, Mbale District
24) Christine Athieno	Nursery attendant at Mbale RRC	Mbale RRC, Mbale District
25) Abusa Michael	Mvule Trust Intern, attached to ICRAF Uganda	Mbale RRC, Mbale District
26) Joel Buyinza	Project coordinator/ Agroforestry Scientist	National Forestry Resources Institute (NaFORRI)
27) George Mayeko	Model farmer	Namabya Sub County, Manafwa district
28) John Wepukulu	Community Nursery Operator	Namabya Sub County, Manafwa district
29) Wabomba Steven	Model farmer	Butta Sub county, Manafwa district
30) Nambuya Sauda	District Councillor	Manafwa District
31) Tsesoyi Bashiri	Farmer	Namabya Sub county