

# *Pruning*

**to improve spatial complementarity in utilization of below ground resources**

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## **Sharing local knowledge: Farmers from Kabale (Uganda) study tree - pruning systems and agroforestry in Embu (Kenya)**

- Report of a visit by Kabale farmers to Kenya in May 1999 -



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the Forestry Research Institute (FORI) Uganda, and the Institute of Terrestrial Ecology (ITE) UK.

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**Figure 1:** Research sites of the Agroforestry Research Network in East and Central Africa (AFRENA-ECA) and route taken for the farmer exchange tour.



**Figure 2:** Video production placing emphasis on farmers' perceptions on management options for agroforestry technologies



**Figure 3:** Some of the farmers at Embu Regional Research Station



**Figure 4:** A group nursery for bare rooted Calliandras is found on the Mitambo farm. Erosion problems are addressed by a catchment approach



**Figure 5:** Mrs. Agatha Mitambo gaps a contour hedge with bare-rooted Calliandra seedlings



**Figure 6:** Dr. Karanja (KARI) and the farmer group visit Purity's zero-grazing unit

## Executive summary

Due to a favourable climate and inherently fertile soils the highlands of east and central Africa have a good potential for agricultural production. However, high population density and poor market facilities have contributed in some areas to unsustainable farming systems with low production. Kabale District in southwestern Uganda is an example of such an area. By contrast, Embu, in central Kenya shows very encouraging trends: farming systems are generally sustainable and market orientation, particularly through dairy farming, coffee and fruit production generates farm income. The integration of trees into the Embu farming systems has not only made the systems more resilient but also more productive. To combat the problems of tree-crop competition, Embu farmers have developed severe pruning and pollarding of trees as a successful management tool for trees in croplands. Pruning enhances compatibility of trees with crops, improves timber quality and produces additional wood, mainly used for fuel.

The majority of Kabale farmers are of the impression that trees and crops cannot be successfully grown together. To expose selected farmers to the advanced agroforestry systems of Embu farmers a farmer-study tour was arranged in May 1999. This tour was combined with the production of a video to further support dissemination of agroforestry and management practices such as pruning for increased production of wood and crops.

Eight farmers went on tour. They expected to learn new and improved farming techniques, management of *Grevillea* and *Calliandra*, and improved methods of dairy farming. In order to encourage beneficial interaction between Kabale farmers and Embu farmers, the Kabale farmers stayed with Kenya host farmers.

Major lessons learnt during the trip included the following:

- ✓ How to manage *Grevillea* and *Calliandra* for wood, fodder, stakes and timber.
- ✓ How to prune and pollarding trees on farm to minimize competition with crops and to enhance timber quality and wood production.
- ✓ Ways Embu farmers use to resolve conflict on tree planting along boundaries.
- ✓ How diversification and integration of high value crops enhances farmers' food and income.
- ✓ The exciting potential of integrating improved fruit trees into farming systems.
- ✓ How land consolidation facilitates improved farming methods and conservation.
- ✓ The excellent time – management which enables Embu farmers to achieve more on their farms.

Kabale farmers felt challenged and resolved to increase tree cover initially on their farms but also to engage in extension work in their communities. The video produced will be particularly helpful to share their new knowledge with fellow farmers. Specific proposals made by the farmers were to:

- Setup private nurseries for bare rooted seedlings of *Grevillea* and *Calliandra*.
- To use a community catchment approach in areas where individuals may not make impact such as areas which are heavily eroded.
- ***Pruning of upperstorey trees was seen as a practical and convincing method to enhance integration of trees in the cropland.***

## 1. Introduction

Climate and inherently fertile soils of the highlands of East and Central Africa are suitable for high agricultural production. This potential has led to high population densities. Present farming systems in these highly populated and hilly areas are not sustainable.

However, in spite of similar conditions, contrasting land-use systems have developed in Kabale (southwestern Uganda) and Embu (eastern Kenya). Except for commercial Eucalyptus woodlots, very few trees are planted by farmers of Kabale district, which is part of the highlands of Kigezi. The absence of tree products and services has critically affected the natural resource base. By contrast Embu farmers integrate trees in many niches of their farming system. They have found trees for timber, poles, wood, fodder, fruits and other purposes to be very profitable and have developed management systems that allow their integration in the cropland. Severe pruning of trees in the cropland is the main management intervention developed by Embu farmers to enhance compatibility of the trees with crops.

There appeared to be a great learning opportunity if Kabale farmers were exposed to Embu farming systems. To further enhance interaction between farmers from both areas, Embu farmers offered to host their colleagues from Kabale. The farmer study tour (see figure 1) was combined with the production of an extension video that will support the further dissemination of the Embu agroforestry and pruning practices.

The Director of KARI (Kenya Agriculture Research Institute) and his staff at the Regional Centre of Embu kindly supported the project. On the Ugandan side the Director of the Forestry Research Institute (FORI) of NARO facilitated the necessary arrangements. At ICRAF the Regional co-ordinator for AFRENA worked hard to make the trip possible at short notice. Funds for the tour were made available by the Department for International Development (DFID), UK, through the Forestry Research Programme..

### *The purposes of the trip were:*

1. To let Kabale farmers share their experience on agroforestry and agriculture in general with other farmers in a similar agro-ecological region but with a more intense farming system.
2. To let Kabale farmers evaluate a farming system which intensively integrates trees and crops.
3. To let Kabale farmers acquire new skills in managing upperstorey trees such as pruning practices.
4. Participate in video recording on agroforestry technologies and tree pruning in particular (see figure 2).
5. To explore whether the Kabale farmers who travelled to Embu can become major agents of change in their local communities..

## 2. Farmers' selection and farmers' expectations

Ten farmers were planned to participate in the exchange tour. The number of farmers to go was limited by the availability of funds and the means of transport. Due to some family problems, which arose just prior to departure, only eight farmers went on the tour. They were accompanied by a FORI research officer and the AFRENA forester supporting the pruning research.

A few days before departure a meeting was held with the selected farmers to discuss the logistics and farmers' expectations. Farmers were selected to represent groups such as the Dairy Co-operative Society, the Two Wings Agroforestry Women's Group and local councillors that are expected to be the early adopters of agroforestry technologies. Other factors considered were:

- Gender – 3 ladies were among the farmers who went to Embu.
- Proven ability to mobilize others for positive change and passing on the acquired knowledge to fellow farmers in their local areas.
- Farmers' influence on the local community e.g. local and opinion leaders.

**Table 1:** Farmers participating in the tour and groups represented

Name	Group	Location (Subcounty)
Peace Turyatemba	Rwene Two Wings Agroforestry Group	Buhara
Jimmy Musiime	Bubare Subcounty Local Council	Bubare
Judith Orikiriza	Nyabushabi Women Group	Kyanamira
Sam Ndaaba Magaba	Kigezi Dairy Co-operative Society	Kamuganguzi
Apoll Oworinawe	Bubare Butabale Kyantobi	Bubare
John Nygkure	Farmer	Kitumba
Rev. Debrah Canon	Chairperson of women group	Kamuganguzi
Micungwe Rukara		
Ahimbisibwe Rwaboona	Ahamurwa Subcounty Local Council	Ahamurwa

*The selected farmers expected the following from the tour: -*

- to learn agroforestry management practices for *Grevillea* and *Calliandra*.
- to learn new and improved farming techniques.
- to see improved methods of dairy farming.
- to see large-scale farming allowing them to compare with the fragmented land in Kabale.

## 3. The tour

The group was composed of 8 farmers, 2 Kabale AFRENA staff and a driver. They travelled over 1324 km from Kabale to Embu- Kenya by road (see figure 1). The journey started on Friday the 30<sup>th</sup> of April 1999. From Kabale, the group spent a night at Lweza training centre in Kampala. The next stop on Saturday 1<sup>st</sup> May 1999 was in Eldoret - Kenya at Hotel 'Sirikwa'. On Sunday the 2<sup>nd</sup> May 1999 the farmers arrived at the 'Mini – Inn' in Embu via Nairobi.

To access useful information and encourage beneficial interaction and discussion between farmers it had been planned that the visiting farmers would stay at the homes of some selected farmers in Embu. This would facilitate visiting farmers to get a much broader exposure to the Embu farming systems and to exchange ideas with their hosts.

After discussing and overcoming the initial fears of Kabale farmers concerning staying at Embu farmers' homes, they enjoyed two nights of excellent hospitality accorded by Embu farmers in their houses. It was arranged that two farmers from Kabale would stay together at an Embu farm, to enable –among others– communication for those of the Kabale farmers not speaking either English or Kiswahili. Reports have it that discussions went on until late in the night covering all points of interest concerning life in Uganda and Kenya. The discussions also focused on agroforestry technologies such as integration of trees with food crops and how best to manage them in order to minimize their competition e.g. pruning and pollarding of trees. Kabale farmers were surprised to learn that work on an Embu farm starts at 5:00 am with women milking cows.

#### **4. Activities at Embu**

##### *4.1 Monday 3<sup>rd</sup> May 1999*

##### *4.1.1 KARI Regional Research Centre-Embu*

The morning session was spent on formal briefing by the KARI/ AFRENA staff about the agricultural research set up in Kenya, the agro-ecological zones and the research themes at the station. The major research themes at the Embu Regional Research Centre include:-

- soil and water management in relation to soil fertility and conservation;
- fodder production and utilization for dairy cows and other livestock in relation to crop production;
- trees with high value products like fruits, nuts, medicines and as wood products.

These themes are explored in the context of:

- development and dissemination of the technologies with farmers;
- social economic analysis to explore profitable modifications of the technologies and their adoption potential.

The farmer group was shown on-station research plots including fruit orchards, fodder experiments and a zero-grazing demonstration unit.

##### *4.1.2 Mzee Muriuki Harrison Terah's Farm*

Kabale farmers visited the farm of Mzee Muriuki Harrison aged about 65 years. He is a small holder farmer with a consolidated farm of three acres. He grows 425 arabica coffee trees, 21 macadamia - nut trees and 53 plants of bananas (Kampala variety).

Agroforestry components on his farm include:

- a zero grazing unit, one Ayrshire cow;
- climbing beans, passion fruits, apples and Macadamia nut trees;
- *Calliandra calothyrsus* for fodder- about 300 shrubs of these on his farm planted in hedges along terrace risers and footpaths;
- *Desmodium intortum* and Napier grass intercropped in fodder plots. Napier acts as natural stakes for *Desmodium* to climb on and the *Desmodium*

replenishes the soil through nitrogen fixation. Napier grass requires fertile soils to produce good fodder;

- Compost (*Boreya*) production using organic household wastes;
- multipurpose trees and shrubs such as Grevillea, Cordia, Croton.

#### Management:

Most of the upperstorey trees are grown either along the farm boundaries or on the terraces. This helps to stabilize the terrace and act as shade for the coffee. The Grevillea is heavily pruned to reduce on shade and minimize competition with neighbouring crops. Most cash is generated from coffee, fruits, Grevillea trees and zero grazing cows.

Calliandra is grown as hedges which are cut at about 2m above the ground. It is often pruned to get fodder for the cows. Compost from cows is used for biogas production. This technology greatly fascinated the farmers of Kabale. It uses polythene tubing of about 1m diameter. This is where the cow dung is kept for producing the gas. After the gas is removed from the cow dung, the residues are used to manure the garden.

#### Lessons from this farm:

- ✓ Pruning and pollarding of Grevillea and other trees is very suitable and practical to minimize their competition with crops (see box on page 11).
- ✓ Innovative technology, such as biogas generation through manure processing is very beneficial for small farms. Cow dung from the zero grazing unit is mixed with water in a pit then fed into a polythene tubing where biogas is released and used for light and cooking. The residues of the process are put into another pit for storage until it is applied as fertile and weed seed - free manure to the field.
- ✓ Improved farming practices, such as planting crops in lines reduce labour and should be promoted in Kabale where it is not common with local farmers.
- ✓ Land consolidation is a major factor for successful farming and good land husbandry.
- ✓ The farmer is a very hard working man even at such an old age.

## 4.2 Tuesday 4th May 1999

### 4.2.1 Mr. Samuel Njue Mitambo (Agatha's farm)

Mr. Mitambo inherited three acres of land from his father. His sole occupation is farming and he has been able to pay school fees for his 11 children mainly from his farm. The main cash crop is coffee of which he has two acres and according to Mr. Mitambo produce 5000 kg per year. He has recently acquired coffee trees of the 'Royal 11' hybrid which yields within 2 years.

Other agroforestry components on his farm include: -

- A zero grazing unit - one cow.
- Calliandra for fodder and soil conservation planted as hedges all over the farmland. Fodder is always cut at about 1m above the ground, but when more

biomass production is required, cutting is much nearer the ground to stimulate many coppices from a single plant.

- Both, *Calliandra* and *Grevillea* are successfully raised and transplanted as bare-rooted seedlings. Farmers experience no problem with this as long as a raised seedbed is used in the nursery and transplanting takes place on a cloudy day when soil is moist (see figures 4 and 5).
- *Macadamia* (nut) tree for increased income. He has 150 trees on his farm, which were planted in 1996 and some of them are grafted for fast and better yields.
- *Grevillea* for timber, firewood through pruning and pollarding and other uses.
- Mangoes and avocados (fruit trees) for both cash and domestic use. Also some of these are grafted to ensure fast and high yields.
- *Vitex keniensis* for timber, fruits and firewood.
- *Prunus africana* for timber and medicine.
- *Cordia africana* for timber, fuelwood and soil fertility replenishment.
- *Markhamia lutea* for fuelwood, poles, soil conservation and timber.
- The farm also hosts a group nursery which raises bare-rooted seedlings for the whole catchment.

#### Lessons from this farm

- ✓ The idea of a catchment community nursery is vital for massive seedling production and planting in a given area. It is an appropriate method of extending and utilizing soil conservation using agroforestry technologies.
- ✓ Seedlings do not necessarily have to be potted because bare root ones have been found to do well, yet they are cheap and require less labour.
- ✓ The community nursery only receives seeds from AFRENA Embu. This reduces unnecessary costs on the AFRENA side and also enables the community to raise as many seedlings as they need. Some more seedlings are obtained as wildlings found near old trees where seeds fall and germinate.
- ✓ There is diversification of crops including fruit trees, which boosts income generation. Through increased income, the farmer has been able to increase his land from 3 acres to 6 acres. It is on this farm that the AFRENA staff have stepped up trials of improved fruit trees through grafting.

On the same day the group also visited Manyatta area, a tea growing area on the slopes of Mt. Kenya. Maize and other common crops are not grown in this area because the soils are acidic and cannot support them but tea does well in such soils. Mt. Kenya forest was also visited where a number of high value timber and medicinal tree species still survive. Domestication of some species is being done by KARI / ICRAF agroforestry project. Details of this visit are reported in chapter 5.

### 4.3 Wednesday 5<sup>th</sup> May 1999

#### 4.3.1. Mr. Frederick Kinyua's farm

Mr. Kinyua is a small-holder farmer. He began farming in 1977 with about 1 acre of land. Through the income from his farm he was able to expand his farm to about 3



acres. He has various crops such as beans, maize and coffee. Trees on his farm include Grevillea, Cypress, Calliandra, Mulberry, Coffee, Avocado and Guava. On this small land, he has 207 coffee plants. Twice he has been selected and awarded as the second best farmer in Kenya and once he was the overall winner. This, coupled with his systematic way of work, such as calculating profit before undertaking any crop growing has earned him the nick- name of “Professor” by the President of World Bank.

Lessons from this farm:

- ✓ Intensive farming with high crop diversification has resulted into optimal utilization of the farmland.
- ✓ The family gets all their fuel needs from the farm through pruning and pollarding of Grevillea and other trees. This is very important since acquiring firewood is a major problem particularly for women because there are no natural woodland or forests.
- ✓ Trees can be arranged systematically in space and time for compatibility e.g. on a contour he has lines of *Morus alba* (a source of fodder), *Grevillea robusta* and *Calliandra calothyrsus* each line at 6ft from the other. This is also very important for soil conservation.
- ✓ Calliandra for fodder used as a more reliable nutrient animal feed instead of dairy meal from shops.
- ✓ He reported that 3 kg of Calliandra fed to dairy cows is equivalent to 1 kg of dairy meal but there is also higher butter content in the milk as a result of feeding Calliandra rather than dairy meal. He harvests 6 kg of Calliandra from 9 stands on a 3 metres area.
- ✓ He also demonstrated how to pollard Grevillea and Calliandra for maximum biomass production and reduced competition with crops (see box on page 11).
- ✓ He is of the view that roots of trees planted on border lines can not be prevented from crossing into a neighbour’s field. This farmer has developed an excellent way of solving this conflict by sharing trees planted along the border with his neighbour though planted by him alone. He provides seedlings but they share the trees in the boundary by use of a ballot.
- ✓ Integration of fruit trees such as avocado, mulberry and passion fruits with bananas and trees on the reclaimed swamp where he hopes that Grevillea trees will act as natural stakes for passion fruits. For better pollination of the fruit trees and for honey production he intends to begin apiculture.
- ✓ Inclusion of *Tephrosia vogelii* on the farm which limits crop pests such as moles and rats.
- ✓ The farmer has a high level of determination and personal initiative as well as good time management that has enabled him achieve a lot. He keeps records for all his farm activities and outputs.

4.4 Thursday 6<sup>th</sup> May 1999

4.4.1 Purity Wanjiku Njagi’s Farm

Mrs. Purity Njagi had more agroforestry components on her farm than any of the previous. Notable was an advanced zero grazing management unit with 4 cows and 3 calves (see figure 6). A standard zero grazing unit was first constructed in 1986 with

the assistance of national dissemination group though she had been practising it since 1975.

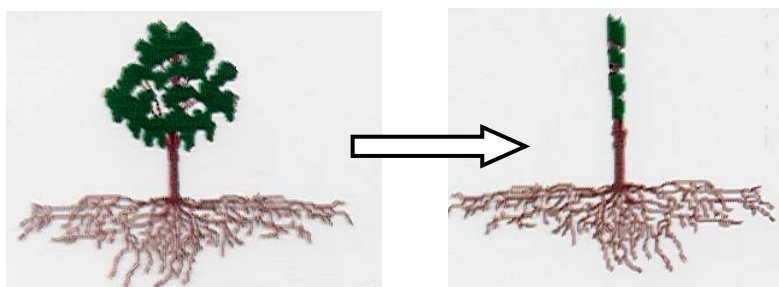
By 1988 field days were held at her farm and Calliandra together with Leucaena were introduced. She then planted 200 seedlings.

Through profits from the milk, she has purchased a chaff cutter, which eases cutting Napier grass and increases fodder utilization with minimum waste. She has expanded her fodder production by planting more species of Leucaena which are resistant to pests that have been a major problem for Leucaena production on her farm (and East Africa as a whole). These species are also said to produce more biomass. They are: *Leucaena pallida*, *L. trichandra*, *L. collinsii*.

Lessons from this farm:

- ✓ Use of appropriate technology such as the chaff cutter and slurry carrier.
- ✓ Practice of soil conservation methods e.g. contouring on the steep slopes of the river in her field. She has now planted coffee on these slopes thus optimally utilizing all her land.
- ✓ Well managed napier grass which regenerates after cutting within six weeks through manure recycling from the grazing unit back to the napier field and appropriate cutting in the field to avoid weeds.
- ✓ Systematic integration of agroforestry components on a small piece of land e.g. fruit trees, fodder species and crops.
- ✓ Use of prunings from Grevillea, fruit branches and other trees for firewood is further enhanced by use of an improved oven, which also speeds up cooking.
- ✓ Grains are better stored in a modern granary made of local materials.
- ✓ The high interest, morale and devotedness that the lady shows towards her farm.
- ✓ Women demonstrated that they can milk cows and they do it regularly. This may be an important message for Kabale women who do not milk cows.

### Box 1: *Embu farmers' Grevillea pruning cycle*



To reduce competition with crops, improve timber quality and get firewood and mulch, Embu farmers heavily prune and pollard their timber trees. This is what they do:

- Begin pruning trees when they are about knee - height:
  - remove all lower side branches. Repeat every 6 months.
- When the stem is strong:
  - On the lower part (up to 3 metres) of the stem remove all branches
  - Leave a few “steps” (branches) to alleviate climbing your tree.
  - Above approx. 5 metres height pollard (cut off the crown) the tree.
  - At subsequent prunings also leave some branches above the pollarding point.
  - Always prune before planting crops near the trees

⇒ Embu farmers say that this is the best way to manage the lower 5 metres of the stem for timber and the side branches and the top part for firewood.

## 5. Saw-milling, pit-sawing and power-sawing

Farmers learned how trees are raised, managed in the fields and finally how they are harvested and utilized for various purposes such as timber.

One of the points of utilisation visited was a sawmill, which was owned by Mr. and Mrs. Njagi Rulima. The two welcomed the farmers to the sawmill and the farmers were able to see the various species (such as Camphor (*Ocotea usambarensis*), Podo (*Podocarpus latifolius* syn.: *milanjianus* and *Podocarpus falcatus* syn.: *gracilor*) from Mt. Kenya forest which are being utilized at the sawmill. The timber is later used in a carpentry for different products such as tables, beds, chairs and coffins. The manager Mr. Hampton Nyaga explained the different sizes of timber and how they are processed before selling either as boards or as finished products. The demand for wood from Mt. Kenya forest is very high and this has prompted the researchers to look into domestication of the species considered endangered and of very high value.

Farmers visited a group of pit-sawers. They were about six members. The species, which was pitsawn at the time of the visit, was *Grevillea* of small size less than 20-cm diameter. This *Grevillea* was about 8 years old. Farmers learnt that under good management *Grevillea* of such age can well be utilised and converted into timber. To farmers this was a surprise as they expected the trees to take 15 to 25 years to reach timber size. The timber, farmers learnt that it could either be sold or utilised at home by using it to make furniture or construct wooden houses.

Kabale farmers also visited a site in the middle of a maize garden field where a Grevillea tree was cut by a power saw as farmers watched and was converted into timber immediately in less than 30 minutes. The Grevillea was also about 8 years of age and had not been managed very well but still good timber was extracted. Farmers were very impressed. Furthermore, they appreciated that the Grevillea tree was harvested with minimum damage to the maize crop. This was achieved by carefully selecting the felling direction and careful cutting. Then, the power saw was also used to cut the planks.

## **6. Visit to ICRAF – HQ and Nairobi**

On their way back to Kabale, the farmers had a chance to stop over at ICRAF headquarters in Nairobi, Kenya. They were taken around the ICRAF complex by Thomas Raussen and also met Prof. Chin K. Ong briefly. The set-up and the cleanness of the whole premises impressed farmers. They were briefly shown some of the laboratories to learn and see the process through which tree seeds are tested before they are sent out to scientists or farmers. They also had a brief introduction on how soils are analysed in the laboratory to know whether they are fertile or not. Unlike their traditional methods where they tell the fertility of the soil by crop yield and sight.

The Director General of ICRAF welcomed and invited the Kabale farmers to the ICRAF staff coffee break where they were introduced to all the staff and guests present. Farmers expressed their pleasure to be recognised at such a high profile gathering.

## **7. General Lessons**

✓ Kabale farmers were most impressed by the widespread integration of trees for

- fodder,
- firewood,
- poles,
- stakes,
- fruit,
- soil fertility management and
- other high value products

with crops. Before they had not thought that this was possible without losing substantially on crop yield. Management of trees on farms to minimize competition with crops yet benefiting from them through pruning and pollarding for fuelwood is an interesting agroforestry innovation that attracted a lot of attention from the visiting Ugandan farmers. This innovation needs to be adopted in Kabale region.



✓ Also of importance was the systematic arrangement and synchronisation of different food crops, cash crops (e.g. coffee) and other high value trees on a small piece of land to obtain high yields.

- ✓ Grafted varieties such as apples, avocados, macadamia nuts on Agatha's farm which yield within two years and other grafted fruit trees should be a major focus for agroforestry research with Kabale farmers.
- ✓ Most trees in the farms that were visited are planted as lines along borders. Tree roots have not been stopped from crossing the border. Good neighbourhood is vital in this case and Mr. Frederick demonstrated an excellent way of solving this conflict by sharing border trees between the neighbours though they were planted by only one of them. Some farmers begin to experiment with root pruning to reduce competition. They report that it is feasible and effective.
- ✓ Farm – record keeping was considered by Kabale farmers as an important tool to improve farm management and profitability as they had observed with Embu farmers.
- ✓ Many young men and family heads in Kabale spend a lot of their time (and money) sitting in bars. This was rarely seen in Embu and this seriously touched Kabale farmers. Precious time and manpower is lost in Kabale. Overall time management of Embu farmers was considered very advanced. The visiting Kabale farmers said that they had learnt an important lesson on this.

## **8. Comments on the Tour**

Ugandan farmers appreciated the hospitality from their Kenyan hosts though staying at a “strangers” farm was a new experience for them. Farmers’ comments were translated into recommendations.

### ***Social:***

- ✓ Prior orientation between hosts and visitors should be arranged before, if possible, to learn each other's habits, likes, dislikes and traditional practices. This will help to reduce embarrassment and inconveniences.
- ✓ At the end of the visit there should be a ‘wrap-up’ meeting where visitors and host farmers can “compare notes”.

### ***Farming:***

- ✓ Management of trees by pruning should be encouraged in Kabale as is done in Embu.
- ✓ There is a need to conserve the degraded soils and fragmented land of Kabale using agroforestry technologies such as those observed in Embu. Every possible effort should be made to consolidate the land in order to have efficient land use.
- ✓ Special arrangements should be made to have at least one demonstration farmer in every sub-county (19 in Kabale District) involving local leaders. These should also be advised to enact bye-laws to protect the practising farmers against all sorts of discouragement by the community and enable others to adopt improved technologies.
- ✓ Areas severely affected by soil erosion in Kabale should be identified so that the community catchment approach, which works well in Embu can be applied.
- ✓ Further research is needed on species and varieties of fruit trees such as macadamia nuts, mulberry, grafted apples and avocado, that can be adopted for Kabale conditions. There is also a need to encourage farmers to venture

into export business of these high value fruits / crops for additional income or local sale. This calls for a well-established linkage between the production of these new crops and their marketability so that the farmers do not produce what they can not sell.

- ✓ Farmers should be encouraged to plan and manage their working time more efficient.
- ✓ An association of volunteer “linked” farmers should be established in Kabale district with branches at every sub-county to help effect changes in farming practices from traditional methods to new and improving ones. The beneficiary farmers from exchange programs can be instrumental in this if they can be facilitated to go to rural areas to share their experiences.
- ✓ For further exchange programs, farmers should first know what exists in their own locations in order to make such visits more useful, because then they can make guided comparisons.

### *8.1 Future farmer exchange tours*

It is suggested that more farmers be involved in future exchange visits, with more e.g. 60 (coach bus), farmers participating. This calls for more resources and planning, as well as better means of transport such as a bus. Hosting such a large number of farmers with their Kenyan counterparts might however be a huge logistical problem. It is also hoped that further farmer exchanges will be more focused on sustainable agroforestry systems for improved soil fertility and increased productivity both in quality and quantity. The main goal is to boost household income and to eliminate or eradicate poverty as advocated by Ugandan President Y. K. Museveni.

### *8.2 Follow-up on exchange tour*

As a means of follow up on this exchange tour, it was suggested that once the video on management of tree-crop competition and agroforestry is ready, the participating farmers be facilitated to go out with the video and share with fellow farmers their experiences and challenges. They will particularly encourage establishment of home nurseries by participating farmers and introduce pruning and pollarding of trees.

Later it should be evaluated how the communities benefited from this extension approach and how it favoured adoption.

Within two months after the tour (July 30<sup>th</sup>) a meeting with the Kabale farmers was held and progress discussed. Despite a drought farmers had already implemented a number of agroforestry technologies that they had observed in Embu. Local leaders in particular, had reported their experiences at a number of occasions and had made recommendations on future dissemination work. They all look forward to enhance their extension work with the video on tree-pruning and agroforestry. Furthermore, the farmers discussed and commented on a draft version of this trip report.

## **9. Acknowledgement**

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Mrs. Jayne Mugwe,

Mr. Muriuki Jonathan and

Mr. Okoba.

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Mr. Arnest Nyaga Nyaga, Kigari

Purity Wanjiku Nyage of Kibugu sub-location, and

Mr. Frederick Kinyua.

Mr & Mrs. Njagi Rulima the owner of a sawmill around the slopes of Mt Kenya,

Mr. Hampton Nyaga the Manager of the sawmill.

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