

UNITE for the Environment

Community Conservation Projects

Tree Planting Training and Fuel-efficient Stove Reporting

October/November 2016



OBJECTIVES OF THE TRAINING

- Understand the concept of raising trees.
- Equip participants with knowledge and skills of establishing tree nurseries and taking care of seedlings.
- Share knowledge on how tree planting can be integrated in classroom lessons.
- Report out on the progress made on the fuel-efficient stove project at school and local community level
- Evaluate the training format and share updates.

INTRODUCTION

What is a tree?

A tree is a woody perennial plant, having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground.

Why are trees important?

- Trees produce Oxygen. If there were no trees, it would be difficult for humans and other animals that need oxygen to live.
- To produce food, trees absorb carbon dioxide. This carbon dioxide is one of the major causes of global warming. Therefore trees act as a carbon storage area or a "sink". Therefore trees help a lot in cleaning the air we breathe and reducing the impact of global warming.
- Trees help in supporting the water cycle through a process called evapo-transpiration. This helps a lot in rainfall formation and increases the amount of rainfall.
- Trees clean the soil. This is through absorption of dangerous chemicals and other pollutants that enter the soil. Trees can either store harmful pollutants or change the pollutant into less harmful forms. They also clean water runoff into streams.
- Trees reduce soil erosion. Roots bind the soil particles together while leaves break the force of wind and rain on soil.
- Trees act as a source of fuel wood particularly in developing economies
- Trees act as habitat for Wildlife

- Trees help in improving soil fertility. Trees especially those with taproots help in bringing nutrients from the deeper levels of the soil near to the surface. Also when tree leaves decompose, they add humus to the soil. These nutrients help the other plants to grow well
- Trees provide shade.
- Property values increase when trees are planted near it or in the neighborhood because they beautify the vicinity
- Trees control noise pollution: trees silence noise almost as effectively as stonewalls. Trees, planted at strategic points in a neighborhood or around your house, can decrease major noises from the neighborhood.

What tree species should be grown in our communities?

As a conservation institution, emphasis is going to be put on indigenous trees that have no adverse effect on the environment. Therefore for this training we are going to focus on three tree species of Musizi, *Sesbania sesban* and *Prunus africana*

These tree species are very good agro forestry trees and therefore may be grown together with other crops, can provide good fuel wood more especially for Musizi and *Sesbania sesban* while offering other ecosystem services.

In addition, *Prunus africana* has a medicinal value of healing prostate cancer. This commercial value has caused people to illegally go to protected areas to harvest it. Therefore growing it on our own community can address habitat loss in Kibale National Park.

Preparing seeds and raising seedlings

Seedling production is one of the key steps in raising most tree species. The way seedlings are handled and managed in a nursery determines their survival after planting. Improving seedling quality means they will have greater survival, growth and productivity.

Seedling quality depends on the genetic make-up of the parent trees, and the physical growth of the seedlings. Therefore when choosing seeds, it is very important to choose seeds from a mature and healthy tree.

When managing tree nurseries, practices must be consistent and the various techniques closely integrated. Good quality seedlings cannot be produced without care and tending and if one element in

the chain is missing there will be a negative impact on seedling quality. Plant nurseries need to be protected from extreme environmental influences until they are strong enough to withstand them. To ensure high quality of seedlings for our communities and schools, it is recommended to start with small-scale manageable nurseries.

What is a Tree Nursery?

A tree nursery is a place where trees are raised with special care until they are ready or large enough for transplanting into the field/main garden. It is the starting point for successful tree planting. Setting-up of nurseries involves soil mixture, sowing seeds, watering, weeding, shading, potting, nutrient and pest management, improving tree varieties, transplanting seedlings and protection of seedlings from damage. The purpose of a nursery is to produce good quality tree seedlings, which are healthy and will be able to establish in field quickly.

STEPS FOR TREE NURSERY PREPARATION

Quality planting material requires quality nursery management. Quality seedling production is necessary for quality tree production because seedlings produced under poor conditions will never perform well when they are established in the field. Good nursery management includes the following

1. Choosing and preparing the nursery site

- Level the site or even terrace it.
- Sites with loam soils are normally preferred for raising Musizi, *Prunus africana* and *Sesbania sesban*
- Properly weed and clear the plot.
- Ensure good drainage and avoid areas prone to water logging.
- Fence the plot to protect against damage from animals.
- Prepare sticks to mark your footpaths and seedbeds.
- The tree nursery bed should have a width of about 1 m, so that you can reach all plants easily although the length may vary.

2. Sowing

For Musizi and *Prunus africana*, seeds should be sowed directly into the pots. Ensure that you put two seeds in each pot, such that when one fails, the other one germinates. In most cases all seedlings are

allowed to grow and taken care of until transplanting although some people remove the weaker seedlings after 4 weeks to reduce competition.

For *Sesbania sesban*, seeds may be put in rows.

For Musizi, *Prunus africana* and *Sesbania sesban*, the seedbed should be covered with light grass for 3 weeks to encourage germination.

3. Watering

When raising Musizi, *Prunus africana* and *Sesbania sesban*, watering of the seeds should be done every morning and evening from the day when seeds are sowed until when the seeds germinate. This should go on until one month before transplanting. To induce hardening off, watering should be gradually reduced one month before transplanting. Hardening off prepares the plants for the shock of transplanting and more difficult conditions in the field. A fine spray should always be used, particularly when the seedlings are small.

4. Weeding

General weeding around nursery area and seedbed area is necessary. Weeds in the pots should be regularly removed to ensure that the seedling grows without competition for nutrients. Weed carefully with your hands.

To avoid damage to the roots, before weeding the seedlings need to be well watered and watered again after weeding.

5. Root Pruning

Root pruning is the removal of roots that have grown out of the pot and into the ground. This is done to avoid seedlings establishing themselves permanently in the nursery since they still have to be planted out in the field.

A pruning knife can be used to prune roots that are outside the container. However, for *Sesbania sesban*, it is not necessary to prune the roots since seedlings are raised on raised beds, as they are air pruned.

Root pruning can take place when seedlings are graded.

Pruning is repeated every month. As the roots will be soft and tender, you will not need to handle each pot separately.

6. Shading

The seedlings for Musizi, *Sesbania sesban* and *Prunus africana* do not need shade. After 3 weeks, the grass used to mulch the seedbed should be removed and the seedlings should be exposed to sunlight.

However watering in the morning and in the evening MUST continue until one month prior to transplanting.

6. Pest and disease control

Several diseases and pests attack seedlings in nurseries. Pests harm plants by eating away parts of the plant or sucking juices. This can weaken and sometimes kill the plants.

Common nursery pests are: termites, cutworms, locusts and aphids. Good cultural practices can prevent damage by insects. Many of these pests are soil-borne.

In other species, damping off and root rot are common diseases in the nursery caused by fungi. This can be prevented by:

- Changing the soil in the seedbeds every 2-3 years and in non-mist propagator after 3 months
- Removing plants immediately if they are infected by fungi or attacked by pests
- Avoiding excessive watering and allow good drainage
- Ensuring good air circulation by thinning the seedlings or weeding in the beds

7. Grading Beds

Often times, seeds do not germinate at the same time. Therefore to prevent larger seedlings from overshadowing smaller ones, the beds should be graded after one month. Larger seedlings should be placed at one end, and the smaller seedlings at the other end or in different beds. Depending on how long the seedlings remain in the nursery, grading can be repeated.

8. Culling or grading

When preparing for transplanting it is important to select healthy seedlings. Seedlings with more than 3 leaf nodes are sufficiently large for planting in the field. When planting into existing vegetation larger planting stock should be used whenever possible (around 50 cm), these larger plants are more easily seen and can better withstand weed growth. Plants should be sorted according to their suitability for transplanting. Only good seedlings should be selected.

9. Thinning and potting

Some tree species require thinning (this is not necessary for *Musizi* and *Prunus africana* because seeds are planted directly in the pots but may be done for *Sesbania sesban*). Thinning involves moving seedlings from a seedbed or containers where they have germinated in large numbers to reduce competition. The purpose of this operation is to have seedlings grow singly per container. This helps to produce healthy seedlings that grow vigorously.

Most tree species should be potted when they have developed a first pair of true leaves. Seeds should be lifted with a small trowel or a flat piece of wood. Great care is needed during potting otherwise high casualty rates may occur. Before picking out (choosing the seedlings for transplanting/ potting), seedbeds and pots should be well watered to prevent them from drying; potting should be done in the late afternoon or early in the morning.

Ensure that you use potting materials, which are deep and wide enough to accommodate the roots. The roots should not be bent or point upwards. The pots should be closed gently by pressing the soil around the plant with a finger. Do not leave air space around the roots. Water the plants immediately after potting. Labeling and documentation may be done at this stage.

NB: Newly potted seedlings are sensitive for the first few days and need careful watering and shade for some species.

The most commonly used containers in potting are plastic bags. These are available in various sizes with or without holes. If they do not have holes, eight holes extending to the base of the bag should be punched before filling with potting mixture. Usually people buy polythene roll of tubes and cut tube length desired sizes, as it's cheaper. For most trees, the plastic bags containers should be 10 x 18 cm (breadth x height, measure flat). If seedlings need to be in the nursery for longer period, then the bag has to be changed to a bigger size.

The potting mixture depends on the quality of the soil available in the site. In most cases loam soil is preferred but a mixture consisting of 2 parts forest soil, 1 part organic matter and 1 part sand or decomposed sawdust by volume may also work well. Mix thoroughly to ensure uniformity of components. When filling, the pots can be filled by hand using slightly dampen/wet soil. When filling the pots, the lower third should be compacted firmly to prevent the mixture from falling out. The upper two-thirds of the mixture should be only compacted a little so that roots can develop easily.

11. Hardening off

To help seedlings to survive after transplanting in harsher field conditions, they must be hardened in advance. It is very important to reduce the amount of watering gradually until transplanting time for *Musizi*, *Prunus africana* and *Sesbania sesban*. For trees that are managed under the shade, remove the shaded area one month prior to transplanting and prune roots.

12. Packing and Transportation

The seedlings should be well watered before transportation. They should be packed in wooden or plastic trays/crates.

The seedlings should never be handled by the stem or foliage; they should always be carried in the bags. To be sure that the seedlings are not damaged during transportation, they should not be packed loosely. Once at the planting site, seedlings should be placed in a protected, shaded area and water every morning and evening until planting. The practice of immediate planting is better.

13. Keeping Records

The following details should be recorded for all seedling batches:

- Number of seeds sown on germination bed
- Date of sowing seeds
- Note any extreme environmental changes observed (rainfall, temperature, humidity.)
- Note date of first germination
- Total number of germinated seeds

TRANSPLANTING AND CARING FOR SEEDLINGS

Once the trees seedlings are hardened off, they can be transferred to other sites such as school, compounds or forests.

The following procedure should be followed

- All transplanting should be done ONLY during the rainy season. This will mean that watering is only done on day one of planting and then the seedlings can depend on occasional rains to get used to the new environment. To achieve this, tree nurseries should be prepared towards the end of a dry season such that transplanting occurs during the rainy season.

It has however been noted that with changes in seasons due to climate change, this is sometimes difficult to time, therefore morning and evening watering after transplanting may be necessary for the first one month

- Dig a whole at least 30 cm in diameter for each seedling. Make a small mound of loose soil in the bottom of the hole.
- Remove the seedling from the polythene sleeve leaving the soil intact
- Place the seedling in the hole using the mound as the root support. Put loose soil back over the roots, filling the hole. Then fill the hole with soil and add water. Do not compact the wet soil or you will reduce oxygen to the roots. Do not use fresh manure or other fertilizer during this transplanting process.
- Note that the planting spacing differs for Musizi and *Prunus africana* on a farm where other plants are grown, the spacing should be an average of 10X10 up to 15X15 meters while in a typical plantation, and

this can be reduced to 6X6 up to 10X10 meters. For *Sesbania sesban* the recommended spacing is 1X1 in fallows and plantations and up to 8X8 meters when grown with other crops.

- Continue weeding around the seedling regularly as the seedling grows
- Protect the seedling from human activities and animals. Goats, caterpillars and other insects may eat the leaves while people may trample on the seedlings. Continue using natural pesticides when watering the seedlings. Employ techniques to encourage tree growth such as proper spacing between trees, pruning or possibly pollarding (the cutting of new branches from a tree to encourage new growth)
- Monitor the trees at least weekly for the first two months and twice a month in the third and fourth month.

NB: All this should go on up to approximately 5 months when a seedling develops into a sapling (a young tree with a woody stem)

Roles of stakeholders in caring for the seedlings at school and local community level

	Stakeholder	Role
1	UNITE	Support schools with seeds and some tools Offer technical guidance and training on raising trees
2	School	Offer land for the tree nursery Protect the tree nursery and trees against humans and animals Offer some land for planting some of the seedlings Provide some tools
3	Teachers	Start up new tree nurseries at the schools Plant some of the trees in their homes Integrate tree planting in the curriculum Regularly monitor the tree nurseries Guide students on watering the trees
4	Students	Talk with parents about the need to plant trees Water the trees nurseries and transplanted seedlings Plant tree seedling
5	Parents	Offer land to plant tree seedlings Offer some tools to be used in the project Plant the seedlings Water the seedlings

	Monitor the seedlings for the first three months
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LESSON DEVELOPMENT

Procedure:

- Divide teachers in groups of 5 and allocate each group a subject and a theme.
- Each group is given a reference textbook to use
- Ask the teachers to design a lesson plan for an 80-minute lesson that integrates tree planting
- Encourage the teachers to share how they would use different teaching methods in delivering the lesson. Emphasis should be put on student-centered methods
- Each group has 50 minutes to come up with this and depending on time several groups will be given time to present.

Primary 1 to Primary Four

Class	Subject	Topic/Theme
Primary 1	Literacy	The world of living things
Primary 2	Mathematics	Algebra/Addition
Primary 3	Social Studies	Living things in our sub county
Primary 4	Science	Interdependence in the environment

Primary 5 to Senior 6

Class	Subject	Topic/Theme
Primary 5	Science	Managing changes in our environment
Primary 6	Social Studies	The climate of East Africa
Primary 7	English	Letter writing
Senior 2	Geography	Vegetation types of Uganda
Senior 4	Mathematics	Statistics

REPORTING OUT

Have each school front two representatives, one teacher who took a lead in implementing the fuel-efficient project and a local community member who took up the project under the school arrangement. The two are allocated 10 minutes each to share as per the report out form.

Note: Some of the local community members who may not speak English can be allowed to share in the local language.

A) SCHOOL REPORT OUT FORM

1. Name of the school.....

2. Total number of stoves built so far.....

3. Number of stoves in use.....

4. Four major advantages of using the stove

i).....

ii).....

iii).....

iv).....

5. Three major challenges associated with using the stove

i).....

ii).....

iii).....

6. Have teachers tried to integrate FES in the lessons?

Yes

No

7. Describe ways in which FES have been integrated in the lessons?

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8. What are the successes and challenges in integrating?

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B) LOCAL COMMUNITY REPORT OUT FORM

1. Name of the community member.....
2. Village
3. Where did you get the information about FES?.....
4. Who offered you technical assistance in building the stove? If he is a teacher/teachers, where do they teach?.....
5. Is the stove working well?
6. What four advantages do you find in using the fuel-efficient stove compared to a three stone stove?
 - i).....
 - ii).....
 - iii).....
 - iv).....
7. What are the two main disadvantages in using a fuel-efficient stove?
 - i).....
 - ii).....

REFERENCES

- Wightman KE. 1999. Good Tree Nursery Practices: Practical Guidelines for Community Nurseries. International Centre for Research in Agro forestry. Majestic Printing Works: Nairobi, Kenya.
- Z. Tchoundjeu, E.K. Asaah, P. Anegbeh, A. Degrande, P. Mbile, C. Facheux A. Tsobeng, A.R. Atangana, M.L. Ngo-Mpeck and A.J. Simons. 2006. Putting participatory domestication into practice in west and central Africa. Forests, Trees and Livelihood.
- Jaenicke H. Good tree nursery practices. Practical guidelines for research nurseries. World Agro forestry Centre (ICRAF), Nairobi, Kenya.