

# COMMUNITY TREE PLANTING GUIDELINE



v.4 March, 2011

## Sawlog Production Grant Scheme *Supporting Tree Planting in Uganda since 2004*



Learn how to grow trees the right way. Whether you are planting a small woodlot or starting a small timber-growing enterprise, this guideline shows you how to obtain the best results.



The Sawlog Production Grant Scheme (SPGS) is a partnership between the Government of Uganda, the European Union (EU) and the Government of Norway (GoN). It supports commercial tree growers and communities around Uganda.

**S**awlog Production Grant Scheme (SPGS) has been helping people plant trees in Uganda since 2004. One of our goals is to educate people about the importance of trees in their community and guide them through the process of successful tree planting.

Franklin Delano Roosevelt once said “to exist as a nation, to prosper as a state, and to live as a people, we must have trees”. History has shown this to be true. As a volunteer or professional, you are important to the health and well being of your community. You can lead the way to enhancing your community by organizing and implementing tree planting.

Trees are a capital investment. They add to the economic and environmental well being of your community. Well planted trees are a source of income, mitigate water run off, lower energy costs, reduce noise, sequester carbon and clean the air, while replenishing the oxygen in the air we breathe.

We designed this Community Tree Planting Guide to help you through the process of organizing and implementing a successful tree-planting project. It begins by assessing your planning site and concludes with long term care for your trees. Your project will be a lasting gift to your community while reflecting community development pride and spirit. SPGS is glad to support you in your efforts and we wish you success.

Sincerely,

Allan Amumpe  
*SPGS Project Manager*



*Learning from others: SPGS Charles and Margaret - a LEMA Community Leader with a South African tree farmer. She built a house out of proceeds from selling her trees to SAPPi Company under Project Grow initiated by SAPPi.*

*Cover Photo:* KANAKI Community Members.

*KANAKI Community in Kamuli District supported by SPGS: The KANAKI Community members in Kamuli District have planted close to 15ha of Pinus caribaea trees since 2010.*

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## 1.0 INTRODUCTION

This tree planting manual is one of a series of plantation guidelines published by SPGS, to assist private growers to establish fast growing and high yielding timber plantations. It is a well illustrated and simplified manual aimed at equipping you with the basic skills in tree planting. It is a guide for establishing plantations for timber, large poles, small poles and/or fuel wood. This guideline covers important aspects of plantation planning, establishment, maintenance, forest protection and harvesting.

*More detailed information on all the topics discussed in this guideline can be found in SPGS Tree Planting Guidelines for Uganda available at SPGS's office or*

[www.sawlog.ug](http://www.sawlog.ug)

### 1.1 Why tree plantations?

Tree plantations are a major source of wood for general construction, especially houses and furniture. Besides increasing the value of your land and protecting it from encroachers, the main objective of growing trees is to produce timber and poles. Others are for fuelwood, charcoal, food for man and livestock, fertilizing and protecting soil, medicinal products and provision of shade for livestock and food crops. Trees are also often planted to provide shade, to beautify the landscape and restore degraded areas.

### 1.2 Which timber tree species are available for planting?

Many indigenous (local) and exotic (introduced) tree species are grown in various parts of the country. However, not all of them can be grown commercially for timber production. The species recommendable for commercial forestry should have the following characteristics:-

- Fast growing and high yielding.
- Should have reliable source of high quality seed.

- Ability to grow well in a plantation situation and whose silviculture is well known.
- Desirable wood properties.

Many exotic tree species grow relatively faster than local ones and improved seed sources are often available. More so, their silviculture is well researched and understood. Examples of such exotic trees are Pines (*Pinus caribaea* and *Pinus patula*), Eucalypts (e.g. *Eucalyptus grandis*), Cypress (*Cupressus lusitanica*), Teak (*Tectona grandis*), Terminalia (*Terminalia superba*) and Hoop Pine (*Araucaria cunninghamii*).

Some indigenous trees such as Musizi (*Maesopsis eminii*), can also do well in plantations. Others like Mahoganies (*Khaya anthothica* and *Entandophragma spp*), Mvule (*Melicia excelsa*), *Prunus africanum* and Podo (*Podocarpus spp.*) are also planted, but mainly for environmental conservation. They are not recommended for commercial forestry because of their long maturity period and the difficulty of growing them in plantations.

## 2.0 PLANTATION PLANNING

It is important that you carefully plan for your resources, both human (labour) and financial a year before embarking on your business. It is also important to plan plantation activities to fall at



*An example of a well thinned stand like this will allow trees to quickly gain more volume.*

the right time, for example doing all the land preparation early before the rains come, so that planting can be done as soon as the rains start. The success of any plantation largely depends on how well you plan for your resources and time your activities. As an example, let us assume that it is now January: you

have land and you need to start planting Pine (*Pinus caribaea*) trees in the September rains.

### 2.1 Plan for labour (both skilled and unskilled)

It is important to know in advance the source of your labour that will ably do the tree planting activities.

This could be from the local community that is willing to work or can be sourced from other districts. The amount of labour required depends on the scale of planting and their productivity.

## 2.2 Plan for funds (money)

Identify sources of funds and save to facilitate payment for plantation activities: some money can be used to buy tools like pangas, slashers, and pruning saws among others.

## 2.3 Know the plantation activities that you need to plan for?

The common activities that you need to plan for include: site survey, species selection, seed purchase, nursery preparation, seed sawing, clearing land, lining out, pitting, pre-plant weed control, planting, weeding and tree protection.

## 2.4 Timing plantation activities

Plantation activities are generally timed according to major rainy seasons in the country. In most parts of the country there are two seasons-March/April and September/October. These seasons differ in duration of rains depending on location. In some areas like Western Uganda, September/October is the longer rainy season; while in most other parts of the country it is March/April. It is advisable that you plan for your main planting to fall in the long rainy season and to plant as soon as sufficient rains start. Planting late in the rainy season often ends in failure.

The plantation calendar (below) helps to relate activities discussed in 2.3 above, showing the best

time at which they should be carried out. The shaded boxes show the month in which you should carry out a particular activity in order to plant your trees in September/October rainy season. Following the shaded boxes in the activity calendar above, and assuming that your plan is to plant in September, site survey and tree species selection should be done in January. Buy the seed not later than February and if you have your own nursery start nursery preparation in March. If you are buying seedlings from a nursery, it must be one recommended by the SPGS (see page 8). With Pine seed sowing should be done in May, to give seedlings 4 months to mature. If raising *Eucalyptus grandis*, 3 months is sufficient, so sowing should be done in June.

Land clearing starts around June and lasts till July. This is followed by lining out and pitting in mid August. The weeds must be controlled before planting by slashing or spot weeding, otherwise they will compete for water and nutrients with the young newly planted seedlings. It is also recommended to use Glyphosate herbicide to kill the weeds, since it is cost effective for large scale (commercial) plantations.

*Note: If using chemicals, the staff must be properly trained and have appropriate safety equipment.*

In September, when the rains have stabilized, the tree seedlings can be planted. Thereafter, the newly planted trees should be frequently weeded and also protected from fires and grazing animals. Always remember that the skill of your work force is a very important aspect of the success of your business, so always make sure you use trained staff.

**Table 1: ACTIVITY CALENDAR FOR PLANTING IN SEPTEMBER / OCTOBER SEASON**

	ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Site survey												
2	Species selection												
3	Seed purchase												
4	Nursery preparation												
5	Seed sawing												
6	Clearing bush												
7	Lining out												
8	Pitting												
9	Pre-plant weed control												
10	Planting												
11	Timely weeding												
12	Fire protection												
13	Animal protection												
14	Pest/Disease control												

## 3.0 SITE SURVEY

In advance to preparing your land ready for tree planting, you should know the details of the site by carrying out site survey. Through site survey one is able to demarcate their land, identify and locate areas of conservation and properly match the tree species on to the site depending on existing site conditions (climate and soils).

### 3.1 Land demarcation

This activity aims at one establishing clear boundaries of the planting site. After clearly identifying the boundaries then you are able to:-

- i. Know the shape (layout) of your plantation and if necessary divide the area into smaller manageable units (compartments), as you decide where the access road or fire breaks will pass.
- ii. Measure total area (in hectares) available for tree planting and thus estimate how much resources are needed to establish and manage plantation.

*Note: Never clear intact natural forest to plant trees. This is because the environmental and biodiversity values of a natural forest may not be replaced by tree plantations. Trees should only be planted in degraded forests and grasslands. Where land is limited, trees can be planted along the boundaries. Also note that timber trees do not grow in water-logged areas such as swamps, so do conserve swamps too.*

### 3.2 Plantation layout and design

Establishing the shape of plantation requires one to walk through, and around the area where trees are to be planted. The objective is to note the special features like swamps, rivers, hills, public roads, that may be located within or neighbouring your area. A plantation layout can be established as follows:-

- i. Locate existing conservation sites on your area (like swamps, intact natural forests, lakes, rivers, cultural sites among others).
- ii. In consideration of existing conservation sites and boundary of your land, mark off fire breaks (both external of 10 metres width and internal of 6 metres) or access roads around and within your planting site. These divide your area into compartments (maximum 30ha) for easier access and management.

*Note: Community members usually have small pieces of land (about 1 – 5ha), so subdivision of such smaller areas is not necessary – only establish external fire breaks around your plantation for access and protection from fire.*

### 3.3 Determining the plantable area on your site

It is important to know the area of your plantation and this will guide you in planning for your resources such as the number of seedlings required and the labour requirements. Below are the steps followed in estimating the area of your plantation:-

- i. For small community woodlots that are normally less than 1ha, the area can be estimated by counting walking steps along two main directions. The number of steps taken along one corner of the plot is taken as length and the other as width. A walking step is approximated to be one metre.  
**Area = length (m) x width (m).**



*There is no timber tree that can grow well in water even eucalyptus! These young pines have already started dying off.*

- ii. If the area is approximately in the form of a square or rectangle, a long measuring tape can be used to measure the two sides of the area. One side is taken as length and other as width. Multiplying the two sides gives an approximate size of the area in square metres (m<sup>2</sup>). This can then be converted into hectares by dividing by 10,000.
- iii. Using Global Positioning System (GPS) which automatically finds the area in hectares after moving around the boundary of your plantation. GPS machines are, however, a little expensive and require skill to use.

- iv. The district survey departments or private surveyors next to you can be contracted to demarcate your land.

## 4.0 SPECIES SELECTION

The main factors determining the choice of species are site suitability (i.e. climatic and soil conditions of the area) and the objective of planting (e.g poles or timber). Incidence of pests and disease will also determine the tree species to plant. For example sites infested with termites are not suitable for *Eucalyptus*. You can decide which tree species to plant by looking at the following climatic and soil conditions and comparing them with the various tree species growth requirements in table 2 (on page 6).

### 4.1 Climatic conditions:

#### 4.1.1 Rainfall amount and distribution.

Basically areas that receive two long rainy seasons (at least 3 months) per year are suited for most tree species like *Eucalyptus grandis*, *Pinus patula*, *Pinus caribaea*, *Maesopsis eminii*, *Cupressus lusitanica* and *Araucaria cunninghamii*. Areas that have only one

long rain season per year, like in northern Uganda, are most suited for growing *Pinus caribaea* (and perhaps teak). Generally, areas along the cattle corridor like Mbarara, Mubende, Kiboga, Nakasongola, Teso and Karamoja regions, which are dry, are currently advised to plant *Pinus caribaea* which is reasonably more drought resistant, until other appropriate species are available.

#### 4.1.2 Temperature.

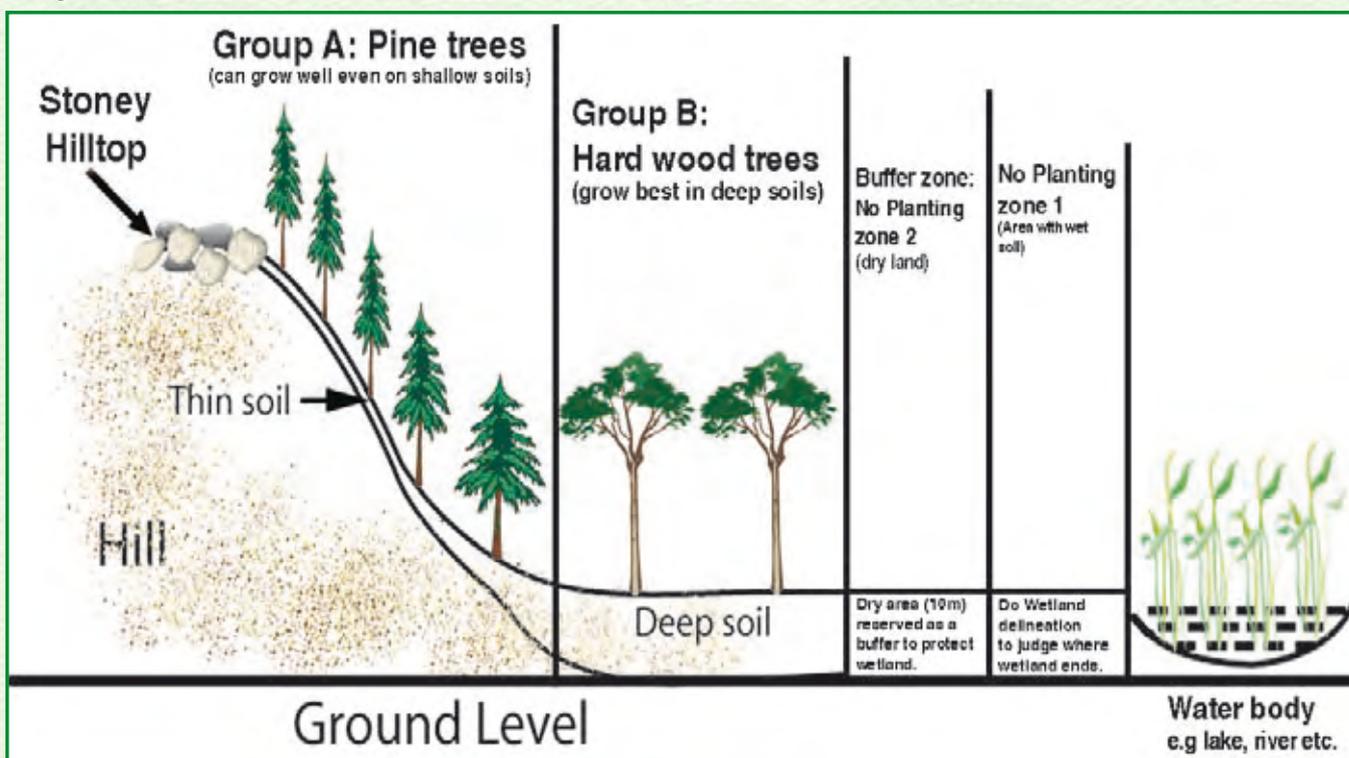
*Pinus patula* is strictly restricted to cooler, higher areas, especially those in Kabale. Cool areas like Kabale, Fort Portal, Paidha, Mbale and Kapchorwa are preferred by *Eucalyptus grandis* and *Cupressus lusitanica*.

### 4.2 Soil conditions:-

Generally, most soil conditions in the country can support tree growth. However, on particular sites one needs to check for soil type, depth, and fertility. This requires you to move across your area and use your personal experience to judge the above conditions as follows:-

Starting from one end of your area, dig a pit 1m deep (or until rock) and wide with a hoe (or pick mattock if rocky) and note the dark layer of top soil, the brown

Diagram 1: HOW TO ALLOCATE THE VARIOUS TREE SPECIES ON THE RIGHT SITE



Group A tree species like pines that are able to grow even on thin soils can always be allocated on hill tops EXCEPT where it is bare stony. Group B tree species are those that prefer deeper soils like Eucalypts, Teak, Terminalia, Musizi and Hoop pine among others. Note that all trees must be planted away from any wetlands as shown in diagram above.

layer of sub soil, the ease of digging through and stoniness. Repeat this in other parts of your area to get the general soil characteristics. While walking across your area, observe the existing vegetation to help you judge soil fertility. Poorly growing vegetation may imply infertile soils. The nature of land influences the soil type. Flat and or gently sloping land usually have fertile soils which can support most tree species while steep slopes have shallow soils often more suitable for pines.

### 4.3 Objective of planting (Final product)

The choice of tree species is also influenced by the objective of planting and from a business viewpoint, by what is demanded in the market. For example, where the end use is poles, *Eucalyptus grandis* is the best choice; whereas pine timber attracts wide market for general construction purposes.

Table 2: The main timber species, their growth requirements and common characteristics

Tree species	Required climate		Soil Conditions	Other notes
	MAR (mm)*	MAT (°C)*		
<b>Kalitunsi</b> ( <i>Eucalyptus grandis</i> )	>1000/yr	Cooler areas <22°C	Deep and well drained fertile soils	Grows faster, 8 - 15 years for timber, Best site - Western parts of Uganda. Termite are a threat.
<b>Pine</b> ( <i>Pinus caribaea</i> )	600 -1,500	20 - 27°C	Grows best on well drained soils along steep slopes. Can also grow on shallow, less fertile soils.	Grows well on a wide range of sites in Uganda. Matures 18 - 25 yrs.
<b>Pine</b> ( <i>Pinus patula</i> )	<1250/yr	Cooler areas <18°C	Can grow on shallow, less fertile, stony soils along steep slopes.	Best site- SW Uganda. Matures 18 - 25 yrs.
<b>Musizi</b> ( <i>Maesopsis eminii</i> )	>1200/y	22-27°C	Fairly fertile, deep and well drained soils.	Best on natural forests sites.
<b>Teak</b> ( <i>Tectona grandis</i> )	>1500/yr 3-5 month of dry season	22-27 °C	Wide variety but well drained, not on hard soils.	Will grow in far Northern Uganda on low sites but slow growing: matures at 25 - 30 yrs.
<b>Cypress</b> ( <i>Cupressus Lusitana</i> )	>600/yr	Cooler areas <22°C	Fairly deep fertile soils. Prefers mountainous sites	Best choice for SW and W Uganda. Matures 25 - 30 yrs. Prone to Aphids.
<b>Hoop pine</b> ( <i>Araucaria cunning-hamii</i> )	>750/yr	17 - 25°C	Deep moist soils like in tropical high forests areas.	Maturity 20 - 30 yrs.
<b>Terminalia</b> ( <i>Terminalia superba</i> )	>1300/yr	24-27°C	Well drained deep fertile soil.	Maturity 20 - 25 yrs

\*MAR = Mean Annual Rainfall; MAT= Mean Annual Temperature; > greater than; < less than.

Group A tree species like pines that are able to grow even on thin soils can always be allocated on hilly areas. **EXCEPT** where it is bare stony. Group B tree species are those that prefer deeper soils like the Eucalypts, Teak, Terminalia, Musizi and Hoop pine among others. All trees must be planted at least 20m away from any wetland.

### 4.4 Pests and diseases

The commonest pests are termites and blue gum chalcid which attack eucalypts, the Cypress aphid is common in Cypress plantations, and *Armillaria* root rot disease for pines.

## 5.0 SOURCING GOOD SEED/SEEDLINGS FOR PLANTING

It is important to use only improved seed and plant high quality seedlings if you need a high yielding plantation. This is normally a compromise between what appears to be cheaper (poor seed/seedlings – low yielding) and expensive (improved/high quality seed/seedlings – high yielding). It is important first to know what a quality seed/seedling is and then where to get the quality ones. Quality here mainly refers to whether the seed is an improved variety (*i.e. has superior growth and timber characteristics and good health*).

### 5.1 What are the characteristics of a good seedling?

A seedling of good quality should have the following characteristics:-

- i. Healthy (of normal green colour without signs of pests and disease attack).
- ii. Best height is from 15cm to 25cm tall measured from root collar.
- iii. Not those that have stayed in the nursery from the previous season.

### 5.2 What are the characteristics of a poor seedling?

A poor seedling unfit for planting has the following characteristics:-

- i. Generally not healthy; leaves are not dark green but yellowish or brown or dry spots on leaves or needles.

- ii. Abnormally taller shoot (stem) compared with its root length (2:1 Shoot:Root *ratio is optional*).
- iii. Its main stem is branched into two equal branches in form of letter 'Y'.
- iv. If you lift and over turn to see the bottom of the seedling you find its roots are protruding outside and the side roots grow while coiling around the pot.
- v. The seedling roots are loosely attached to its soil block that is meant to keep its roots intact.

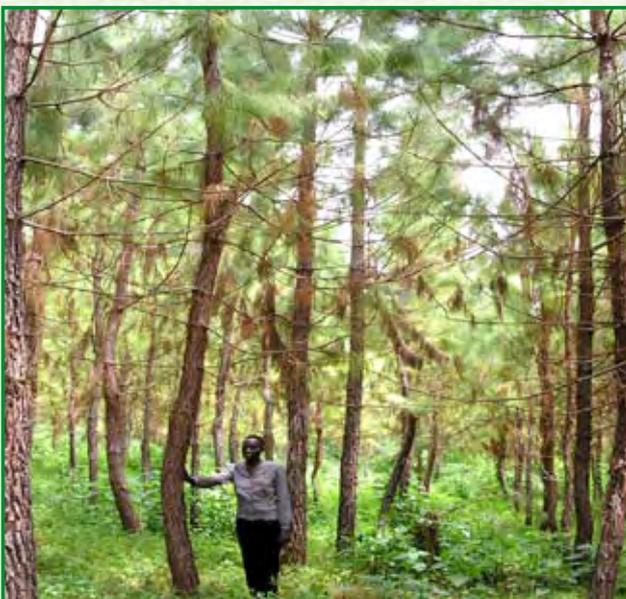
### 5.3 Where can I get quality seed/seedlings for planting?

Currently SPGS in conjunction with Uganda Timber Grower's Association (UTGA) is importing improved pine seed from Australia and Brazil, and Eucalypt from South Africa for sale to private planters in Uganda. These are the current approved sources for seed orchard seed of *Pinus caribaea* var *hondurensis* (PCH) and *Eucalyptus grandis*. Trees from these improved seed sources are fast growing and high yielding if compared to locally collected seed.

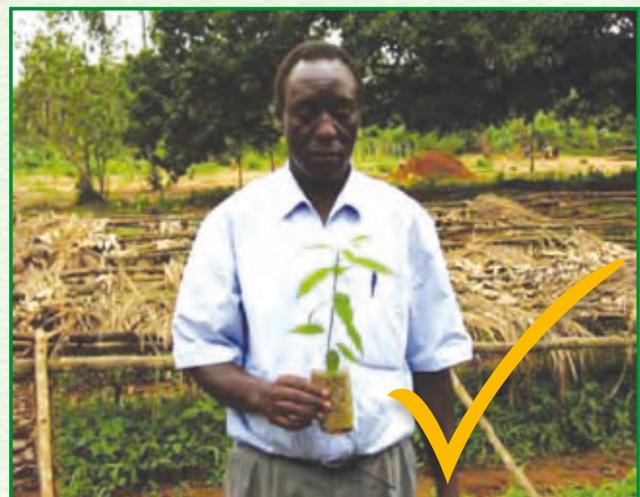
Tree nurseries require much skill in establishment and management. You need properly trained and experienced nursery workers and constant supervision. Often many people have wasted money buying expensive improved seed and they fail to raise seedlings. Therefore, unless operating on a large scale (say planting 100ha/year) you are advised not to start



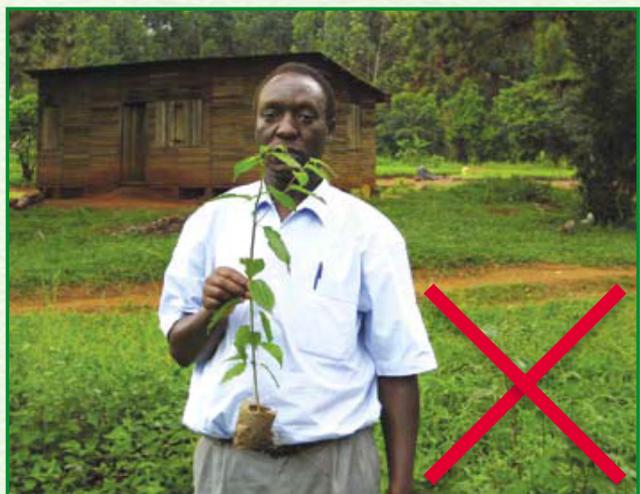
*The impressive 3 - year old demonstration planting of Pinus caribaea (Australian seed) at Kasagala Forest Reserve, Nakasongola. This is the result of careful planning, using only high quality seed, good land preparation and intensive weeding.*



**LOCAL *P. oocarpa*:** You get trees with poor stem form, non uniformity and of low growth rates which may catch lower market value.



**GOOD SEEDLING:** An example of a good seedling ready for planting. A good seedling should be 20cm shoot height.



**BAD SEEDLING:** This seedling is over grown and will not establish well.

your own tree nursery, but rather buy from any of our recommended nurseries. *Refer to table 3.*

**Table 3: SPGS CERTIFIED PRIVATE NURSERIES WHERE YOU CAN BUY SEEDLINGS**

No.	Name of nursery	District	Contact person	Phone
1	Global Woods AG Nursery	Hoima	Otim Moses	0772-000916
2	Akori Nursery	Lira	Alfred Macapili	0772-615132
3	Agromax (U) Ltd	Wakiso	Hellen Machika	0772-885068
4	Busoga Forestry Company.	Mayuge	Teddy Nsamba	0772-471164
5	Uganda Gatsby Trust nursery.	Kabarole	Samson Epillili	0782-153659
6	Kamusiime Memorial Rural Development Pilot Scheme	Bushenyi	Jonathan Mwebaze	0772-589659
7	The New Forests Company	Mubende	Martine Okello	0414-268263
8	Uganda Forestry Supplies	Kampala	Eric Waiswa	0772-487198
9	UMOJA Farmers Ltd	Mukono	Asiimwe Richard	0772-460600
10	Uganda Sustainable Forest Products and Services Ltd (USUFOPS).	Mukono	Paul Ochom Okello Yobe	0782-529133 0772-431039
11	Caroldina Enterprises Ltd	Kampala	Jane Mukunya	0772-414035
12	Premier Green 'U' Ltd.	Kampala	Juliet Kyayesimira	0772-307161
13	Kagunga Tree Nursery	Rukungiri	Valence Arinaitwe	0702-194705
14	Uganda Gatsby Trust Nursery.	Mukono	Abubaker Mwima	0772-671583
15	Core Woods Tree Nursery Ltd.	Hoima	Fred Babweteera	0772-466336
16	BESEPO Tree Nurseries	Mubende	Jean Vianney	0772-905153
17	E & P Investments Ltd.	Kampala	Elvis Mulimba	0772-412949
18	Kazal (U) Ltd.	Mukono	Abitega Jaliet	0773-327316
19	JOSH Contractors & Consultants Ltd.	Mukono	Katureebe Generous	0779-907566
20	Jose Ltd.	Mukono	Kaazi Twinomujuni	0772-982911
21	Kieve Company Ltd.	Kabale	Ninsiima Evelyne	0782-469104
22	M & S Forestry Services	Mukono	Apolot Mary	0774-139084
23	Quality Tree Nursery	Gulu	Prof. Philip Nyeko	0392- 967729
24	Quality Forestry Services	Luwero	Fred Ahimbisibwe	0772-392175
25	New Forests Company	Kiboga	Okello Martine	0414-268263
26	Blossom Forever (U) Ltd.	Kampala	Dr. Jolly Murungi	0772-476174

**Note:** Search our website at [www.sawlog.ug](http://www.sawlog.ug) for current recommended nurseries. Always be careful of the nursery you buy seedlings from. Look critically at the set up and management of that nursery and judge whether it is of the right standard to buy seedlings from. Ask for the source of the seed used to raise seedlings to be sure that you get exactly the seedlings you want. E.g. I want *Pinus caribaea* (PCH) from Australia or Brazil. Always make sure you specify the species and seed source.

## 5.4 What is the cost for high quality seed/seedlings?

Prices keep varying. A seedling of *Pinus caribaea* var. *Hondurensis* (Brazil and Australia) is at US\$300 - 500. *Eucalyptus grandis* (local seed and South African seed) goes at US\$ 100 - 150. Seedlings should be booked six months in advance. Find up to date prices regarding seed from SPGS Newsletters.



**WHERE YOU GET YOUR SEEDLINGS MATTERS:** a good nursery like this at Busoga Forest Company should be clean, have qualified staff and records well kept.

*Seedlings from improved seed may appear more expensive to you but they are not when you consider the superior growth characteristics they have over unimproved seeds.*

## 6.0 PREPARING LAND FOR TREE PLANTING

**L**and preparation involves activities like bush clearing, lining out and pitting (digging planting holes). These activities are carried out to ensure that the land onto which the trees are to be planted is clear of any growing vegetation to provide weed-free environment and a well cultivated

pit for the young seedling's roots to penetrate and establish well. This leads to rapid and uniform growth in addition to high survival. Generally, well prepared land makes the subsequent activities like lining out and weeding much easier.



*A well cleared site ready for lining out should not hinder visibility and movement.*

## 6.1 Bush clearing

This is the removal of existing vegetation on the site in preparation for planting. Bush clearing is often done manually using simple tools like axes, pangas slashers simple power saws. When the vegetation has been cut down, it's then left to dry and later burnt. The choice of method to use for bush clearing will depend on the type of existing vegetation, scale of planting, terrain, labour availability and costs of related activities among others..

### *It is important to note the following:*

- i. Natural forests should never be cleared for plantation establishment; wetland should not be drained and lakes; rivers or streams should not be diverted.
- ii. All the vegetation including grass and any standing trees at the site must be cut down and left to dry. Trees should be cut as close to the ground as possible and the big tree branches be chopped into smaller pieces, heaped, preferably on stumps and then burnt at a safe time.

## 6.2 At what spacing should I plant my trees?

Espacement is the uniform distance at which you make your planting pits, which determines how far apart you plant your trees. It is important that you

know the right spacing to use so that you order for the right number of seedlings. We strongly recommend planting your trees in lines, which makes subsequent operations much easier. The actual spacing (distance between the trees) may change depending on type of tree species, quality of seed, expected growth rate, planned weeding technique and the availability of market for thinning or small diameter poles. It may be beneficial to plant trees at a wider spacing such that:-

- There is less competition between trees for a longer time.
- Cost savings (less pits and seedlings per hectare).
- Trees grow larger.
- Where it may be required (like in community planting) it allows for some food crops to be planted in the inter-rows.

However, wider spacing between trees can have negative effects like:-

- It will take a longer time before trees close canopy - so you spend more money on weeding your trees for longer.
- Trees tend to develop thicker or bigger branches at the expense of the main stem.
- Trees will be fewer and so you will have less trees to choose from during thinning.
- Increased weed growth (as weeds are exposed to light) will most likely increase the fire risk on your plantation.
- Reduced benefits from thinnings where market is available.

The standard spacing for most timber trees including pines and Eucalypts of improved seed is 3m x 3m (10ft x 10ft). Also 2.7m x 2.7m (9ft x 9ft) is frequently used. But if planting next to where there is high demand for small construction poles, the spacing for Eucalypts can be reduced to 2m x 2m (6.6ft x 6.6ft). However, closer spacing like 2m x 2m brings in an early competition between trees and so a farmer must be aware and be prepared to do an early and heavy first thinning to allow for better growth of the remaining trees. All tree plantations being grown for sawlogs/timber production have to be thinned (*refer to section 9.3*).

**Note: Number of seedlings in one hectare:-**  
 $= 10,000\text{m}^2 \div (3 \times 3) = 1,111 \text{ sph}$  or  
 $= 10,000\text{m}^2 \div (2.7 \times 2.7) = 1,372 \text{ sph}$ .

Remember that when planting at 1,111 stems per hectare (sph) instead of 1,372 sph, your costs of buying seedlings and labour for pitting and spot hoeing can be reduced by almost 20%.

Table 4: TREE ESPACEMENT

Species	spacing (m)	No. of seedlings (sph)	15% for Beating up	Total required Seedlings
Eucalyptus	2 x 2	2,500	375	2,875
	2 x 3	2,000	300	2,300
	2.5 x 2.5	1,600	240	1,840
	3 x 3	1,111	167	1,278
Pine, Teak, Araucaria	3 x 3	1,111	157	1,278
Musizi, Terminalia	4 x 4	625	94	719

### 6.3 Lining out

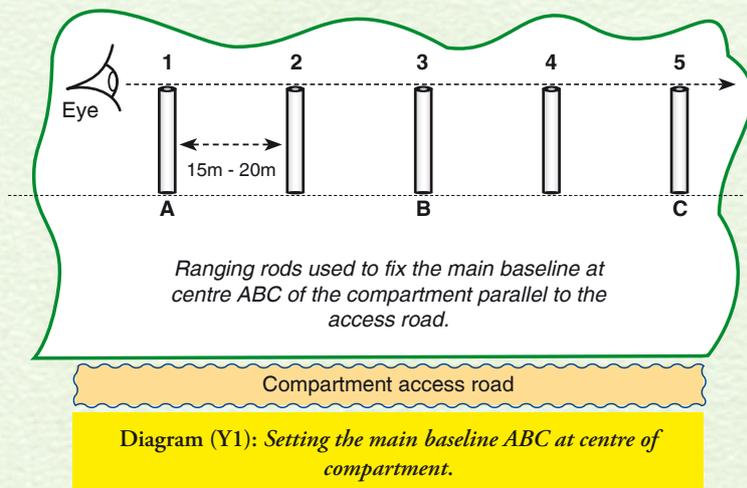
This activity is done to ensure that trees are planted in straight lines and at the required spacing. The main reason for lining out is to ensure that the trees have enough space to grow at the same time have some competition between themselves. This competition is important as trees grow to ensure that they produce straight stems with reduced branches. Other benefits of planting trees in lines are:-

- For easy accessibility through the plantation.
- Maintenance activities like weeding, pruning, thinning and harvesting are much easier to supervise.
- For quickly estimating the number of trees or volume existing on your plantation.

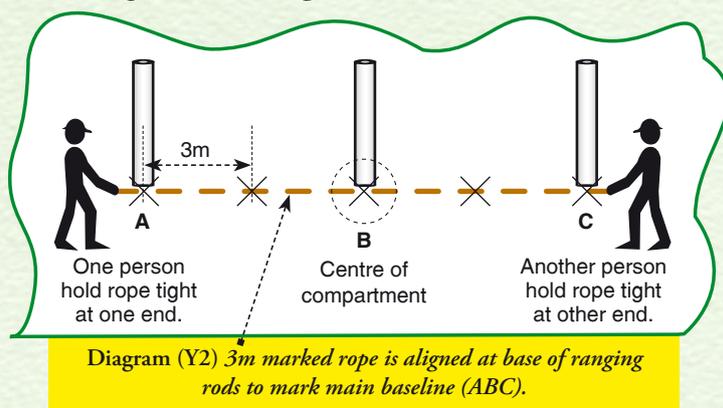
#### Procedure for lining out (marking holes for pitting on ground)

This procedure involves putting marks on the ground where pits will later be dug. The tools used include one cross head, at least 6 ranging rods, a long rope (about 100 meters) marked at desired spacing (say 3m spacing) and hoes for digging marks on ground. Steps followed are:

1. Establish a main baseline (ABC) using ranging rods. Do this by first fixing 2 ranging rods on the ground and thereafter, carry on with rods 3, 4, 5 etc. in a straight line. The main baseline should be the longest line across the centre of the compartment, preferably parallel to the compartment access road (see diagram Y1).



2. Next, align the marking rope at the base of the ranging rods, then mark the 3m points on the ground (see diagram Y2 below).



3. Locate the position of the sub-baseline (EBF) at right angle to the main baseline (ABC) and align ranging rods along it using a crosshead. The sub-baseline should pass through one of the planting marks on the main baseline. Preferably, the sub-baseline should be located at the centre of the main baseline as shown on diagram Y3 below:-

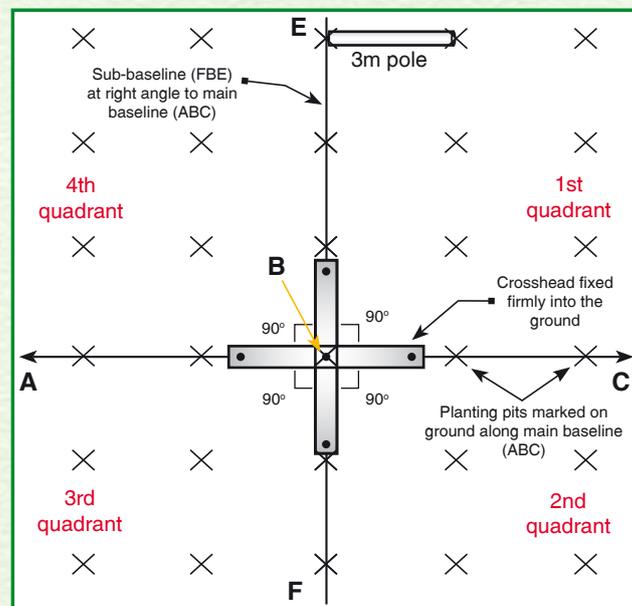
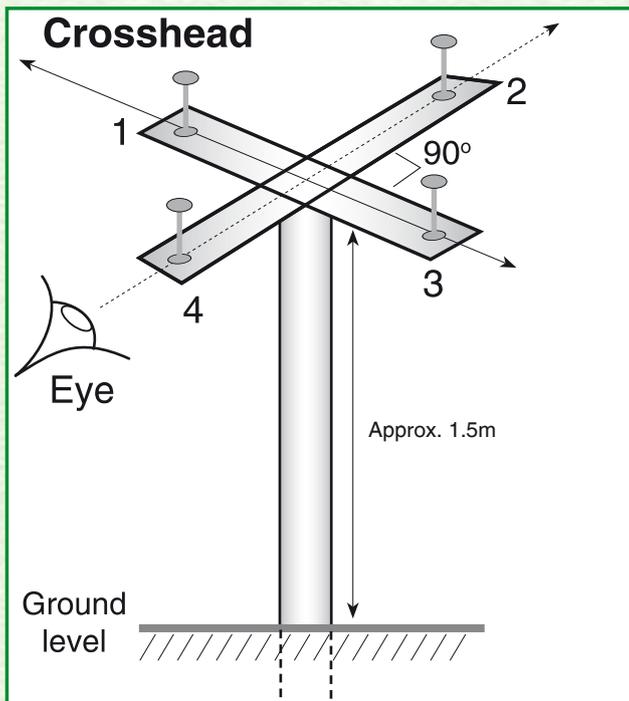


Diagram (Y3): Locating a sub-baseline (EBF) with a crosshead.



4. Mark planting pits in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> quadrant progressively. Mark starting from the centre of the main baseline so that any errors are pushed towards the edges of the compartment.
5. The rope holder working along the main baseline (ABC) should use the 3m pre-marked pits on the ground while the person working at the other edge of the compartment uses a 3m long pole to align the rope parallel to the sub-baseline EBF. Once 1<sup>st</sup> quadrant is all marked, the team moves to 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quadrants too.
6. When lining out on steep slopes or hills (more than 20° slope), it is important to do slope correction otherwise the horizontal distance between the trees will be less than expected. The same procedure of lining out as described above is followed. However now the baseline or cross line needs to be lifted up from the lower end of the slope such that point A and C are at the same height as shown on diagram (c).

Now your sub-baseline should appear as shown by rope AC whose 3m mark on the ground is determined by a vertical pole CB. Next, with your pole still at the same mark B, lower the rope AC to lie on the ground and hold it tight at both ends. You now find that the rope AC of 3m long when placed on the steep ground does not cover the full length of AB but ends somewhere at D.

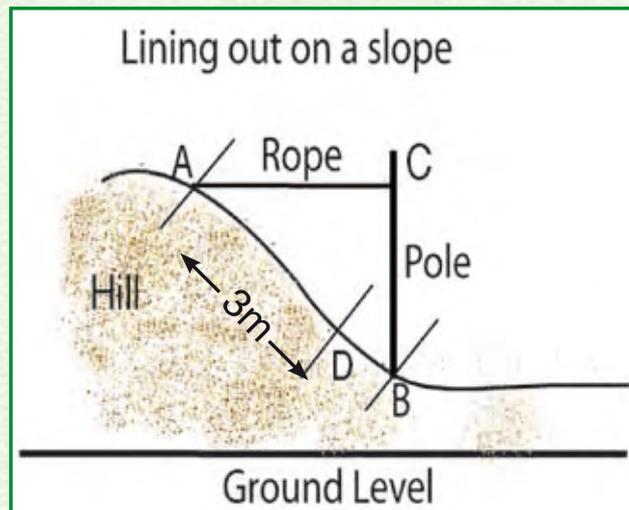


Diagram (c): Lining out on a slope needs you to keep the cross line rope not on the ground level but be raised up at the same height as the upper end (A). A pole then can be used to locate the point (B) where the next pit down the hill should be dug.

Therefore, measure length DB and add this to the spacing being used in order to get the true distance AB on the steep ground. If DB is 30cm or 0.3m, then add it to our spacing of 3m, that is,  $3 + 0.3 = 3.3\text{m}$ . This means all the trees on this particular slope should be spaced at 3.3m. In this case, the 0.3m is our slope correction factor. You can then mark your rope at 3.3m spacing.

After successful lining out, the next step is to proceed to pitting.

## 6.4 Pitting

Pitting is the process of digging holes into which the seedlings are to be planted. These are dug at the points marked during the lining out.

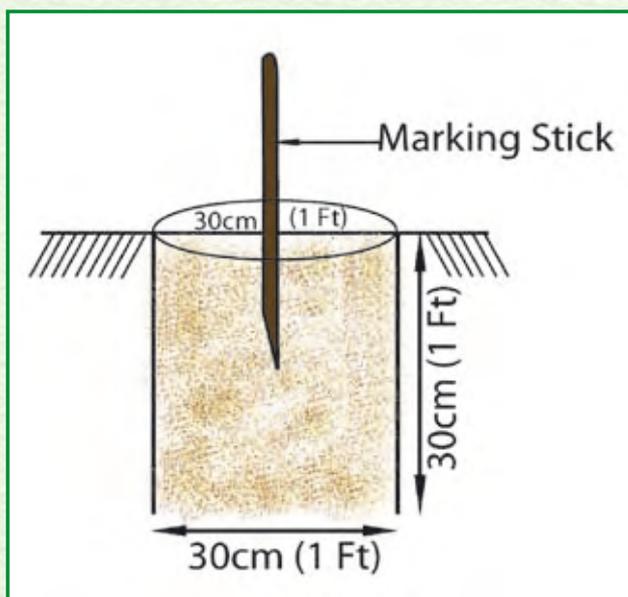
### How is pitting done?

- Use a hoe to remove the vegetation or any debris at each marked planting hole to make a clean circle of 1 metre wide around it.
- Then dig a pit at the centre of the cleared area by enlarging the marked hole. This pit should be 25cm - 30cm (1ft) wide and 25cm - 30cm (1ft) deep. If the soil is hard, like on rocky areas, you must still dig 30cm deep and 30cm wide. In cases where soils are hard, use a pick mattock (*Ensululu*) to penetrate the hard soil. Dig the pit from different sides to ensure that the hole is as flat and as wide at the bottom as it is at the top.
- Having dug the soil out of the pit, break down the large soil clods and put the soil back to fill the pit.



*Margaret clearing a 1m diameter circle prior to digging a pit.*

- You can then push in a small stick (about 1m long) into the centre of the pit so that during planting, one can easily identify the pits and also be able to plant the seedling at the centre of the pit.



*An example of a well dug pit 30cm deep and 30cm wide with a marking stick put to mark the centre of pit.*

- When pitting is complete, the farmer is advised to wait until the area has received enough rainfall before planting. Unfortunately the little rain received during this period is enough to trigger germination of weeds. The best practice for larger growers is to carry out a pre-plant spray. Alternatively, do manual weeding just before planting. Never plant into a weedy pit and always keep the 1m diameter circle around the tree free of weeds.

## 6.5 Pre-plant weed spray

When the area is wet enough for planting, usually many weeds emerge and are most likely to out compete the young seedlings. The right thing to do therefore, is to first kill these weeds and plant immediately after. You can do this by slashing or digging your area. Another method of controlling weed (which is not recommended to community members for safety and cost effectiveness reasons) is the use of herbicides. You can carry out a full cover herbicide weed spray with glyphosate to kill all newly germinated and growing weeds before seedlings are planted (pre-plant weed spray). After this spray is done, planting can start the next day to allow seedlings to take an early advantage of growing free of weeds - for some time before the next generation of weeds comes up. Note that when using chemicals, people must first be properly trained, well supervised and have appropriate protective clothing.

## 7.0 SEEDLING HANDLING AND TRANSPORTATION

When conditions are favorable for planting (i.e. when the site has been properly prepared and sufficient rainfall has been received), seedlings are transported to the plantation site. Care must be taken while loading, transporting and off loading of seedlings or their quality may be affected making them stressed or otherwise unfit for planting.

### 7.1 In which ways can seedling quality be affected?

Seedling quality is usually affected as a result of several handlings that occur when seedlings are picked from the nursery bed ground, while loading them in containers, then when being transported to the planting site. After reaching the site, again in the process of off-loading from the transportation containers to the ground some seedlings may be damaged. Generally, the seedlings are affected in two ways:-

- Seedlings losing a lot of soil from their pots, exposing the roots leading to drying up.
- Physical damage by breaking seedling roots, leaves and stems.

## 7.2 How to minimize loss of seedling quality

Seedlings should be packed in small containers designed like crates that are later packed onto a car. If you have no containers, load the seedlings upright on the car, but not lying down.

- Seedlings should be watered first before transporting to avoid excessive drying and soil loss.



*A young man off loading pine seedlings: Some seedlings have already lost soil and their roots are at a high risk of dying or being bent.*

- Transport seedlings in the morning and evening to avoid hot day sun shine and shelter them from wind.



*Well packed seedlings on small designed containers like crates ready for transportation.*

- Offload seedlings at the planting site carefully avoid holding the seedlings by their shoot. Water the seedlings and temporarily put them under shade. After the seedlings have recovered from

stress (which you can tell when their shoots stand upright) they should be immediately planted.



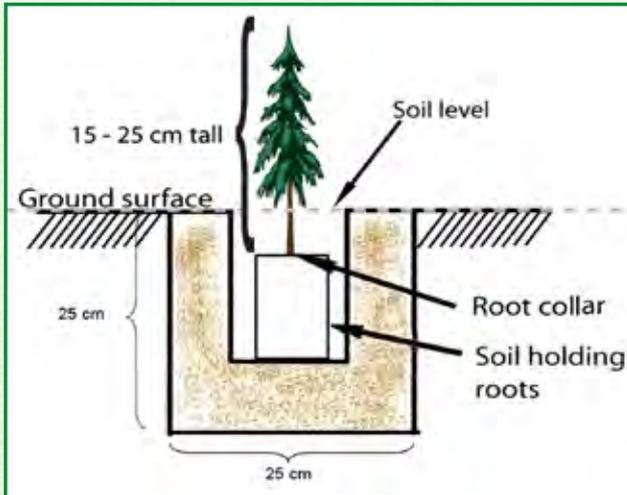
*Seedlings badly placed on the ground and also kept too long unplanted.*

## 8.0 PLANTING

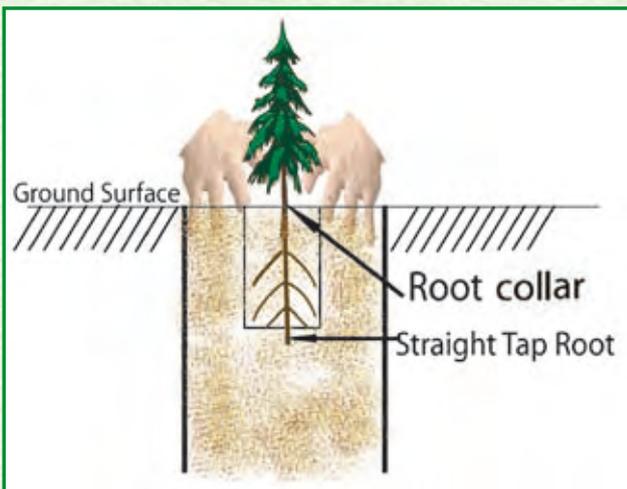
This is where seedlings are placed into the planting pits and carefully covered with soil. The planting process should be done carefully so that the roots are not bent and ensure that the seedling is planted at the right depth.

The following procedure should be followed when planting:-

- Remove the stick once used to mark the hole during the pitting process and dig a small hole into the centre of the planting pit. The hole should be deep enough to accommodate the whole root plug up to 2 cm above root collar. If the hole is deeper than this then some soil should first be put back to reduce the depth so as to avoid planting the seedlings too deep.
- Once the hole has been successfully dug, the seedling is carefully stripped off its polythene bag. The polythene bag should not be thrown about but collected and later burnt to keep our environment safer.
- Next, hold the seedling in one hand and place it vertically into the planting pit.
- Gently cover the seedling with soil up to above root collar - soil just touching the lower leaves (See drawing on next page). The seedling should then be properly firmed using the tips of your fingers. Ensure that the soil around the seedling is level with the ground. Do not heap the soil around the seedling.



A seedling (15-25cm tall) is carefully put into the pit deep enough to be covered up to above root collar - soil just touching the lower leaves as shown on diagram above.



A seedling is carefully covered with soil and then firmed at its sides with hands but not foot.



A well planted pine seedling deep enough into the soil will be firm on the ground.



This pine seedling is not planted deep enough and can easily be bent by strong wind /rain. It is also poor quality seedling as it lacks a leading stem.

## 8.1 Beating up/blanking

This is the process of replacing trees that have died or are not growing properly shortly after planting. This operation must be done within the same rainy season for uniform growth of all trees. For *E. grandis* beating up should be done within the second week after planting, whilst for pines it should be no more than a month after planting. Beating up can be minimised or prevented by properly timing the planting to coincide with the rains and protecting trees against animals since deaths will be minimised and survival will be high (above 90%). It is necessary to first determine how many trees have survived before rushing to beat up. If only a few seedlings have died there is no need to beat up - after all some of the trees will still be removed during the thinning operation later on. To determine the survival percentage, one should inspect the plantation and make some counts as follows:-

- Randomly walk along every 3<sup>rd</sup> row and count the 1st 10 planting pits you come across.
- Record the number of both the dead and surviving plants on these 10 planting pits.
- Repeat the same procedure on the next 3<sup>rd</sup> row for at least 5 rows to cover a total of 50 planting pits (5 x 10).
- Add up the total number of seedlings that survived in the 50 planting pits and divide by the total planting pits surveyed (i.e. 50).

- Multiply this by 100 to get the survival percentage as follows:-

$$\frac{\text{Survival Percentage/}}{\text{Stocking}} = \frac{\text{No. of surviving seedlings} \times 100}{50}$$

If the survival percentage is 80% and above, do not worry about replacing the dead trees, as long as death is not in one location but spread through out the plantation. However, if the survival falls within 60%-80%, replace the dead ones immediately. Survival of <60% will probably require replanting of the whole area, preferably in the next rainy season.

## 8.2 Establishment of plantation under Taungya

Taungya is one of the old methods of plantation establishment where food crops are grown among trees for up to 3 years depending on tree species, initial spacing and food crops being grown. However, it has advantages and disadvantages as summarized below:-

### Advantages

- Reduces costs of weeding trees.
- Provision of food.
- Legume crops add nitrogen to soil.

### Disadvantages

- Some times trees are intentionally pruned too early and too high to open space for crops.
- There is competition between trees and food crops for nutrients and water.
- Tall crops like cassava and maize shade young trees.
- Tree roots are often damaged in the process of weeding food crops.

Unfortunately Taungya for many years in Uganda has failed to produce good tree plantations, mostly because people tend to give less attention to trees and care more about the crops, especially if the owner of the crops is not the owner of the trees.

It is recommended that all commercial tree planters should not practice Taungya because those who have done it have got poor results on their plantations. It is even worse with *Eucalyptus*, as this tree species does not tolerate competition from any other type of vegetation.

For small growers, like the community tree planters, with limited land and who at the same time want to plant trees, some short non-climbing food crops may be grown with trees in a way which does not affect tree

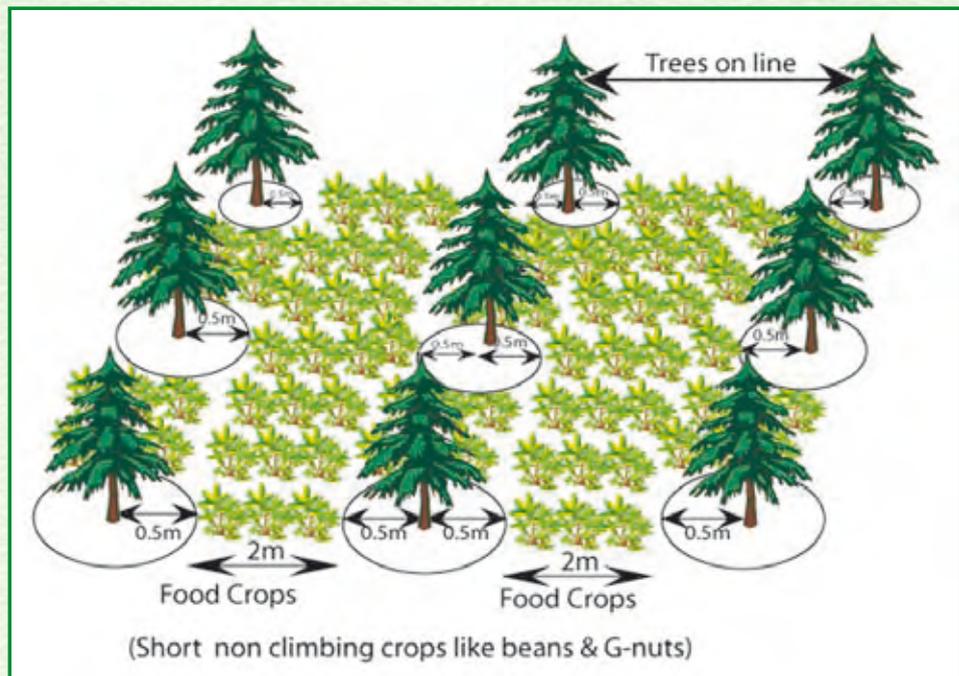


Figure (d): Recommended Taungya under community planting. Food crops (mainly short non-climbing ones are planted within 2m strip (inter row) between tree lines. Each tree has an allowance of 0.5m radius as feeding area.

roots and shoot growth. Such crops could be beans and ground nuts but not tall crops like cassava, maize or sun flower. A half metre (0.5m) radius round each



It is wrong to mix trees like these pines with tall shading crops like maize or cassava as trees also need sun light for growth. It is also wrong to do early pruning in order to expose young food crops to sun light!

tree should be left as free feeding space for the tree such that the remaining space between trees lines be for food crops as shown in the figure (d) on page 15.



The right way of doing Taungya: Here beans have been grown between tree rows at a safer distance from trees.



Clean weeding of pine trees like this is the best but may be difficult financially on a large scale.

## 9.0 MAINTENANCE OF PLANTATIONS

Once trees have been well established, they must be properly maintained to grow well. The important management activities for maintaining plantations include weeding, pruning, thinning and protection from fires, animals, pests and diseases, thieves etc.

### 9.1 Weeding

This is a regular activity carried out to ensure that trees are kept free of weeds to reduce competition.

#### 9.1.1 Importance of good weeding

Consistent weeding of trees enables them to mature earlier and also to produce high quality sawlogs which



Well weeded eucalypts trees: You can only get good profits from eucalypts by maintaining them under zero weeds.



Poor weeding regime: Weeds are already taking advantage over the trees.



Poorly weeded eucalyptus trees - No good results from such trees.

are straight and big, and can be sold at high profits. Never allow weeds to grow more than half the tree height because weeds compete with trees for water and nutrients. Some species trees like pines can tolerate some little competition from weeds while others e.g especially *Eucalyptus* are non- tolerant to weeds.

### 9.1.2 Methods of weeding

There are various ways of weeding as described below:-

#### Clean hoeing

This involves removing all the weeds between the inter-rows. Take care that weeds within 20cm radius from the tree are just uprooted by hand to avoid damaging roots. Clean weeding is a recommended method of weeding *Eucalyptus* trees.

Young trees will grow much more quickly if all the weeds are removed by clean hoeing. However this method is not cost effective for some tree species like pines, which can tolerate some little competition from weeds.

It also makes hilly areas prone to soil erosion. On steep slopes, a combination of slashing with either spot or line weeding across the slope is recommended.

#### Spot weeding

In this method weeds (including food crops) are removed from a radius of 0.5m from the base of each seedling.



SPGS's Zainabu demonstrating to Muzira Farmers how to do spot weeding of trees.

Spot weeding is normally done with a sharp hoe to scrape off (not dig) the weeds within 1m diameter around the tree See figure (e). Weeds within 10cm radius should be uprooted by hand and within 40cm radius they should be carefully scraped by a hoe.

#### Line weeding

A 1m wide strip along each planting line (0.5m from either side of each seedling) is cleared of weeds using a hoe.

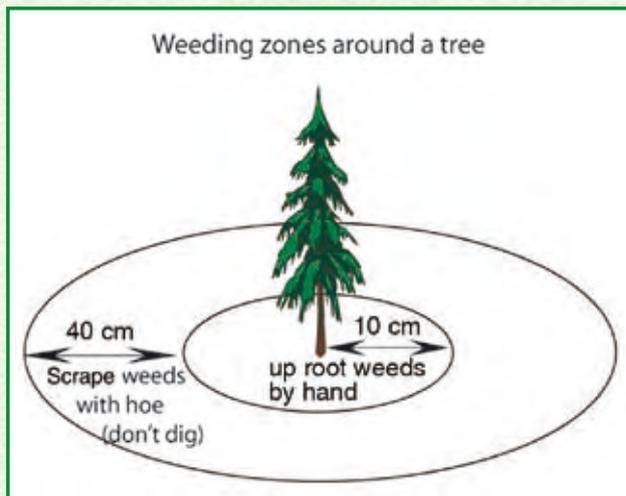


Figure (e): All weeds within 10cm radius around the seedling must be constantly removed by hand to avoid destroying seedling roots. You can use a hoe to scrape off any weeds within the 40cm region. Weeds here should always be kept down as they compete directly with seedlings.



Good spot hoed pine trees.



An excellent line weeding of young *Pinus caribaea* trees. Those weeds between trees should be kept shorter preferably by slashing or spraying.

*If Taungya is being practiced, line weeding is usually not suitable, but rather do spot weeding.*

### **Slashing**

After spot or line weeding, weeds in the inter rows can be cleared by slashing. This slashing should be close to the ground if it is to be effective. Slash weeding and line weeding can be done in combination with spot weeding for controlling weeds in most tree plantations like pines, Muzizi, Terminalia, Teak etc. However, Eucalypts must be 100 % weed free and should therefore be weeded by clean hoeing or herbicide spray until the canopy closes.



*A good example of combining spot hoeing with slashing in pines.*

### **Herbicide spraying**

This is the most cost effective method used to weed commercial plantations. It is less labour intensive and kills weeds well if properly done by skilled people. Trees must be protected because the chemical (Glyphosate)



*A well sprayed tree plantation like this gives trees a chance to maximize their growth rates while still young.*

is non- selective and kills everything green. The use of herbicides for weed control on small scale planting is not recommended because it is not cost effective. One also needs to have trained workers for effectiveness and be cautious about safety.

### **9.1.3 Controlling Invasive weeds.**

Usually at about 3-4 years when the trees have established above the common grass and legume weeds, competition from such weeds is no longer a big threat hence no need for intensive weeding. Of most importance though, is to keep monitoring your plantation for aggressive invading species like *Lantana camara*, Bug weed and Paper mulberry as well as the indigenous tree re-growths like *Combretum spp.* These weeds normally form a bush in between trees and actively compete with trees and also inhibit access. The growth of these weeds should periodically be controlled by chopping, up rooting/digging out or spraying with chemical to kill them.



*The trees that have already grown up like these no longer need constant weeding apart from selective cutting down of regrowing shrubs.*

## **9.2 Pruning**

This is the successive removal of the lower branches from timber trees mainly to improve on timber quality.

### **9.2.1 Why should trees be pruned?**

The main purpose for pruning is to improve timber quality (get knot free timber) but also to improve accessibility for other activities like thinning and controlling fires. Trees grown for fuelwood need not be pruned.

Table 5: Guides on how and when to prune pine trees.

Pruning Type	Age	Prune to	Purpose
1 <sup>st</sup>	3 - 4	2m	Open access
2 <sup>nd</sup>	6 - 7	4m	Knot-free timber
3 <sup>rd</sup>	9 - 10	7m	Maximise log quality

### 9.2.2 How is pruning done?

Pruning is carried out in stages as the trees grow, known as a series of pruning 'lifts'. Before starting to prune a tree, first stand at a distance where you can see its crown. Next, judge the point where half of the crown height is. Then cut off the tree branches starting from the bottom up to half of the tree height using a curved pruning saw (not a panga or axe please). A clean cut must be made as close to the tree stem as possible.



AN EXAMPLE OF BAD CUTS WHILE PRUNING. Long branches left on the stem will later dry and form dead knots. These knots can come out leaving holes on timber surface.



While pruning, make clean cuts as close to the stem as possible (as shown by the arrow). A well pruned tree with nice cuts improves on the quality of timber.



GOOD WAY OF HIGH PRUNING: When tree branches become too long to reach while standing, use a long pole to cut branches. Climbing on a tree using a ladder is dangerous.

**Note:** All pruned branches must be piled between tree lines and must be 5m off any firebreak. Use of ordinary ladders as is commonly done is unsafe to both the tree and a person carrying out the work.

**NOTE 1:** Timing depends on growth rate of trees not the age.

**NOTE 2:** Pruning will have to be done much earlier with Eucalypts grown for timber.



**BAD WAY OF HIGH PRUNING:** *Climbing on a tree using a ladder to cut branches is dangerous. Use a long pole with a pruning saw fixed on it*



**PRUNE TREES AT THE RIGHT STAGE:** *These trees were pruned while still too young and this reduces their growth rate.*

## 9.3 Thinning

This is an operation carried out at different stages of tree growth by selecting and deliberately removing some of the living trees from a given plantation stand. Thinning gives the best trees more space to grow and if done in the right time, encourages the growth of the remaining trees.

### 9.3.1 Why should plantations be thinned?

As trees grow, they start competing with one another for light, nutrients, water and space thereby slowing down growth. Therefore, some of the trees in the plantation should be systematically removed (whether good or not) in order to reduce the competition between the trees. This allows the best remaining trees to grow faster and larger, thus increasing the value of your plantation. At sawmills, fatter trees are preferred for cutting into planks than many smaller trees.



*An example of a well thinned Eucalypt stand like this will allow trees to quickly gain more volume.*

### 9.3.2 When should thinning be done?

Generally, timing of thinning depends on tree species, its growth rate and extent of maintenance. Thus like pruning, there is no compulsory time for thinning plantations but it should be done before competition begins (before crowns and branches start touching). It is advisable to do first thinning only after first pruning for clear view of trees and accessibility. The rest of the thinning operations can be done before pruning to save money from pruning trees that are after all going to be thinned out.



This 2 - year old plantation of *E. grandis* is for fuelwood (James Finlay Ltd.) and thus has many trees per hectare (i.e. high stocking); if grown for sawlogs, it would have to be thinned to give the best trees more growing space.



**UNTHINNED PLANTATION:** Delayed thinning does not give bigger saw logs that fetch high profits. Thinning **MUST** be done before the trees get stressed like in the photo above. These trees are also overdue for pruning, since the lower branches are drying up.

Table 6: Shows the suggested thinning type, age and number of stems left for a pine plantation.

Thinning type	Age (Years)	Thin to
1 <sup>st</sup>	4 - 6	700
2 <sup>nd</sup>	6 - 9	500
3 <sup>rd</sup>	9 - 12	300

This means at any tree spacing used, e.g. 3m x 3m where there are 1,111 trees/ha, the number of trees to be removed per ha at first thinning would be (1,111 - 700) 411. In the 2<sup>nd</sup> thinning it would be (700 - 500) 200 and at 3<sup>rd</sup> thinning you remove (500 - 200) 300 to leave you with 300 trees per ha for final clear cutting at 18 - 25 years.

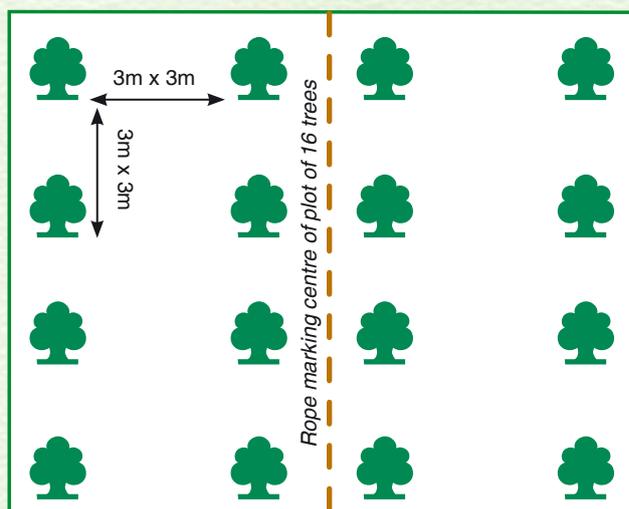
### 9.3.3 Procedure of marking for thinning

#### Marking by groups

The decision as to what trees are to be thinned should be made by trained and experienced personnel. Marking by groups is normally used for 1<sup>st</sup> and 2<sup>nd</sup> thinning. This is because the rows of trees can still be clearly seen and thus it would be easy to select groups of trees. A given group of trees constitutes a plot. In order to mark trees to be thinned out follow the procedure given below:

#### Determine the plot size

The most common method is to have four rows wide by four rows lengthwise. This gives a total number of 16 trees (4 x 4) in a plot.



This is a thinning plot with a group of 16 trees. A person walks along the rope and marks trees for thinning from two rows on either side.

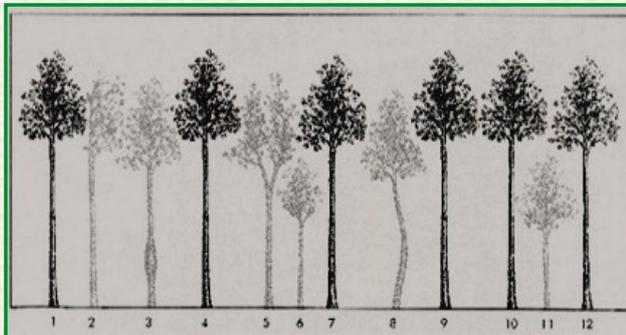
**Note:** The above procedure is repeated in each plot throughout the compartment.

## Plot centre and plot length

A rope is placed along the plot centre with two rows of trees on either side. The rope also helps to make the starting and ending point of the plot.

### Determine trees to be removed from the plot

According to the table 6 (see page 21), first thinning reduces stand density from 1111 to 700 stems per hectare (assuming the spacing is 3 m x 3 m). Thus, number of trees to remain per plot of 16 trees equals  $700 \div 1111 \times 16 = 10$  therefore, trees to be marked equals  $16 - 10 = 6$ . Thus in a group of 16 trees we mark 6 to be thinned. All blank spaces are part of the 6 trees to be marked. The marking for thinning (i.e. the trees to be removed) must take into account the quality and the growing space of the the trees remaining.



The trees fit to be removed by thinning are (2) one – sided crown, (3) bole (trunk) deformed, (5) forked stem, (6) overtopped tree, (8) crooked stem, and (11) very small tree next to larger ones.

**Note 1:** When counting the 9 trees to be removed, also include gaps (where trees died). Bent trees, tree with branched tops in form of letter “Y” or any poorly growing tree should be removed. Note that whether all trees are good, the thinning should still be carried out to create more space between the remaining trees. Selection of trees should be done as in example on diagram above.

**Note 2:** If thinning are to be sold, the operation should be closely supervised to ensure that bigger trees do not end up being cut as a priority for sale. In this case, the objective of thinning as recommended in forestry will have changed.

## 9.4 Protecting your trees

Usually, trees need to be protected from fires, pests, diseases and animals.

### 9.4.1 Protection against fire

Fire is one of the worst enemies of your trees and you could loose all of your investment in a matter of minutes if your plantation caught fire. To minimize fire risk the following fire protection measures should be taken:-

#### Firebreaks:

These can be internal or external depending on size of your land. For small areas of 1-5 acres, an external open area of at least 5m wide should be kept open and free of any vegetation. If the woodlot is bordered by gardens of food crops, then ensure that after their harvesting, the drying remains should be removed 5m away from the trees. This strip of area should be kept open by slashing or hoeing before each dry season. As your plantation expands, internal firebreaks need to be included.

#### Careful burning of crop gardens:

While clearing adjacent land for food crops, make sure the rubbish is heaped and burnt in the middle of the garden. Burning should be done during cool non windy conditions and should be closely supervised



A plantation with a good fire break between blocks



A forest you have been investing in for years can be destroyed by fires in hours! Ensure you protect your forest against fires.

until you are sure the fire is completely dead before leaving the area.

### ***Timely weeding:***

Make sure that all your trees are well weeded during the rainy season such that in the dry season, there are no tall dry weeds that easily catch fire to burn your trees.

### ***Good relationships:***

Ensure you have good relations with your neighbours to avoid malicious fires. They can also be of assistance when called upon to help put off fire.



*Tree left to grow with drying weeds like these do have a higher chance of being burnt down during the dry season.*

### ***9.4.2 Protection against pests and diseases?***

For the trees being planted, it is important to be vigilant about the health of your trees. This can be done by periodic inspections to note any signs of diseases e.g. drying up, changes in colour etc.



*Eucalyptus tree attacked by Blue gum Chalcid wasp (BGC) common in stressed trees like those planted on wrong sites and poorly weeded.*

Recently, *Eucalyptus* plantations are being attacked by the Chalcid wasp (Blue Gum Chalcid) but it is seen to be more severe in stressed plantations such as poorly weeded plantations, and those planted of-site.



**WILTING IN PINES:** *The cause of this disease is still not clear, but as we wait for the findings, ensure you do not plant your trees in wet areas as this is one of the causes we often see.*

It can be controlled by planting eucalypts on the right sites and by intensively weeding them to reduce tree stress.

Eucalypts are also susceptible to termite attack and should therefore not be planted in areas infested with termites. Chemicals like Dursban and Furadan are used to control termites but for their proper use, please seek professional advice. Report any strange occurrence of a disease or pest on your plantation to an appropriate authority. These could be District Forest Officers, National Forest Authority, SPGS and National Forest Research Institute.

### ***9.4.3 Protection against animals***

Because plantation investments are worth of millions of shillings, the farmer must protect the trees from browsing cattle, goats and other wild animals like

antelopes, monkeys and bushbucks. These prefer shoots of young seedlings. They can also damage seedlings by stepping on them. Wild animals need to be constantly scared away, and clear any hiding places for them. Make sure you regularly inspect your plantation to check for any damages on trees. Talk to your neighbour about his/her wandering cattle or goats and if the problem continues, report to LCs and get a lasting solution. Otherwise a charge per tree destroyed may be calculated based on its establishment value plus compound interest depending on the number of years the tree has been standing.



**THE UNWANTED GUESTS:** *Cattle like goats and other animals should be kept out of tree plantations because they eat or trample on the young trees.*

## 10.0 HARVESTING AND REPLANTING TREE PLANTATIONS

**H**arvesting is the cutting down of only mature trees when the best market for their sale exists. It is advisable to cut trees block by block as they mature depending on when they were planted. Remember that the rotation for trees is when they reach market size and not necessarily maturity. An appropriate harvesting system has to be designed according to the nature of the area of your plantation.

### 10.1 What is the best time for cutting (selling) your trees?

For *Pinus caribaea*, the recommended time is from 15-25 years (depending on growth rate and size). For other tree species, please refer to table 2 section 3.2. Trees are like money put in bank to gain interest so that at some time in future you get more than the

amount you put in. Likewise, as trees grow each passing year, they keep on gaining more size (volume) until the recommended time of cutting them. You get more money from a bigger tree than from small sized poles.

It is not advisable to harvest trees before the recommended time, because they are still small in size (volume) yet are still actively putting on volume. More so, the wood itself is not mature enough to attract a better price. On the other hand, allowing trees to remain too long beyond the recommended time of harvesting (over maturity) is not advisable because trees by this time are no longer growing actively and some may start dying of old age. However, the most important point to note is that, you can sell your trees at any stage of their growth provided there is the best market offer for them. But you have to be careful of the fact that the best value of your trees is from big saw logs!

### 10.2 Replanting of felled tree plantations

After a given block is harvested, it should be immediately prepared for replanting in the forthcoming rain season when still free of weeds. Many of the trees like pines, musizi, or Terminalia are commonly propagated by seed. For most Eucalypts and teak that develop shoots stems from cut stumps after harvesting, this regrowth (coppices) can only be used for fuelwood and small poles plantations. Eucalypt plantations that have been grown for timber or large poles must be replanted after harvesting and the coppice regrowth be frequently cut or sprayed until they die off. The replanting is necessary because many of the trees will have been cut down at various stages of thinning and any regrowth from such stumps will have been suppressed by shade from the remaining trees leading to less stocking.

## 11.0 PLANTATION RECORD KEEPING

**T**here are some records that are particularly important for a tree farmer to safely keep for accountability and for future reference. Such records include:-

- 1) **Nursery records**  
Information on tree species, seed origin, date sown, amount sown etc
- 2) **Plantation compartments records like;**
  - Compartment identity (Name or No. etc.)

- Compartment size
- Planting details (tree species, date planted, spacing, survival etc.)
- Weeding status
- Pruning plan
- Thinning plan
- Harvesting plan

- 3) Pest, disease and fire outbreaks
- 4) Tools and equipment stores
- 5) Expenditure and revenue
- 6) Weather records (Only for commercial planters)
- 7) Map(s) of the area.

*Note: For a community farmer, the list of activities carried out and date when they were done can be enough.*

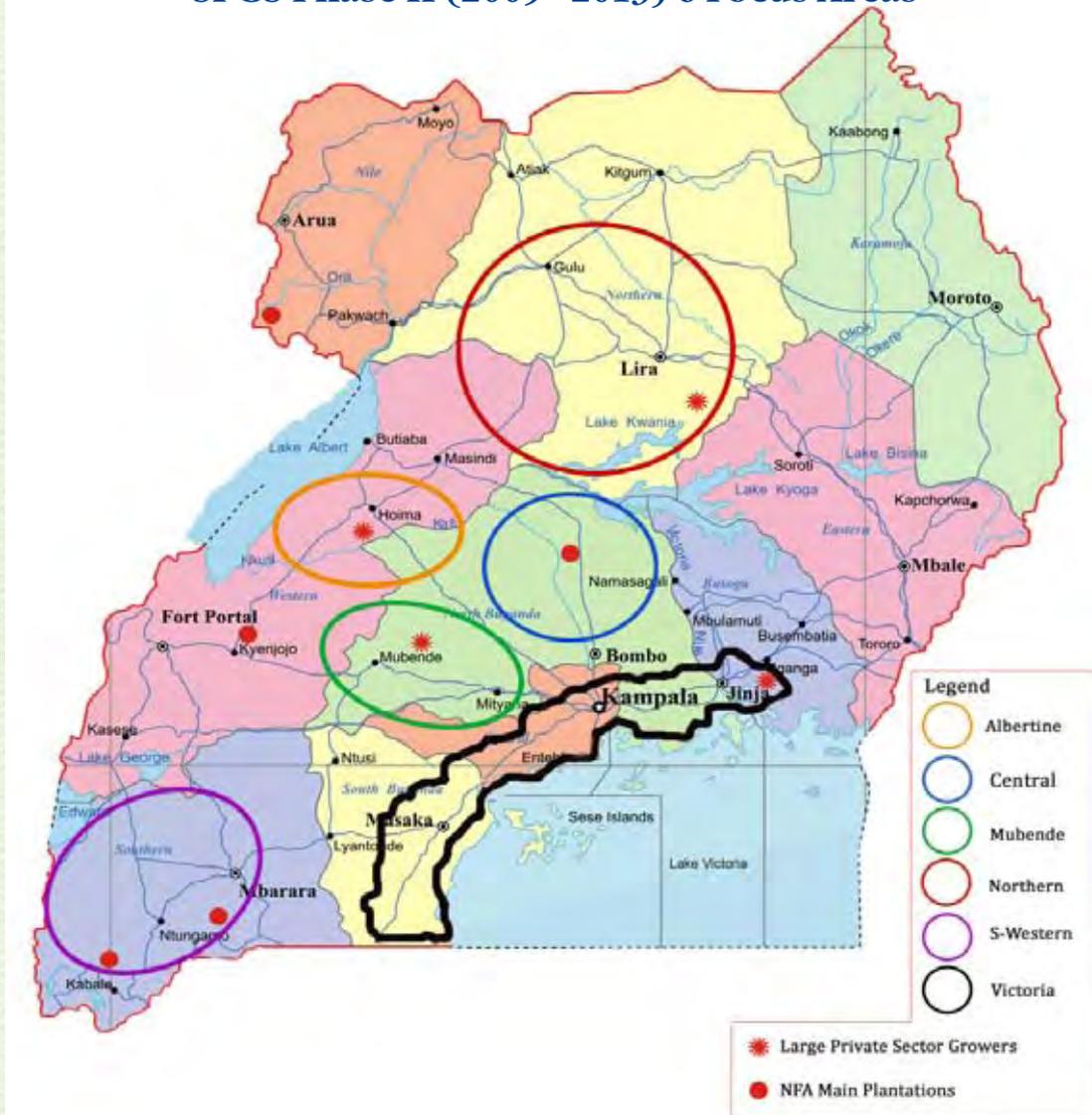
## INFORMATION ON SPGS WOODLOT SUPPORT

SPGS separately supports communities, schools, prisons, among others with land 5ha – 25ha specifically for woodlot planting. Woodlot support is aimed at enabling such institutions to meet their own fuelwood needs and thus help reduce pressure on the remaining natural forests.

### *For more information contact:*

- SPGS Tree Planting Guidelines for Uganda
- SPGS News letters
- [www.sawlog.org](http://www.sawlog.org)
- SPGS Office

## PLANTATION “CLUSTERS” SPGS Phase II (2009 - 2013) 6 Focus Areas





*A valuable, mature pine plantation in South Africa: The result of using good seed, establishing well and then thinning and pruning on time.*



*This is Pinus caribaea (PCH-Australia) 2004 crop growing well in Kasagala CFR, Nakasongola.  
Quality seed and proper weeding gave it this impressive look*

**THE SAWLOG PRODUCTION GRANT SCHEME (SPGS)**

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