NFA National Forestry Authority

SPGS SAWLOG PRODUCTION GRANT SCHEME

PLANTATION GUIDELINES
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POST PLANT WEED CONTROL



Eucalypts do not tolerate weed competition. Where Eucalypts are grown commercially (for fuelwood, timber or pulp), 100% weed control is standard practise. Here, 3 month old hybrid Eucalyptus (GU) clones have been pre-plant sprayed and then post plant weeded using Glyphosate (SAPPI, RSA).



An illustration of good weeding in Pines in Uganda: a clean weeded 1.0 metre strip in the planting line and the weeds in the inter-row slashed.

WHAT IS POST PLANT WEEDING?

In this Guideline we define post plant weeding as any weeding that takes place between the planting of the young trees up until canopy closure - i.e. the time when adjacent trees touch their crowns, thereby shading out the ground vegetation.

WHY IS WEEDING NECESSARY?

Weeds have gained their name from their ability to grow fast and dominate an area very quickly; Thus they compete against our desired (planted) crop. This competition deprives the planted trees of the nutrients, water, sunlight and the space needed to grow quickly and with a good form. By weeding we remove this competition and help to provide the optimum growing environment for our tree crop.

Weeds, however, are tough to eradicate. They can often re-grow from large root systems and normally have a vigorous seeding ability, sometimes producing millions of seeds that germinate very quickly. In addition to the competition for resources, weeds also provide shelter for rodents and are a food source for cattle and wild antelopes: these animals will often then cause damage to the trees. Weeds also increase the fuel load within a plantation and thus increase the fire risk during the dry seasons.

Only with good weeding will you acheive the growth potential of the tree crop and make the returns expected on the plantation investment.

Weeds are clever plants and most have evolved methods of rapid dispersal of their seeds (check those Black-jack seeds in your socks). Because weed seeds are often spread easily, it is important to keep the entire area under control. Weedy areas provide a seed bank that keeps infesting areas being managed.

This is one of a series of Plantation Guidelines being produced jointly by the National Forestry Authority and the Sawlog Production Grant Scheme. Together they form a comprehensive silvicultural manual to encourage high standards of plantation establishment and management in Uganda.
Copies are available from the NFA and SPGS offices.

Summary Comparison of Different Weeding Methods

	Chemical	Mechanical	Manual
PROS:	Very cost effective if carried out well and at a right time.	Cost effective if land is well prepared from the planning phase.	Relatively unskilled labour can carry out job.
	Well trained team can cover large areas each day.	Large areas can be completed quickly.	Cheap (and widely available) tools.
	Kills very persistent weeds (especially perennial grasses).		Can be carried out in all weather and on all types of terrain.
CONS:	Weather dependant	Weather dependant – some areas may not be accessible when wet.	Does not necessarily kill the weeds.
	Can cause serious damage to the tree crop if spray drifts during operation.	Requires accurate planting lines; fairly flat terrain and no obstacles to tractor.	Very time consuming (i.e. expensive) when weed growth is heavy.
	Can be expensive if not properly managed (herbicide will disappear!).	Requires a tractor in good working order.	Careless workers can damage tree roots (with hoes) or slice the tops of trees (slashers/pangas)
	Safety issue with workers	With careless operator can cause serious root damage to trees.	Physically difficult with certain tough or well established weed species.
	Must use well-trained team.		Cultivation creates ideal seedbed conditions for weeds.
	Requires transport of water to field		High labour requirement

What Types Of Post Plant Weeding Are There?

There are three main categories of weeding: herbicide, mechanical and manual. The main features of each method are outlined below.

CHEMICAL WEEDING:

This involves the killing of weeds with a herbicide. The main herbicide being used in forestry in Uganda at present has the active ingredient Glyphosate. Glyphosate affects any green plant material so when using the chemical in the post plant situation, it is crucial to prevent it from coming in contact with the trees. NB. Refer Guideline No. 16 (v2) for details on the safe use of Glyphosate.

The herbicide is sprayed over the weeds while caution is taken to prevent any from touching the trees. Provided the spraying operation has been carried out properly, the weeds remain where they were but do not compete because they are dead (or dying). If the area was very weedy it may increase the fire danger in the short term but then so would a manual operation.

MECHANICAL WEEDING.

This is where mechanical means are used to eradicate weeds. Disking, ploughing, rotovating or slashing behind a tractor are examples. Using a "hand held" brush cutter to slash down weeds is another.

Mechanical weeding can be very cost effective, especially as large areas can be covered quickly. The main drawback, however, is having suitable conditions that enable the tractor access throughout the plantation: tree stumps and slope often make it impossible to carry out safely and there is also the high initial capital cost to consider.

Even where conditions are suitable for mechanical weeding, great care must be taken to not to damage the tree roots - which with older seedlings will be exploiting the inter-row area where the tractor will be passing. Where you know mechanical weeding will be carried out after planting, it is recommended to increase the inter-row plant spacing to 3.0 metres or more to safely accommodate the tractor between the tree lines.

MANUAL WEEDING

1. **Slashing**. This is normally a full cover operation whereby the entire area is slashed or a spot operation where the weeds are only high in certain areas (e.g. the inter-row).

Two points to note are:

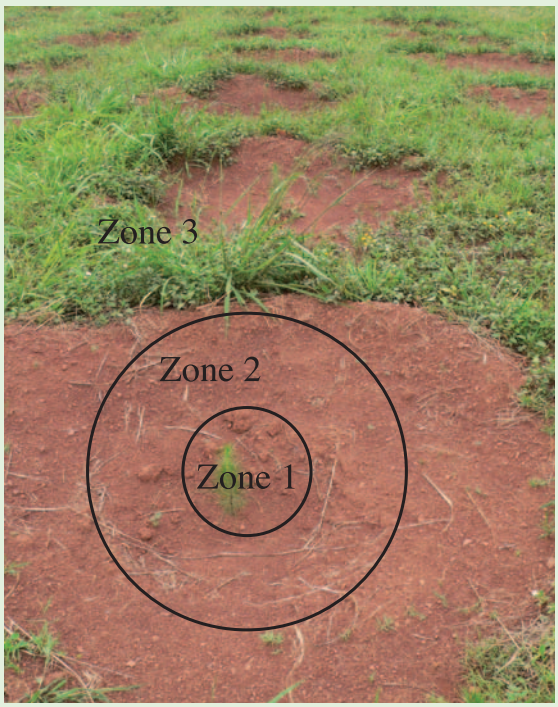
a. The slashing needs to be done as low as possible. People will tend to slash higher as it is easier. The vegetation is thinner and younger therefore softer. Supervision must ensure that the slashing is done as low to the ground as possible.

b. Care must be taken to not slash the tops of the trees off (known as 'Sheffield Blight'). One way of reducing this danger is by first doing a spot weed around the tree, thereby exposing the tree and creating a gap between the weeds being slashed and the trees. Another useful method is by placing a stick between the tree and the weeds to be slashed: this could be a walking stick that the labourer moves with, keeping it between the slasher and the tree so that it protects the tree from any misplaced slashing.

2. **Hoeing**. Hoeing can be three different kinds:

a. **Spot hoeing**. The area immediately around the tree is hoed and the rest is left, slashed or sprayed with herbicide. It is recommended to weed a circular area of a minimum 1 metre diameter (i.e. 0.5m radius) around each tree.

b. **Line hoeing**. The tree line is hoed and the inter-row (the row between the trees) is left, slashed or sprayed with herbicide.



Line hoeing on a slope must be done along the contour to prevent erosion and if it is going to be sprayed with herbicide, spraying with herbicide on a slope is always done on the contour. A one metre strip is normally recommended for line weeding (i.e. 0.5m each side of the tree line).

c) **Full cover hoeing**. The entire area is hoed. This method must not be done on erodable, steep slopes as there is no vegetation to prevent erosion.

Hoeing must never take place within 20cm of the tree. The tree has many sensitive surface roots that will get damaged and retard the trees growth if this area is hoed. Weeds in this zone need to be hand pulled.

How Often Should Weeding Be Done?

Because seeds are resilient and prolific seeders, they are difficult to eradicate. With proper planning and timeous weeding, however, the weed intensity will reduce and it will be easier to remove the weeds. The interval between successive weedings will also increase.

Weeding both manually and with herbicides only remove weeds that have germinated: seeds will continue to germinate and therefore follow up inspections and weeding will always be required. So once you have weeded an area, don't walk away and forget it: inspect it regularly.

The timing of the next (follow-up) weeding is vital: leave it too late and the weeds will seed and you will be back at the beginning. Time it right and you will eradicate the weeds when they are vulnerable and before they have a chance to seed. This will result in a lower weed infestation next time and possible a longer gap between weeding.

To help guide when weeding is required, refer to the photo on this page. Remember that weeding needs to be done before the weeds seed. A clue to when a weed is going to seed is that it flowers. If your weeds are flowering you need to get in and weed quickly.

Eucalypts are particularly sensitive to weed competition. If suppressed by weeds early in their life, Eucalypts do not respond to being released later in their lives. Pines, however, do tolerate some weed competition later but for maximum growth, they still perform better with good weeding.

There are three main areas that need to be weeded:

Zone 1 - This is the area with 20cm of the seedling. There are many of the seedlings' surface roots in this area. Weed infestation in this area therefore will compete hugely on the seedling. Also because of these surface roots only hand pulling of weeds should be done. A hoe scraping off weeds will cut and destroy the seedlings surface roots. In this zone the competition is high so no weeds should be allowed.



Zone 2 - This is the area from 20cm to 50cm around the seedling (i.e. a 1.0m diameter circle excluding the hand-pulling zone). This is another important area that needs to be kept clear of weeds. Here the weed competes for nutrients as well as space and sunlight. Hoeing can be done in this zone. In this zone weeds should be kept to a minimum. Any weeds must only be young, small weeds (having limited root development).

Zone 3 - This is also called the inter row. Small young weeds will not compete directly with the seedling. However as they get taller and their root systems develop, they will compete. Also mature weeds will seed and infest the other two zones. On slopes it is advised not to scrape this area, either use herbicide or slash to prevent soil erosion.

In this zone weeds should be kept below half a metre in height.

How To Achieve Effective Weeding:

Many of Uganda's existing and potential plantation sites have a climate and vegetation that encourages massive weed growth once the land is cleared and planted. Therefore, step one of a good weeding strategy will often be a good pre plant herbicide application, which will help all subsequent weeding and give the trees the best start possible (provided the pre plant spray is carried out close to the time of planting). Remember that the interval between the first and second weeding may be short but the time will increase as you do successive weeding operations, as long as you don't let the weeds seed. If they seed you go back to step one.

A good herbicide operation will give you a longer period between weeding compared with manual weeding. This is because it kills the weed not just chopping them in half or moving them around.

During the wet season it is important to turn over weeds when hoed out (roots in the air); if not they can just continue to grow in a new place. Get as much of the root out as possible. Weeds store nutrients in the roots, by removing those nutrients it makes it more difficult for the remaining roots to sprout.

Slashing is quick and cheap but all it does is make the weeds shorter. Other than in grassy inter rows, slashing should only be used as a preparation for a herbicide operation. Better still spray the weeds before they get too tall.

Refer to the paragraph on weeding zones. Weeds should not be tolerated within Zone 1. Weeds should be kept to the minimum in Zone 2 and although some weeds are allowed in Zone 3, they should be kept below half a metre in height.

The timing of the follow-up weeding operation is a vital part of a cost-effective weeding strategy: time it so that you can eradicate the weeds when they are small.

Remember the better the weeding, the quicker the tree will grow; the quicker the tree grows, the sooner the plantation reaches canopy closure; the sooner it reaches canopy closure the sooner you can stop weeding. It is as simple as that!

This is one of a series of brief Plantation Guidelines being published by the NFA and the SPGS, Other topics covered include Growing Eucalypts for Timber & Large Poles; Sawlog Scheme Guidelines; Growing Pines for Timber; Eucalyptus Coppice Management; Growing Musizi; Safe Use of Glyphosate Herbicide; Species Choice in Uganda. Contact: NFA Head Office, 10-12 Spring Road, Nakawa, Kampala, Email info@nfa.org.ug; Tel: 031 264 035/6; spgs@nfa.org.ug