

# Multiplication of fodder grass in farm-based nurseries

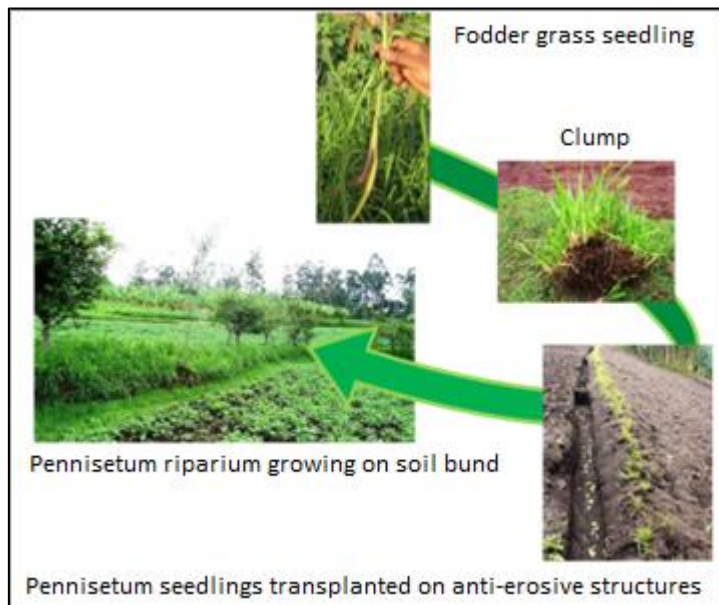
## 1. Introduction

This document focuses on the propagation of forage grasses in farm-based nurseries. In the mountains of southern Ethiopia, certain perennial and drought-resistant grasses are particularly interesting to vegetate and stabilize anti-erosion structures that help conserving the soil. They can also be used to setup fodder plots (fodder bank) to feed livestock by using cut and carry, or be associated at the feet of hedges.



Picture: the grass can be planted on the contour lines to conserve the soil or to establish a fodder plot

Starting from few seedlings, families can quickly multiply a significant number of plants within a micro nursery and then transplant them at the appropriate time. Many grasses can indeed be multiplied quite easily, like *Pennisetum riparium*: planting two slips in a hole allows the gradual formation of a new clump made up of several slips that can in turn be transplanted elsewhere. For other grasses, like bana grass (*Pennisetum purpureum x americanum*), the multiplication is done by cutting.



This document aims to provide technical teams with some key recommendations to help farming families in the establishment of a micro-nursery and the multiplication of grass seedlings. It also gives an overview of the characteristics of some grass species that are well adapted to the midlands and highlands of southern Ethiopia.

## 2. Establishment of a nursery

**a. Site selection:** the nursery should be established on a **fertile and partially shady place**, ideally close to the house in order to easily take care of the young plants during the growth phase. If established in a field, the place has to be protected against:

- ✓ Mid-day sunlight: young grass seedlings should not be exposed to direct sun otherwise they can easily get dried, which affects the survival and growth of the grass.
- ✓ Animals: open-grazing should be carefully controlled to prevent animals for eating the young plants. If any risk, the backyard nursery has to be fenced or kept in an area enclosed by a hedge

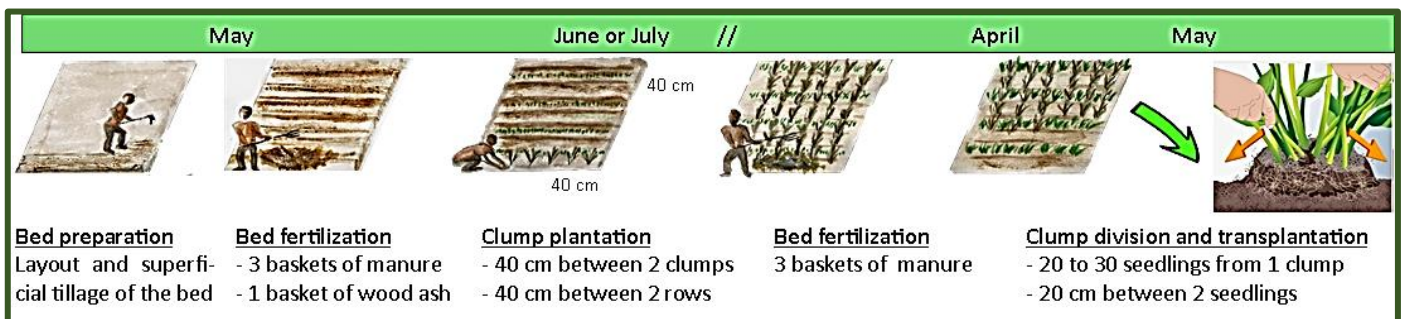


To visualise the location of the nursery, it is advised to first physically mark the place with sticks.

**b. Size for the nursery:** the recommended size of the nursery is **30m<sup>2</sup>**, which allows to vegetate about 200 linear meter of anti-erosion structures or to develop a fodder plot of about 100 m<sup>2</sup>. After a first transplantation, it is also recommended to continue multiplying grass in the nursery to have the possibility to gradually extend the vegetated structures in order to fully protect the farm against erosion.

**c. Spacing and density of the plants in the nursery:** for all types of grasses, the spacing between the seedlings should be 40cm x 40cm (64 holes per 10 m<sup>2</sup>). A backyard nursery of 30m<sup>2</sup> corresponds therefore to 192 holes

**d. Calendar:** ideally, the multiplication should start by the plantation of the initial slips between April and July, depending on the rainfall and the available moisture in the soil. The earliest the best!



**e. Preparation and fertilization of nursery beds:** a key factor for the success of seedlings' production in backyard nursery is the optimal preparation and fertilization of beds. After demarcation, superficial tillage of 15 to 20 cm should be done to take out stones or roots and get a loose, levelled fine soil. For optimal growth, nursery beds should be fertilized with organic manure one month before the plantation of the seedlings (preferably at the onset of the rainy season) and three weeks to one month before the transplantation of the grass.



### **3. How to plant and multiply the grass**

We present here two main methods of multiplication that depend on the grass species:

#### **a. Multiplication through clumps and slips**

*Indicated for: Pennisetum Riparium, Pennisetum Pedicellatum, Elephant grass (Pennisetum purpureum)*

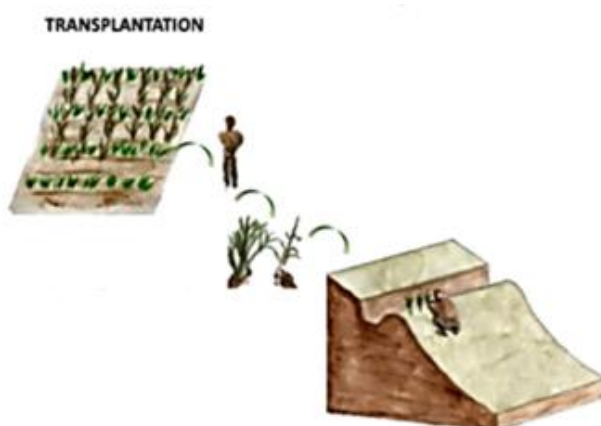
Usually, farmers who are willing to propagate grass, need to collect a set of clumps. One clump can spawn between 15 to 30 slips, easily divided by hand.

In the nursery, **2 slips (not more!!) should be planted together in a hole of 10 cm deep**. Before the plantation, it is advisable to cut the top part of the leaves in order to decrease the evapotranspiration of the plant and give more energy for the development of new roots. After the insertion of the base of the slip within the hole, the soil should be piled up and slightly compacted to ensure a good development of the roots.



Planting those 2 slips per hole will allow the gradual emergence of small suckers that will progressively form a new clump.

The transplantation has to be done at the onset of a rainy period. Usually, the farmers wait at least 6 months to transplant their seedlings. At this stage, the clumps will normally produce more than 20 slips. The clumps are then up-rooted and again divided into slips to be planted in the farm.

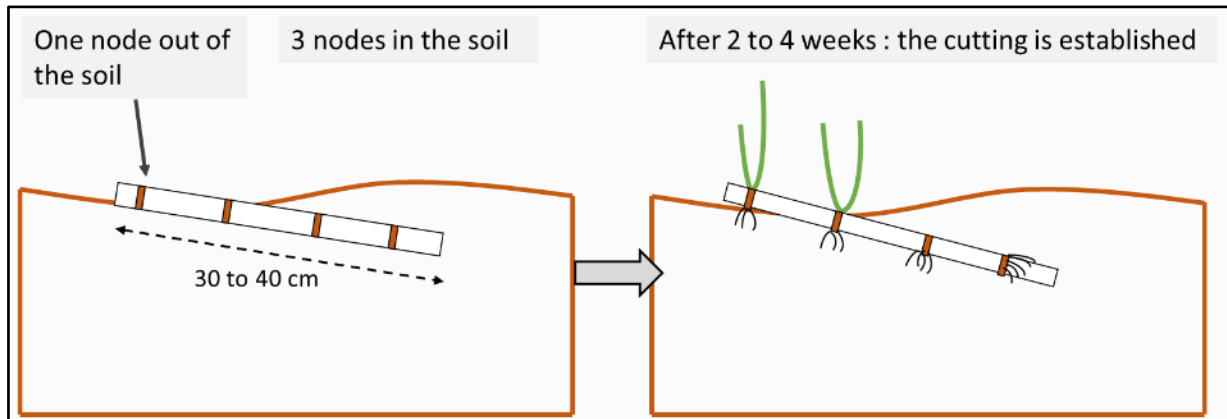


### **b Multiplication through cuttings**

Indicated for Elephant grass (*Pennisetum purpureum*) and bana grass (*Pennisetum purpureum x americanum*)

The cuttings are collected on matured stick aged of 1 year.

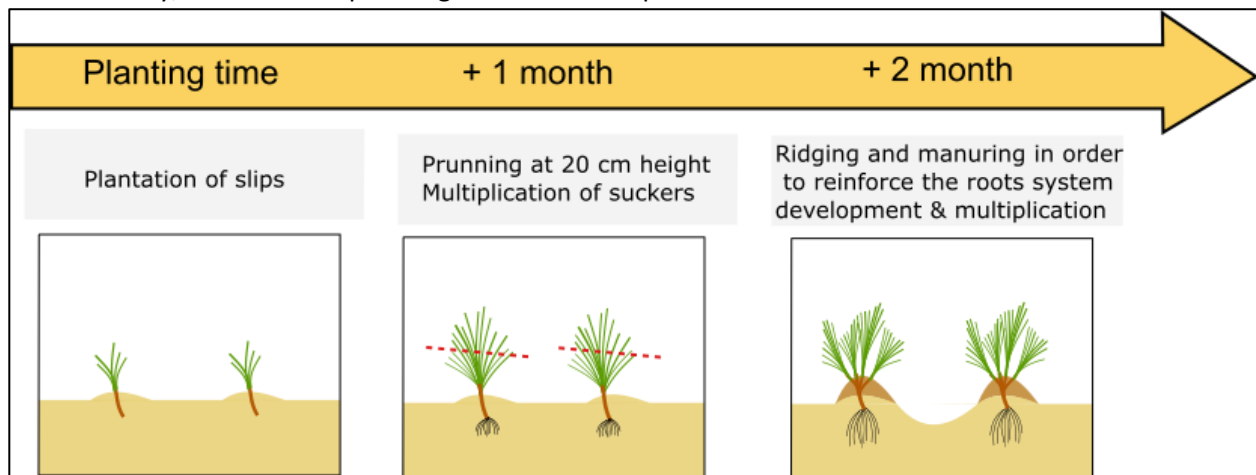
The sticks are divided into cuttings **depending on nodes**: each cuttings should contain **at least 3 nodes**. There are usually 5 cuttings per stick. The plantation of cuttings is done at 10cm deep: 2 nodes must be in the soil, and 1 should be out of the soil.



#### 4. Management of the nursery

As the nursery aims at multiplying the grass, the technical management should be oriented with the primary goal of optimising the suckers' multiplication. For that, it is recommended:

- 1 to 2 months after the plantation: the grass should be cut at 20cm height in order to stimulate the emergence of new suckers. This action must be repeated each time the grass overpasses 50cm height.
- After 2 months: the grass has to be ridged in order to stimulate the roots development and suckers multiplication. Applying animal manure contributes to increase the growing rate.
- After 3 months: if necessary, some grass seedlings can already be transplanted by using the out-soil suckers only, but without uprooting the whole clump!



For bana grass (*Pennisetum purpureum x americanum*), the management is different: the grass mustn't be cut in order to develop long sticks that are used for the creation of cuttings.

#### 5. Different types of grasses

If possible, it is recommended to provide farmers with different species as it allow them to adopt, multiply, test and select the most adapted species in their farm condition. The table below is not exhaustive (there are many types of fodder grasses!) and presents the characteristics of some varieties of *Pennisetum* that adapt well in the context of southern Ethiopia. A distinction has to be made between midlands and highlands, as the agroecology differs.

Altitude	Common ame	Scientific name	Adaptation	Biomass Production	Resistance to drought	Suitability near crops	SWC structure stabilization
Highlands	Hard Desho	P. Riparium	✓✓	✓✓	✓	✓✓	✓✓
Midlands	Bana grass	P. Purpureum x americanum	✓✓	✓✓	✓✓	XX	✓
	Elephant	P. Purpureum	✓✓	✓✓	✓✓	X	✓
	Hard Desho	P. Riparium	✓	✓	X	✓✓	✓
	Soft Desho	P. Pedicellatum	✓	✓	✓	✓✓	✓✓

As indicated, Bana and Elephant grass are the best option for biomass production in the midlands. However, they can be competing with the other adjacent crops (particularly with maize). It is therefore preferable to plant *P. Riparium* or *P. Pedicellatum* on narrow anti-erosion structures, strip lines or in between two crops fields.

Other types of grasses that have also been tested successfully:

- Guatemala grass (*Tripsacum Laxum*): adapted both for midland and highland, but slow to establish
- Surinam grass (*Braccaria Decumbens*): more adapted for midlands
- Guinea grass (*Panicum Maximum*): adapted both for midland and highland
- Let's note that Bana grass can also be used in the low parts of the highlands

**PENNISETUM RIPARIUM - locally known as “hard desho”**



Advantages	Limits
<ul style="list-style-type: none"> <li>▪ Good biomass in the highlands (&gt;1900m)</li> <li>▪ Good ground coverage</li> <li>▪ Little competition for adjacent crops</li> <li>▪ Good to stabilize anti-erosion structures</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not well adapted for the midlands</li> </ul>

**PENNISETUM PEDICELLATUM - locally known as “soft desho”**



Advantages	Limits
<ul style="list-style-type: none"> <li>▪ Strong capacity to recover after severe drought</li> <li>▪ Adapted for the midlands (1500 to 1900m)</li> <li>▪ Good ground coverage</li> <li>▪ Little competition for adjacent crops</li> <li>▪ Good to stabilize anti-erosion structures</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not well adapted for the highlands</li> </ul>

**BANA GRASS (*Pennisetum purpureum* x *Pennisetum americanum*)**



Advantages	Limits
<ul style="list-style-type: none"> <li>▪ Tolerant to drought</li> <li>▪ Adapted for midland</li> <li>▪ Suitable for low parts of highland</li> <li>▪ Good biomass production</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not well adapted for the highlands</li> <li>▪ High competition with adjacent plants</li> <li>▪ Low structure stabilization (less than <i>P. riparium</i> and elephant grass)</li> <li>▪ Becomes less palatable for animals if not cut frequently</li> <li>▪ Does not tolerate waterlogging</li> </ul>

Note: bana grass doesn't make flowers

**ELEPHANT GRASS (*Pennisetum purpureum*) - also known as Napier grass**



Advantages	Limits
<ul style="list-style-type: none"> <li>▪ Good biomass production all year long (also in dry season)</li> <li>▪ It adapts well in midlands and highlands</li> <li>▪ Relatively good tolerance to drought</li> <li>▪ Deep root system</li> </ul>	<ul style="list-style-type: none"> <li>▪ High competition with adjacent plants</li> <li>▪ Medium structure stabilization (more than bana but less than <i>P. riparium</i>)</li> </ul>

## GUATEMALA GRASS (*Tripsacum Laxum*)



Advantages	Limits
<ul style="list-style-type: none"><li>▪ Good biomass production</li><li>▪ Good palatability for animals</li><li>▪ Tolerant to waterlog</li></ul>	<ul style="list-style-type: none"><li>▪ Does not tolerate frequent cuts</li><li>▪ Poor stabilization of anti-erosion structures</li></ul>

## BRACCARIA OR SURINAM GRASS (*Braccaria Decumbens*)



Advantages	Limits
<ul style="list-style-type: none"><li>▪ It stays green during the dry season</li><li>▪ Good ground cover</li><li>▪ Drought tolerant</li><li>▪ Good palatability for animals</li></ul>	<ul style="list-style-type: none"><li>▪ Probably invasive</li><li>▪ 3-4 slips while planting</li><li>▪ Not adapted for SWC structure</li></ul>



## Appendix: Content of the training – 1 page summary

During this training, you could start from the experience of the farmers on cultivating grass and on using farm-based nurseries. The training should combine explanations, discussions and practices. Four key topics are proposed:

### 1. How to establish a nursery

- Site selection: fertile and partially shady place, ideally close to the house for easy care. Important to protect from direct sun and animal grazing (enclosure recommended)
- Size for the nursery: 30m<sup>2</sup> (not less than 10m<sup>2</sup>)
- Spacing and density of the plants in the nursery: for all types of grasses: 40cm x 40cm (it corresponds to 64 holes per 10 m<sup>2</sup>)
- Calendar: best at the onset of the rainy season, when there is enough moisture in the soil.
- Preparation and fertilization of nursery beds: demarcation (using sticks), superficial tillage of 15 to 20 cm. Fertilisation with organic manure one month before the plantation of the seedlings (preferably at the onset of the rainy season) and three weeks to one month before the transplantation of the grass.

*Ideally, it is recommended to make a practical case with the farmers + to visit some farms of interested farmers to see possible locations*

### 2. How to multiply the grass species?

Two main multiplication methods, depending on the grass species:

**a. Multiplication through clumps and slips** (*indicated for: Pennisetum Riparium, Pennisetum Pedicellatum, Elephant grass (Pennisetum purpureum)*)

- ☞ Starting from a clump of grass, separate each slip – cut the top part of the leaves to decrease evapotranspiration - plant 2 slips per hole –pile-up the soil and compact it a bit to ensure good development of the roots
- ☞ Transplantation to be done at the onset of the rainy season (usually at least 6 months after planting in the nursery): uproot the clump and apply the same method (spacing of 20cm in a SWC structure). Refill the nursery.

**b Multiplication through cuttings** (*indicated for Elephant grass (Pennisetum purpureum) and bana grass (Pennisetum purpureum x americanum)*)

- ☞ The cuttings are collected on a matured stick aged of 1 year. 1 stick = 5 cuttings on average.
- ☞ Cut the stick into cutting considering that 1 cutting = at least 3 nodes (2 nodes in the soil at least 10cm deep + 1 node out of the soil)

*Here also, it is recommended to do some practices with the farmers, for both types of multiplication*

### 3. How to manage the nursery?

To optimize the production of new seedlings: regular visit, good care, weeding...

For P. riparium, elephant grass...

- 1 to 2 months after the plantation: the grass should be cut at 20cm (to be repeated each time the grass overpasses 50cm height).
- After 2 months: earthen up the grass to stimulate the roots' development + apply manure

For bana grass (*Pennisetum purpureum x americanum*): grass should not be cut in order to develop long sticks that are used for the creation of cuttings.

### 4. Presenting different grass species

See the experience of the farmers, present different types available in the area and their main characteristics (possibly by bringing some examples)

Note: such kind of small nursery can also be used to produce seeds of annual legumes, trees and shrubs seedlings...