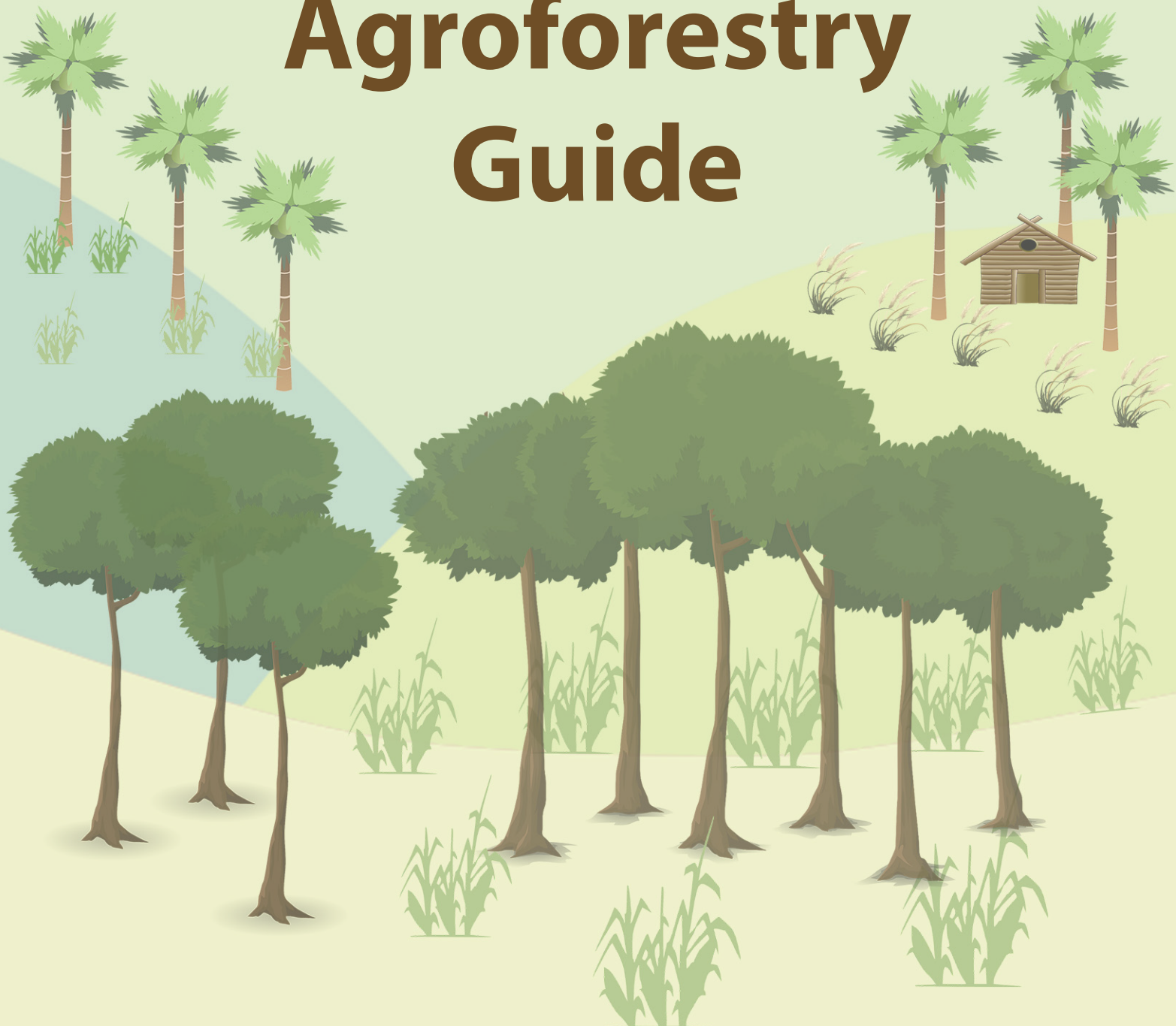




# Community Agroforestry Guide



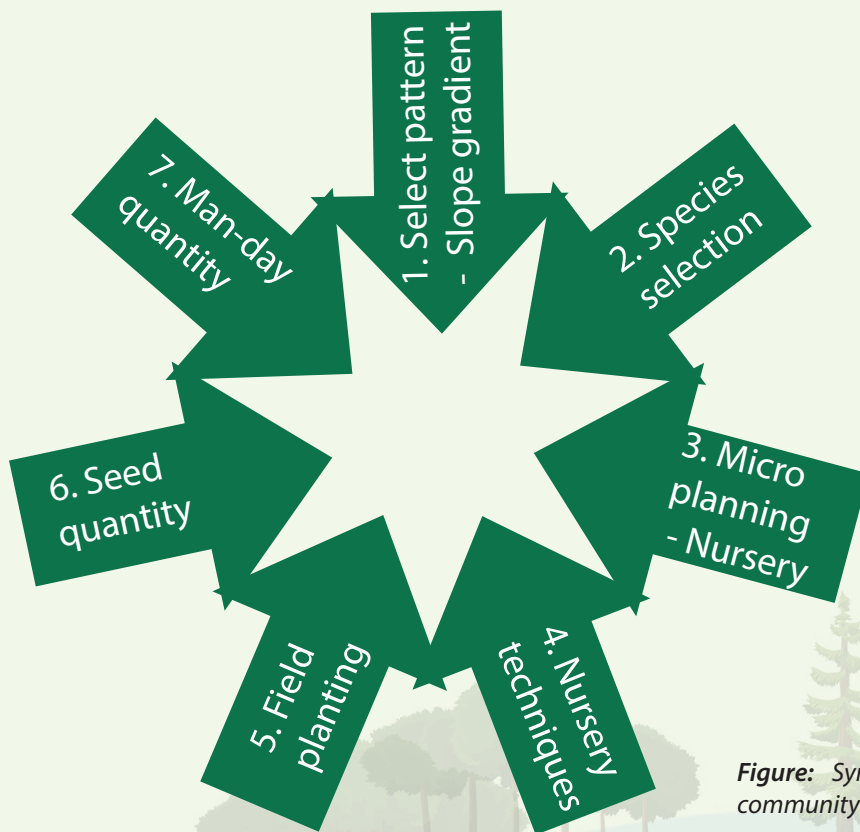


Figure: Synopsis of activity hierarchy for community agroforestry

## What is Agroforestry?

Agroforestry is a system of farming that combines trees with agricultural crops. It increases profits through creation of plant diversity, improves agricultural quality, prevents land degradation, reduces the risk of crop failure, protects against soil erosion and reduces the need for fertilizers among other benefits.

Agroforestry can be performed through 5 models:

1. **Alley Cropping** – Planting in the alley between rows of hedges/trees arranged according to contour lines. This model has several advantages, such as

- Minimizing disturbance of agricultural products
- Reducing occurrence of landslides
- Increasing the flow of water discharge on a long-term perspective

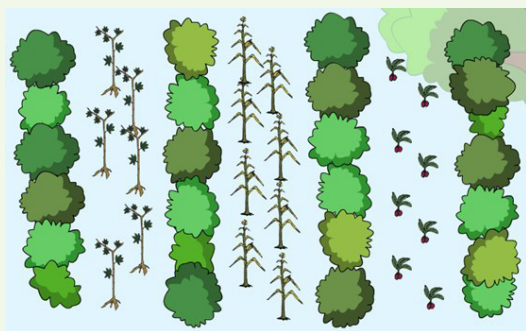


2. **Tree-Along Border Pattern** - Planting trees/shrubs along the border (hedgerow). This pattern has advantages such as

- Soil conservation especially on steep slopes
- Provision of organic materials and fodder after pruning

3. **Random Mixers** – Irregularly spacing trees while planting, and simultaneously growing the annual crop in stratum underneath





4. **Alternate Row** - Planting trees in regular alternate rows and seasonal cultivation done in the space in-between the rows. This pattern is particularly suitable for flat and wide areas



5. **Woodlot** - Planting to produce wood. It is suitable for light demanding species which are often suitable for carpentry

## How do I select the most appropriate Agroforestry pattern for my farm?

Selection is done based on slope conditions as specified in the table below

Slope degree (Gradient)	Alley	Tree along border	Random Mixers	Alternate Row	Woodlot
1 - (< 26%) Low	✓	✓	✓	✓	✓
2 - (26-35%) Moderate	✓			✓	✓
3 - (> 36%) High	✓			✓	✓



Type 1 slope gradient



Type 2 slope gradient



Type 3 slope gradient

## How do I select the appropriate species for my farm?

Selection is based on 3 main factors namely: - Environment, management objective and availability

- 1. Environment** - Adaptability of the plant species to the existing environment. Consideration is made of plant growth rate, natural regeneration ability and resistance towards disturbance (weeds, pest, disease and fire)
- 2. Management objective** - In land and water shed context and specifically in terms of economic value of the plant (energy, housing, food, fodder) and soil conservation (repair & protection)
- 3. Availability** - Should be easily available in local nurseries

## How do I initiate Agroforestry within my community (Micro planning)?

The initial step usually involves building a nursery for processing seeds into seedlings for planting. Key points to consider are:

- a) Flat slopes should be prioritized; although slanting slopes can be used facing eastwards due to the abundance of morning light.
- b) Proximity to site for minimization of seed damage during transportation
- c) Clear land ownership free from disputes
- d) Security and protection from disturbance
- e) Availability of a water source
- f) Accessibility for easy transport
- g) Proximity to the village for easy supervision and workforce availability

## What materials do I require for a nursery?

The following items are required for your nursery to be functional:

**1. Seeding medium** - this is prepared according to the seed size and group i.e.

a) Big size seed (> 2cm) e.g. Jackfruit, Avocado, Mango can be sowed directly in a polybag

b) Medium size seed (1-2cm) e.g. Mahogany, Khaya and small size seed (< 0.5cm) e.g. Suren, Acacia, Jabon, Eucalyptus can be sowed first into a planting medium. Thereafter germination can be concluded through:

- A sowing bed (1x4) m with a 10-15cm medium
- A plastic germinating basin. Perforated at the bottom to avoid water inundation.
- A wooden germinating basin to complement the plastic basin. Small coral/rocks 5cm thick should be filled at the bottom before putting a 15cm thick germinating medium.

**2. Weaning bed** for growing seedlings in a medium until they are ready for planting. They should be elongated in the North-South direction facing direct sunlight.

**3. Nursery Shade** to protect early seedlings from direct sunlight radiation

**4. Readily available Water**

**5. A simple working hut** if possible

**6. An organic fertilizer production house**

**7. Cinder husk production tools.** Cinder husk improves aeration, water drainage, pH neutralization, soil retention and binding of nutrients.



*A sowing bed*



*A bamboo weaning bed*



*A nursery shade*



*A nursery watering tank*

# What is the best technique option for my nursery ?

Both generative and vegetative techniques can be applied. However, you will need to pay particular attention to the following:

**1. Seed procurement** with special attention on seed characteristics (availability on long or short-term basis), source and seeding season for each species. Local species from quality sources should be preferred to ensure genetic quality.

## 2. Seeding

- **Pre-seeding treatment** - to accelerate germination of slow germinating species. Methods include
  - a) soaking in hot and cold water e.g. Sengon, Acacia, Eucalyptus)
  - b) soaked and dried e.g. teak
  - c) roasted (teak) and assisted by decomposer mushrooms
  - d) scarification by altering/breaking the seed shell (soursop)
- **Preparation of a germinating medium** to enable a suitable environment. It is dependent on various factors e.g. porosity for effective circulation of water and air, humidity, inundation, moisture content and sterility from diseases.

The medium can be composed of various materials i.e. fine sand, river sand mixture and soil in the ratio 2:1, cinder husk mixture and river sand in the ratio 1:1 etc.

• **Seeding technique** – This mainly involves the following stages:

- Preparation of seeding medium and subsequent transfer to a sowing, plastic germination or wooden germination basin
- Moistening the medium with water
- Sowing (evenly) the seed (small and fine) onto the germinating medium and subsequent covering in a thin medium layer
- Planting the seed (medium size) until  $\frac{1}{2}$ - $\frac{3}{4}$  of the seed is embedded in the medium
- Continuous moistening of the medium to ensure proper germination

**3. Weaning** - This involves moving the seedlings from the germinating basin into the weaning medium inside the plastic bags. The process involves:

- Preparation of weaning medium in a polybag
- Saturating the seeding medium with water
- Preparation of seedling in the germination medium for weaning in the seedling medium
- Selecting ready seedlings (those that already have leaves) for weaning
- Saturating seedling medium with water for easy uprooting
- Preparation of water to accommodate seedlings from the previous medium
- Uprooting from germinating medium into a water container to minimize evaporation
- Ventilating the polybag and transferring the seedling to the already prepared growing medium
- Gently pressing the medium to enable the seedlings to stand firmly
- Placing the weaned seedlings under a paranet awaiting outdoor adaptation

**4. Seedling maintenance** has the following main activities:

- Regular watering (morning and evening)
- Shifting seedling positions in weaning bed every 2-3 weeks to avoid penetration of roots into the soil
- Applying organic pesticides to prevent plant diseases or pests

**5. Seedling selection** before planting improves plant survival chances. Eligible seeds must

- Have a developed stem base with wood part and have a minimum height of 30 cm
- Be healthy and uniform
- Not be having young leaves
- Have a compact rooting medium that can still be stable without the polybag
- Have straight stems and unbranched seedlings
- Have unbroken seedling buds

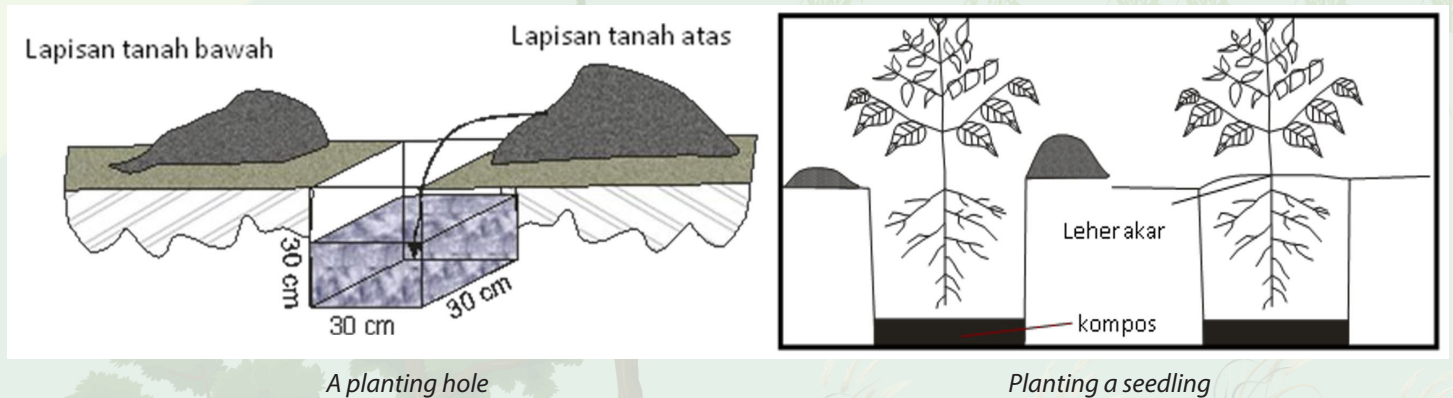
## 6. Seedling timetable

No.	Activity	Month						
		May	June	July	Aug	Sep	Oct	Nov
1.	Seed procurement	✓						
2.	Material & equipment procurement	✓						
3.	Facilities & infrastructure procurement	✓						
4.	Seeding	✓	✓					
5.	Weaning the seedlings in polybags		✓	✓				
6.	Maintenance of seedlings		✓	✓	✓	✓	✓	✓
7.	Seedling selection before planting							✓

## How do I plant in my farm (field planting process)?

More important the species must be suitable to the area and also the management purpose. The steps include:

- Preparing and clearing the demonstration plot
- Demarcation of the planting space to enable sunlight penetration and nutrient absorption
- Preparing the holes and staking the plants
- Fertilization process
- Planting



## How much seed will I require for a particular agroforestry pattern?

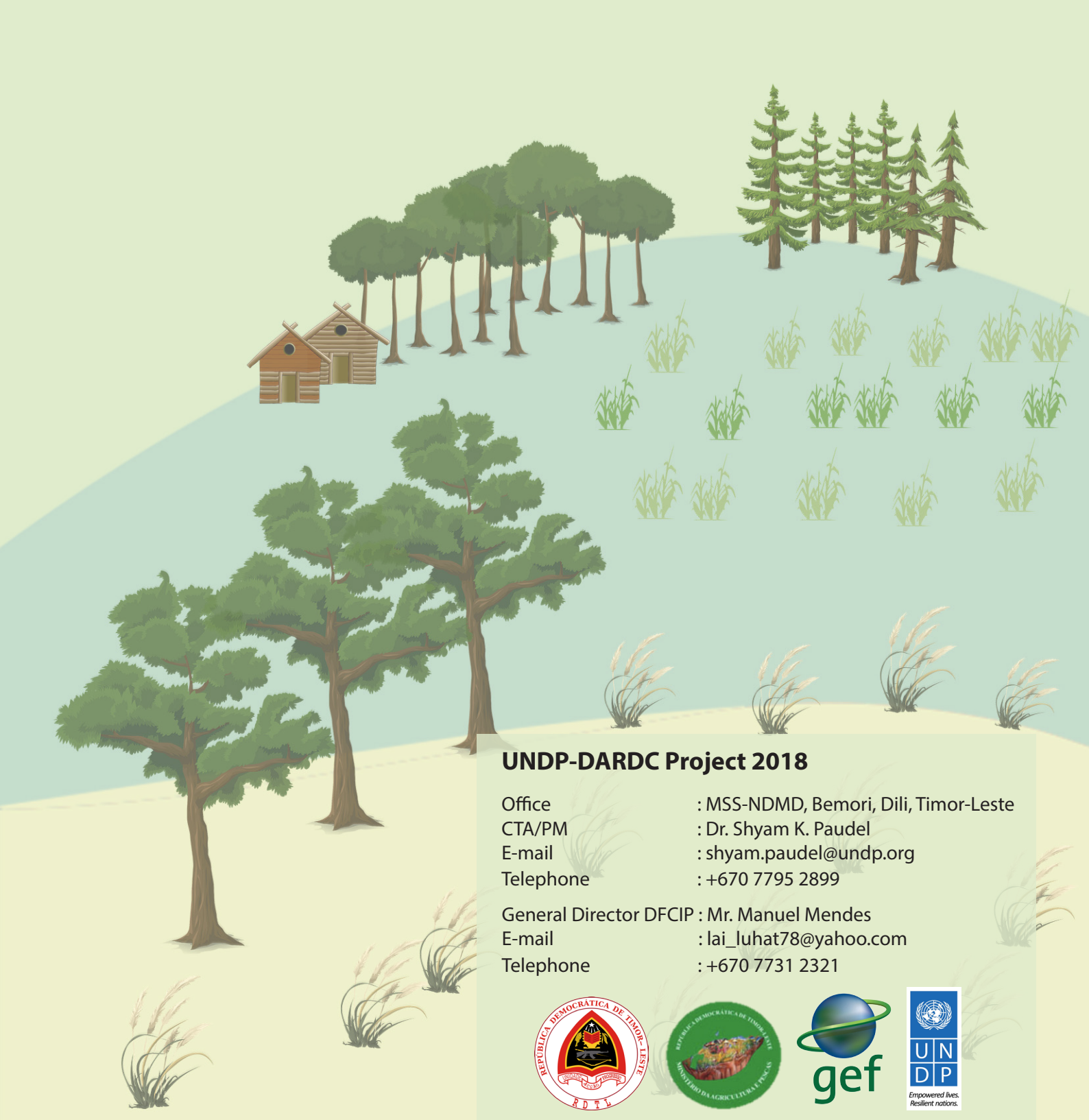
No.	Pattern	Estimated seed amount/Ha
1.	Alley Cropping	N= 166 (plant spacing 3mx20m) N= 111 (plant spacing 3mx30m)
2.	Trees along border	N= 200 (plant spacing 3m, surrounding the area) N= 130 (plant spacing 3m, surrounding the area)
3.	Random Mixers	N= 400-600 (random plant spacing)
4.	Alternate Rows	N= 500 (3 rows) N= 664 (4 rows)
5.	Woodlot	N= 1111 (plant spacing 3mx3m) N= 833 (plant spacing 3mx4m)

## How do I determine the number of days required for an agroforestry pattern?

The Table below presents necessary activity details for each agroforestry pattern. The number of days required for planting 1000 seedlings for each agroforestry pattern can be calculated by using the formula presented below:

$$\text{No. of days} = \frac{\text{Estimated seed amount of each pattern}}{1000} \times \text{man-days requirement}$$

No.	Activity	Unit	Volume	Frequency	Capacity (man-days)	Requirement
<b>Planting</b>						
1.	Land preparation (1 ha)					
	- Land clearing	Ha	1	1	0.2	5
	- Soil processing	Ha	1	1	0.2	5
2.	Planting	Seed	1.000	1	50	20
	- Inorganic fertilization (NPK 100gr/plant)	Kg	100			100
	- Organic fertilization (manure 3kg/plant)	Kg		1		3.000
<b>Maintenance Year 1</b>						
1.	Maintenance / weed eradication	Ha	1	2	0.25	8
2.	Herbicide	Liter		1		5
3.	Herbicide operator	Ha	1	1	0.4	3
4.	Monitoring	Ha	1	3	0.2	15
<b>Maintenance Year II</b>						
1.	Maintenance / weed eradication	Ha	1	2	0.25	8
2.	Herbicide	Liter		1		5
3.	Herbicide operator	Ha	1	1	0.2	5
4.	Monitoring	Ha	1	3	0.2	15



## UNDP-DARDC Project 2018

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