Proper tree planting

a training manual








Produced by World Agroforestry for the Integrated Natural Resources and Environmental Management Project (INREMP)

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Learning objectives

By the end of this module, trainees should be able to demonstrate the proper protocols for handling, planting, and maintaining tree seedlings in the field.

Introduction

Improper planting procedure is one of the main reasons for the death of seedlings in the field after planting. This leads to wastage of planting materials and lost sources of income and ecosystem services. If proper handling, planting, and maintenance procedures are followed, seedlings will have improved chances of survival.

What is this manual about?

Through text and technical illustrations, this manual outlines information necessary to successfully:

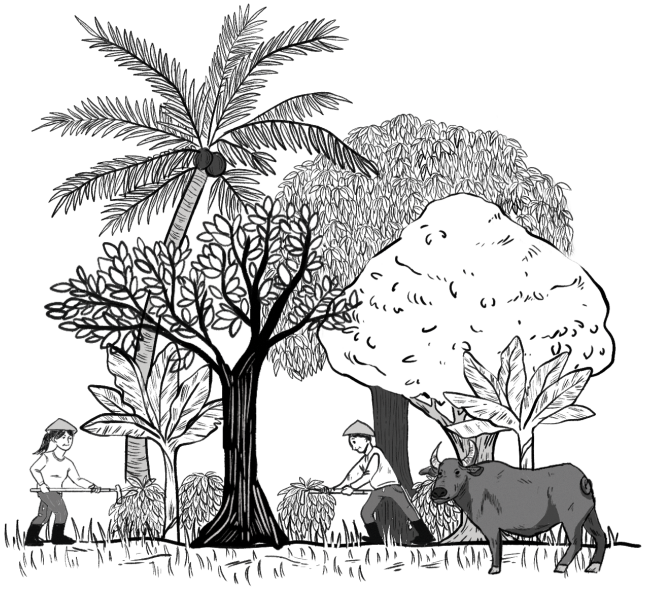
- prepare a field for outplanting;
- identify which planting material is ready for outplanting;
- handle and transport seedlings from the nursery to the planting site;
- avoid common mistakes in outplanting; and
- care for the seedlings at the planting site.

Who is this manual for?

This manual is written particularly for 1) extensionists working in agroforestry and natural resources management projects; and 2) farmers, especially those who want to share their agroforestry knowledge with their fellow farmers.

The manual can be used as reference material for training sessions and other learning activities.

Site preparation



Site preparation involves several processes — such as clearing and identification of spots in the area where seedlings will be planted. These activities involve brushing, determining spacing, and staking. Digging holes is also part of the process. As the last activity before actual planting, it is discussed in the Planting techniques section of this manual on page 11.

Methods of site preparation

The two methods of site preparation are 1) complete removal and 2) partial removal.

Complete removal

This involves cutting all the grass and weeds growing at the planting site. If the brush cover is light, it is recommended to slash all vegetation using common cutting and brushing tools, such as bolo and scythes.

If the brush cover area is large, the most efficient way to clear it is through the use of herbicides that will inhibit the growth of any vegetation while leaving the soil undisturbed.



Note: *When using herbicides, it is important to know which kind to use, how to use it, and the effects it may have. You must also strictly adhere to the safety measures required when using it. If you do not wish to use herbicides, the alternative is to slash or slightly scratch out the weeds and leave them to dry on the surface to suppress future weed growth.*

Partial removal

This involves brushing the grasses, weeds, and other vegetation growing in specific areas within the planting site. In doing so, the usual cutting and brushing tools are used.

Strip clearing

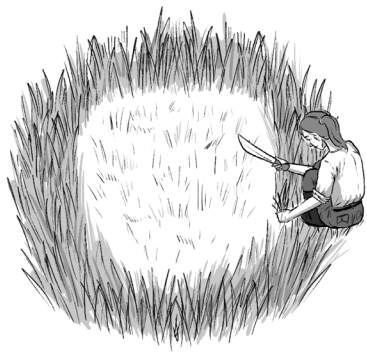
This is the practice of cutting grass and other vegetation in strips around 40–80 inches wide. In areas with steeper slopes, follow the contours using either an A-frame or the cow's back method (refer to pages 4–5) and remove all vegetation.



Spot/patch clearing

This means clearing the vegetation in spots or patches of 40–80 inches diameter where seedlings are to be planted.

Loosen the soil in the cleared areas and remove rocks and stones that can impede the growth of the seedlings.



Important considerations when clearing vegetation

- On most sites, removing bushes and grass is necessary to eliminate competition with the seedlings. If shade-tolerant species will be grown on the site, existing trees can be used as shade but only if this agrees with the agroforestry plan.
- Trees bordering bodies of water should not be removed. Always refer to existing laws and policies regarding tree cutting.
- On moist grassland, complete removal of bushes and grasses is recommended.
- On sites where the existing vegetation is below 3-feet-high, strip or spot clearing is usually best. The vegetation between the strips and spots should be trimmed to a length close to the ground. However, if the area is prone to erosion, keep the vegetation between the strips or spots.

Spacing

The spacing depends on the characteristics of each site, the management objectives, and the species to be planted. The rule of thumb in spacing is that **trees with broad canopies should be allocated a wider space** (see Table 1).

Since the management objectives specified for this manual are for agroforestry, spacing between tree seedlings should be wider to allow sunlight to reach the crop components. Table 1 shows suggested spacing for selected fruit trees usually planted in agroforestry farms.

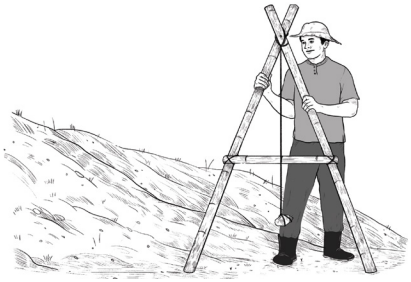
Table 1. Suggested spacing per species

Fruit tree	Spacing (meters)
Durian	7 x 7 or 7 x 8
Lanzones	6 x 6
Rambutan	7 x 7 or 8 x 8
Mangosteen (seeded)	7 x 7 or 8 x 8
Mangosteen (grafted)	4 x 5 or 5 x 5
Pomelo	5 x 5 or 5 x 6 or 6 x 6
Avocado	10 x 10 or 10 x 12 or 12 x 12
Marang	5 x 5 or 5 x 6 or 6 x 6
Orange	5 x 5

How to establish a contour line

Using an A-frame *(steps to build an A-frame can be found in Conservation agriculture with trees: a training manual, page 11)*

1. Starting in the middle of the slope, work from the bottom, moving upwards to minimize errors. Ensure that both legs of the A-frame are level.



2. Mark the position of one leg by placing a stake.



3. Move the second leg until the frame is 'levelled' and mark the position of the second leg using a stake.



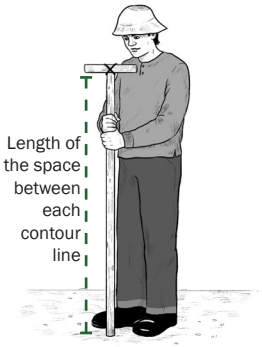
4. Continue the process until the end of the field.
5. Correct off-contour stakes to smoothen the contour lines.

For the **cow's back method**, there is no need to place stakes. To mark contour lines, just check if the cow's or the carabao's back is level (similar to when it walks in flat land) while it plows perpendicular to the slope.

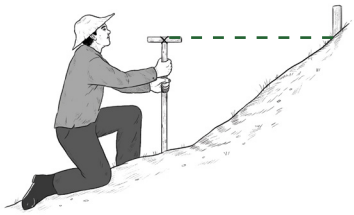


How to work uphill or downhill to establish the next contour line

1. Make a T-stick with the same length as the space between each contour line. The spacing of the contour lines may be based on the suggested spacing of fruit trees or timber trees (see Table 1 on page 3) or may just follow the recommended 10-meter spacing. Only the height is important for the T-stick. Bamboo can be used because its poles are naturally straight.

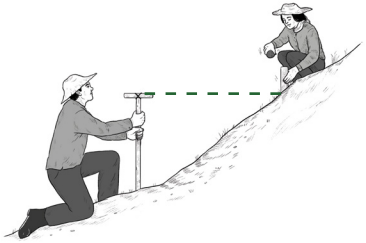


2. Going downhill: Go downhill and use the T-stick to sight a stake from the previous contour line. The top part of the stick must be level with the base of the stake; keep moving downhill until it is level. On steeper slopes, spacing between contour lines must be narrow compared with less steep slopes.



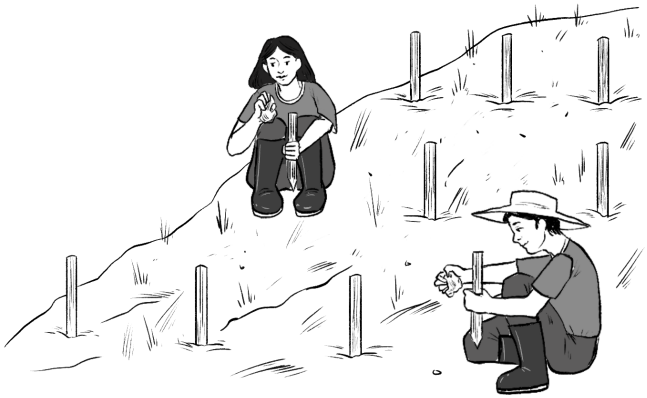
Going uphill: Another person must go uphill and hold the new stake for the next contour line. From a stake in the previous contour line, lay the T-stick and sight the stake being held by your partner; it must be level to the base of the new stake. Ask your partner to adjust by moving up or down until it is level.

3. Once the T-stick is level with the new stake, drive the stake forcefully to the ground. This will be the start of the new contour line.



Staking

There should be an agroforestry plan that describes the kinds of species, spacings, arrangements, and management options for the farm. After the planting site has been cleared, refer to the plan and mark each spot intended for planting. Make sure that the markers are easily noticeable and driven deep into the soil to secure them.



Transporting planting stocks

Considerations before leaving the nursery

Quality check



Always check the seedlings before taking them out of the nursery for outplanting. Seedlings exhibiting good quality will have a better chance of surviving field conditions. The following characteristics should be present on seedlings suitable for outplanting:

- a sturdy stem with a strong root collar;
- vibrant and healthy-looking leaves; and
- no signs of disease, fungus, or insect attack on any parts.

If a seedling does not show these characteristics, it should not leave the nursery for outplanting. Such seedlings should have been rejected at the production stage.

Grading

Grading is a physical assessment of each seedling before outplanting. This evaluates each seedling to see if it has the qualities discussed above. This is a strict process where the seedlings are grouped into classes.

1. **First class** includes all the seedlings exhibiting the best characteristics.
2. **Second class** covers seedlings that will still develop good characteristics as they grow.





3. **Third class** is the "reject" group, containing seedlings that are frail or diseased.



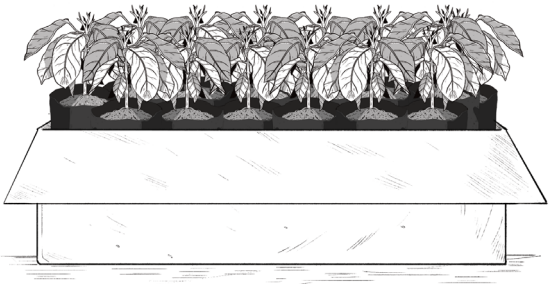
The stocks in the third class should not be loaded for transport nor returned to the nursery. These should be placed at a distance to avoid accidentally including them for transport.

Considerations before transport

Seedlings must be packed well to prevent injuries and losses during transport. Replacing seedlings is expensive given all the effort, money, and time provided prior to outplanting.

First and most important rule: *All seedlings bound for the planting site must be thoroughly watered before leaving the nursery.*

1. Use boxes or trays to load the seedlings in the vehicle.



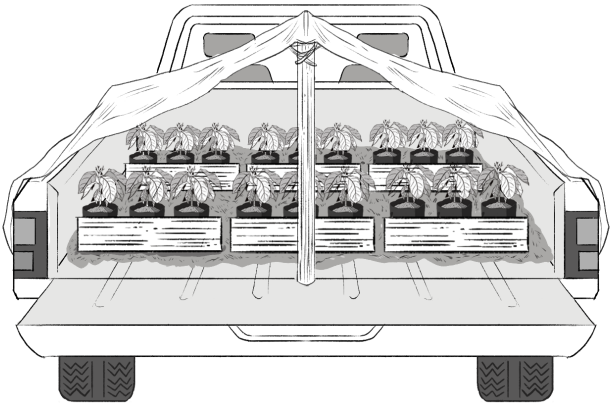
2. When arranging the seedlings in the box or tray, always hold them on the edge of the container's opening. Holding a seedling by the stem will uproot it and gripping the containing might crush the roots, especially if done tightly.
3. Be sure to load the seedling containers upright and set them in straight and compact lines.



Transporting the seedlings from the nursery to the planting site

Transport time should be as short as possible to lessen the exposure of seedlings to stressors, such as strong light and heat. The seedlings are still young and cannot tolerate harsh conditions yet.

- If using a hauling or pickup truck to transport the seedlings, protect the seedlings by laying an insulating material — such as soil, straw, or cardboard boxes — on the truck's flooring and a roof made of used tarpaulins or rice sacks at a safe distance above the seedlings.



- Usually, planting sites are not easily accessible by trucks or vehicles. In this case, the seedlings can be transported using backpacks and yokes.



- Carriers strapped to a cow or a carabao can also be used to transport planting stocks.



Planting techniques

Hole digging

Digging holes can be done weeks before the actual planting if the soil is not hard. If done in advance, it will save effort, labor, and time and make the actual planting faster. However, during the actual planting, you should bring a digging implement, like a hoe, pick mattock, or trowel, in case the holes have become covered or need adjustment.

If hole digging will be done during actual planting, you should have company so that one can dig the holes while the other is planting the seedlings.

Locally available tools for hole digging

Tools are generally adapted to the characteristics of the terrain, the workability of the soil, and the preference of elderly, female and male farmers — especially regarding a tool's weight and the length of the handle. The following tools are often used for digging.

- An **oval blade hoe** is used to break generally loamy soil more easily. Use a hoe with a narrow blade for seedlings in containers and one with a wider blade for bare-rooted seedlings.



- A **pick mattock** is recommended for planting sites with stony and hard to break soils.



- A **dibble** or its alternative, a **digging bar**, is recommended when the site has sandy soil and when planting cuttings.



- A **shovel** is used to adjust hole depth and to carefully separate the topsoil from the subsoil.



Mechanical hole diggers

Mechanical hole diggers, also known as augers or drill bits, can be used to make the hole digging process more efficient. If budget permits, these power tools can be used to increase productivity during site preparation. Generally, there are three types of earth augers:

- A **basic earth auger** has a long pole with a handle on one end that is held while twisting the tool to dig a hole in the earth.



- A **well-boring earth auger** is usually powered by petrol and lifted and lowered through a tripod-like structure.

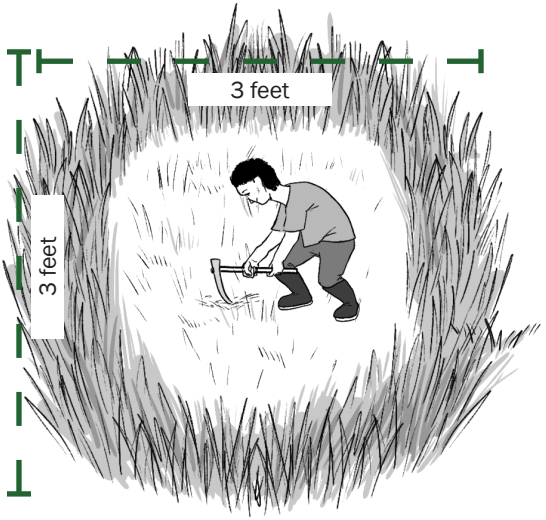


- A **two-man auger** is the largest and most powerful type of earth auger. It is also powered by petrol. It can allow digging in any angle at the position that is required. Unlike the previous types, this mechanical hole digger is operated by two people.



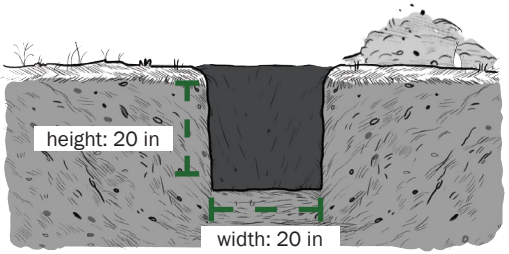
General protocol on hole digging

The area around the hole should be clear of vegetation to minimize competition with the seedling. Separate the topsoil from the subsoil.

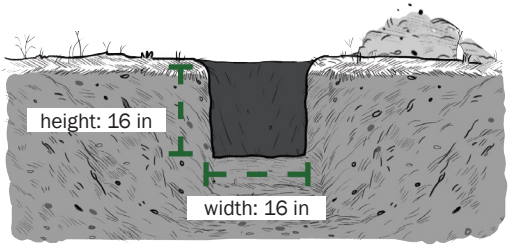


Recommended hole sizes

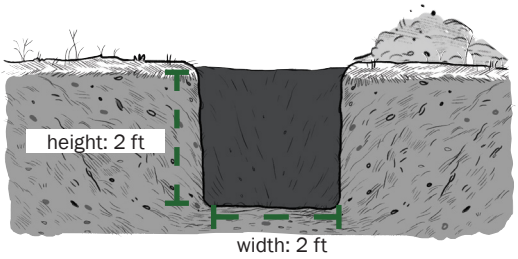
The recommended hole size is **20 x 20 inches.**



If the soil is soft, this hole size could have a size of **16 x 16 inches**.



If the soil is hard, this size could be bigger at **2 x 2 feet**. **As a general rule: the heavier the soil, the bigger the hole.**



When digging out the soil, separate the topsoil (darker soil from the surface to 4 inches deep) from the rest. The reason behind this will be explained in the next parts.

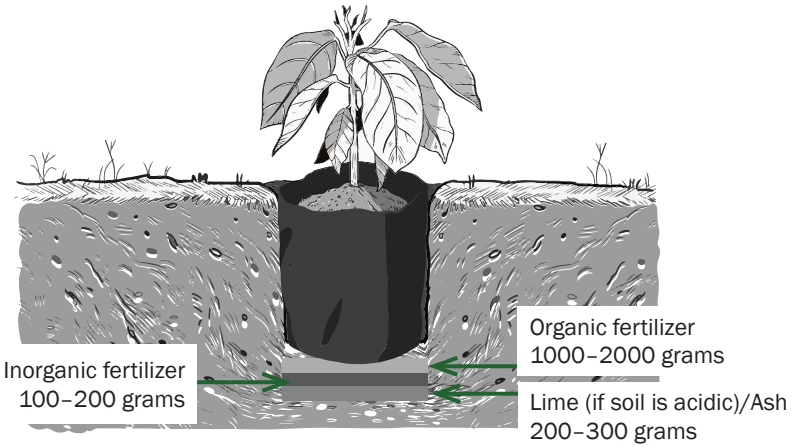
Basal fertilizer and amendment application

Organic and inorganic fertilizers or a combination of both, as well as other soil amendments, can be applied before outplanting the seedlings. Table 2 summarizes these additions.

Table 2. Summary of basal fertilizer and amendments

Soil condition	Recommended additional inputs	Ratio (soil : additions)	Remarks
Normal condition	Organic fertilizer (composts)	-	1 to 2 kg of organic fertilizer, depending on hole depth
Acidic soil (pH <6)	Add liming agent (e.g. ash)	-	Optimum pH range for plants is between 6 to 7. Add at the bottom of the hole before any additions
Heavy clay	Add soil aerator amendment and manure	1 : 2 : 1	Soil aerators such as rice hull, sawdust, and sand
Sandy	Add manure or compost	1: 2	Chicken manure is one of the best but do not use fresh manure because it has high nitrogen and ammonia content that may burn the roots. Use dried and well decomposed chicken manure.

If the additions will be a combination of organic, inorganic, and soil amendment agents (such as lime), it is recommended to place the liming agent at the bottom of the hole, then the inorganic fertilizer, and finally the organic fertilizer.



General protocols in outplanting seedlings

This section presents the usual process of outplanting. These steps will be modified in the next part to show adaptation to some possible unfavorable conditions in the planting site.

Note: *If possible, outplant on a calm cloudy day. Late afternoon is the best time. The seedlings must not be watered for two to three days before outplanting so that the soil holds together around the roots when you remove it from the bag.*

1. Fill the topsoil first back into the hole. The subsoil can be mixed with compost, if available.



2. Grasping the top edge of the seedling bag, lower the seedling into the hole to a point where the top edge of the container is level with the top of the planting hole. If it is not, add or remove soil until the container's edge is level with the top of the hole.



3. Remove the container from the hole. Lay it on its side beside the hole. Using a sharp blade, Slit the plastic bag from the bottom, leaving an inch or two from the brim. Make sure that the soil around the roots ('earthball') does not break apart.



4. Gently lower the seedling into the middle of the planting hole by supporting with both hands without breaking the earthball.



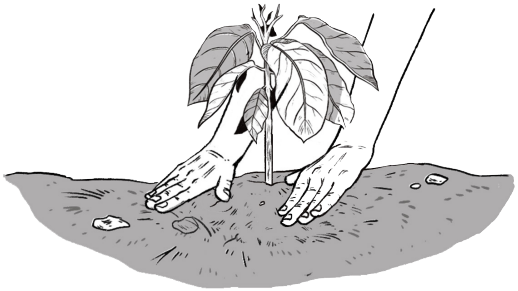
5. Fill the soil back into the hole until more than half of the bag's height is covered with soil.



6. Hold the seedling using one hand and gently slide the rest of the bag off the seedling.



7. Carefully firm the soil around the newly planted seedling by pressing it with your hands or heel. **If there are any air pockets around the earthball, the seedling will die**.



8. Check if the seedling is planted firmly enough by very gently pulling the plant. If it barely moves, then it is properly planted.

Note: In case the earthball breaks up or totally crumbles away from the roots, just proceed with the rest of the steps but after firming (step 5), cut across all the leaf blades leaving a small part of each leaf intact. This will lessen evapotranspiration.



Adapting outplanting techniques to other site conditions

In addition to the outplanting process discussed in the previous section, below are some adapting techniques for several unfavorable site conditions.

Waterlogged areas

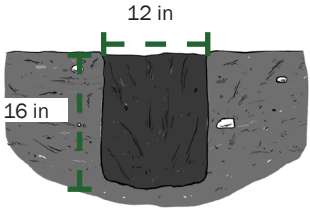


1. Do the planting before the rainy season while the site is still dry. This will give the seedlings time to adjust before being exposed to waterlogged conditions.
2. As you firm the soil, mound the base of the seedling after planting so that the top edge of the seedling container will be a thumb's length (2 to 3 inches) higher than the ground. The mound will force excess water to drain away and not drown the seedling.

Dry sites

Choose seedlings with straight tap root and dense root hairs because this ensures efficient water uptake. To further ensure survival, techniques suited to the conditions should be applied, such as the following.

1. A 12 x 16 inch (W x H) hole is recommended for dry sites. A deeper planting hole will ensure better retention of moisture in the soil, thus increasing the seedling's chance of survival.



2. Follow the general planting procedures but the top edge of the container should be a thumb's length (2 to 3 inches) lower than the top edge of the hole.

3. After firming the soil, the base of the newly planted seedling should be sunken. Add mulch around the stem (For mulch application, refer to page 38 of the *Propagation of quality planting materials: a training manual*). The sunken base will collect water and the mulch will retain it.



Eroding slopes and rocky sites

- Establishing contour lines is necessary (refer to page 4 of this manual for instructions on how to make contour lines) for slopes. Planting should be done along the contours.
- Weeding should be done sparingly; spot clear, if necessary. The vegetation's roots hold the soil from eroding further. This will also slow down any eroded soil from reaching the bottom.
- For planting sites that have very poor soil quality, add fertilizer and amendments at the bottom of the planting hole to provide nutrients for the seedling. Refer to page 16 for the basal fertilizer and amendment application.



- Aside from organic mulch, you may add pebbles around the newly planted seedlings.



Do's and don'ts in planting

Don'ts (×)	Do's (✓)
■ Obtain planting material from unreliable sources	■ Buy or source planting materials from reliable sources or accredited nurseries
■ Handle the seedling by holding its stem and/or holding the body of the container	■ Hold the brim of the seedling bag and not the body of the container or the seedling stem
■ Transport seedlings without ensuring adequate protection against drying	■ Cover the seedlings to avoid direct sun exposure during transport. If possible, transport at night.
■ Leave the plastic container on the seedling even after planting	■ Remove the bottom of the container carefully. Then, make a slit on the side of the plastic bag and pull the bag upward to fully remove it, while holding the stem of seedling firmly. Ensure that the earthball, or the soil clinging to the roots, is not disturbed.
■ Plant seedlings immediately	■ Give seedlings a week or two to recover from the stress of travel. Let them become used to the conditions at the planting site.
■ Plant in holes of wrong width and depth	■ Dig holes of recommended sizes. Small holes may cause the soil to be compact, thus stunting plant growth.
■ Plant seedlings with bent or twisted roots	■ Prune J-roots and curling roots before planting.
■ Fail to properly firm the soil around newly planted seedlings	■ Firm the soil around the newly planted seedlings to remove air pockets. Air pockets will dry out and kill the roots.
■ Shading the seedling for too long	■ Provide appropriate shading to the newly planted seedlings.

Care and maintenance

Since field conditions are unpredictable, it is better to expect that the seedlings will be exposed to unfavorable conditions, like strong winds, fire, animals, and trampling. Interventions can be applied to prevent or address such occurrences.

Replacement planting

Replacement planting or 'replanting' is outplanting new seedlings to replace the seedlings that have died.

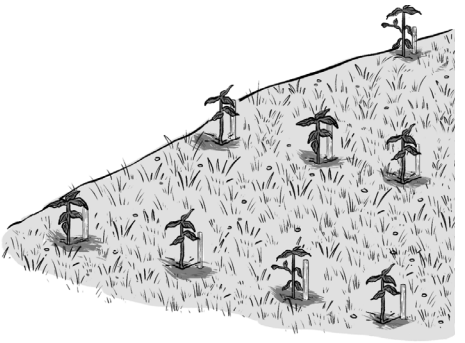
Proper timing for replacement planting

Replanting should be done when 10% or greater of the seedlings have died due to:

- use of poor-quality planting stock;
- injuries obtained during transport;
- improper planting techniques;
- damage by insects, rodents, or livestock;
- fire, typhoon, or prolonged dry season;
- competition with weeds; or
- improper application of fertilizers.

Replacement planting methods

1. Survey the planting site and put stakes on seedlings that need to be replaced to make them easier to track.
2. While putting the stake next to each seedling, determine why it died so that the new seedling can be planted appropriately (in case the reason is not fire, typhoon, or drought).



3. Replant the seedlings using the proper outplanting techniques as recommended in page 17 of this training manual.

Protection

If the seedlings are planted at a site that has few shade trees or there are stray animals, protective fencing must be built.

Protective fence

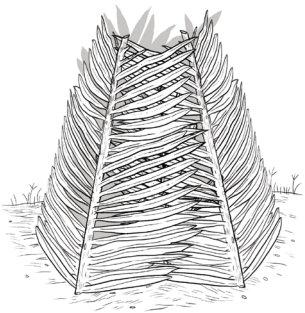
A fence should be made out of locally available material, such as stems, branches, or bamboo slats that can protect seedlings from being trampled by people and grazed by animals.



1. Gather material that can be used as fence posts — such as tree branches or bamboo slats, whatever is conveniently available in the area.
2. Surround the seedling with branches or slats leaning slightly inwards. Make sure to bury the branches or slats deeply to secure against accidental displacement.
3. Secure the frame using brightly colored plastic ties (if available) or thin ropes.

Temporary shade

Use coconut or other palm fronds to create a protective shelter for the seedling after outplanting.



If there are no fronds, build a protective frame then cover it with a rice sack.



Continue watering and other maintenance activities then remove the protection after a month.

Community education

The physical barriers around the seedlings will not be effective if the nearby community is not informed of the activities at the site. Persons of authority in the community are the best partners in educating other members of the community to prevent destruction of the seedlings.



- Make cattle herders aware of the area where the seedlings are planted and request that they do not let their cattle graze near or within the field while the seedlings are still growing; and
- Educate children on the importance of trees to the community with a follow-up request to their parents to remind their children to be careful when playing near the planting site to avoid damaging the seedlings.

Intermediate treatments

The seedlings in the area will eventually grow and form a stand. The stand will have to be maintained through intermediate treatments so that the trees will continue to develop in line with the management objectives and competition with other plants will be lessened.

Intermediate treatments are tending operations done to trees after outplanting and before the final harvest of the stand. These operations occur throughout the life of the forest stand. Some of these operations follow.

Weeding

This is the removal of undesired vegetation to lessen competition for limited resources, such as space and water.

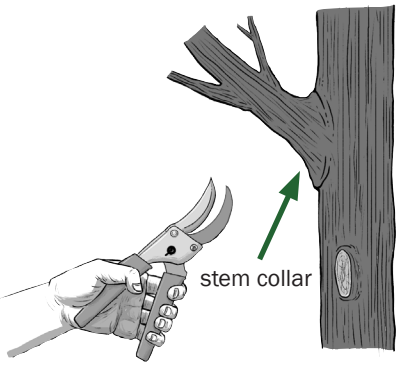
Do this as often as necessary and use the removed vegetation as mulch for the seedlings (for mulch application, refer to page 38 of *Propagation of quality planting materials: a training manual*).

Pruning

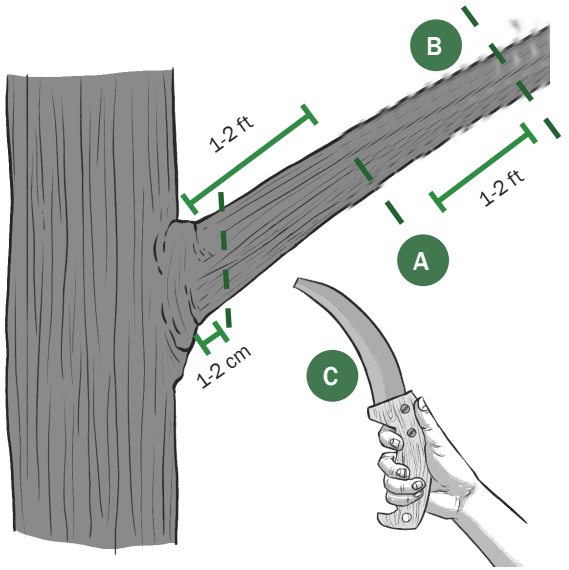
This is the selective removal of certain branches or stems of trees to improve growth and tree form and to allow light to pass through and reach crop components in an agroforestry system.

Tools: sharp pruning shear for thin branches and saw for bigger branches

- Be careful not to tear the bark when pruning at the stem collar.
- Trim a large branch in three cuts to avoid the branch pulling off with a piece of bark:
  1. The first cut (A), called the undercut, is made 1 to 2 feet away from the trunk and is done on the underside of the limb. The sawing motion goes up and only half-way through the branch.

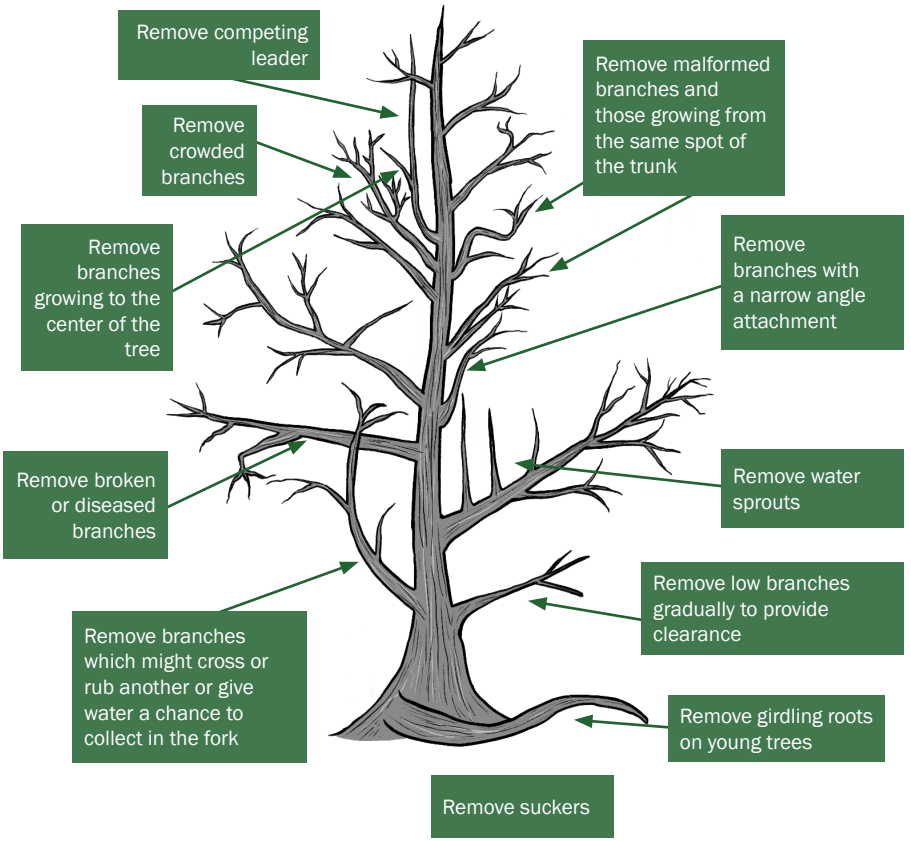


  2. The second cut (B) is made 1 to 2 feet away from the first cut and is made on the top side of the limb. The sawing motion goes down and all the way, cutting the branch.



  3. The third cut (C) is made near the branch collar or the part where the branch meets the trunk. Make sure to cut 1 to 2 centimeters away from the trunk.

This is a general illustration guide in tree pruning:



Session guide

Topic: Proper way of planting seedlings

Logistical considerations:

Time allotment: ≤ 9 hours

No. of participants: Ideally 20–30 (ensure a ≥30% attendance of females)

Venue: A farmer's field

Purpose: Improper planting procedures are the main reason for seedling death in a planting site. Strict adherence to the proper handling, planting, and maintenance procedures will greatly improve the chance of survival of seedlings in the field.

Objectives:

By the end of this training session, the participants should be able to:

- recognize the common mistakes in outplanting;
- describe the characteristics of seedlings that are ready for outplanting;
- demonstrate the proper way to handle seedlings;
- apply the proper way of outplanting seedlings and modified techniques for different planting site conditions; and
- apply the care and maintenance procedures to the newly outplanted seedlings.

Resources:

- Around 200 high quality containerized seedlings from the nursery (5 seedlings per participant for outplanting; the rest are for demonstrations and backup seedlings)
- Materials and tools for hole digging (page 11 of this manual) and cutters or scissors (allocate enough materials for each participant)
- Locally available materials for protective fences (page 24 of this manual)
- Visual materials (slide presentation, flipchart, or video if available) illustrating the common mistakes in handling and loading

Methods:

- Short lectures/discussions
- Hands-on demonstration/application (page 17 for general outplanting process, page 20 for outplanting process for waterlogged and dry areas, page 23 for care and maintenance operations)

Modifications and variations:

It is advised to have a break after the participants apply techniques of hole digging and outplanting. However, it should be noted that the session plan is only a guide for the trainer and your creativity in conducting the training is encouraged as long as all the topics in the session plan are covered.

If there are uncontrolled events, such as a sudden change of weather (e.g., heavy rain or there are few seedlings available), it is advised to reduce the number of holes and seedlings to be outplanted per participant. Continuation of planting in the next dates of availability will be facilitated by field personnel. Guidance and frequent monitoring of the seedlings outplanted should be done by the field personnel. Progress reports in the form of photo documentation can be sent to the trainer/resource person.

Session Plan

Activity	Time	Learning check
Introduction Introductions/Greetings Presentation of training objectives	15 minutes	Confirm that participants understand the flow of activities. Check if they have any concerns or anything to add to the training program.
Theoretical (Discussion) Before leaving the nursery (page 7) ■ Quality check: Qualities of seedlings that are ready for outplanting ■ Grading process Transporting seedlings (page 9) ■ Thorough watering before leaving the nursery ■ Proper handling and loading of the seedlings	30 minutes	Check for questions and clarifications. Quality check: Show them an illustration or photo of a seedling exhibiting these characteristics. Grading process: Demonstrate how to group the seedlings using the seedlings to be outplanted. Transporting seedlings: Use a slideshow of side-by-side illustrations of proper and improper ways of handling and loading.
Practical Divide the participants into groups. Make sure that each people's organization is represented in each group and men and women are well-distributed. I. Holing digging (Discuss and demonstrate) ■ Short discussion: when can it be done and tools needed (page 11), general hole size, hole size for soft soils and why, hole size for hard soils and why, emphasize that the heavier the soil, the bigger the hole ■ Demonstration: dig out each hole size and show it to the participants II. General outplanting techniques (Discuss and demonstrate) ■ Short discussion: tools needed (page 11) and where it is applicable ■ Demonstration: general process (page 17), process of planting when the earthball crumbles away from the roots (page 20) III. Adapting outplanting techniques to planting site conditions (Discuss and demonstrate) ■ Modifications when outplanting in waterlogged areas (mounding the base, page 20) ■ Modifications when outplanting in dry planting sites (sunken/depressed base, page 20) VI. Protective fence and shading (Discuss and demonstrate) Learn the planting site's condition by asking the participants what the usual disturbances for the seedlings in the area are. Start the discussion by using those disturbances.	6 hours	Make sure to do the process slowly and if possible, explain each step before doing it. Make sure to repeat demonstration at least twice. Check and encourage participants to ask questions after every demonstration. I. Hole digging (After Discussion and Demonstration): Discuss what kind of soil is in the planting area: ask the participants to feel the soil then randomly ask a member of each group to identify what soil and what hole dimension should be dug out. II. General outplanting III. Adapting outplanting techniques (after discussion and demonstration): Ask the participants if the outplanting techniques that will be applied to the site should have adaptations by asking for a show of hands (i.e. raise hands for those who say yes, raise hands for those who say no), count the hands for each option then reveal the correct answer. Application: After discussion and demonstration of parts I to III, repeat the hole dimension and the outplanting procedures to be applied.

Activity	Time	Learning check
■ Protective fence **1.** Discussion: when should it be built, the materials needed and alternatives (page 24) **2.** Demonstration: Process of building a protective fence around outplanted seedling ■ Shading **1.** Discussion: when should it be applied, for how long should it be left on the seedling, and the materials needed and alternatives (page 24). Emphasize that seedlings should not be left shaded for long periods or else they will grow stunted or it might die. **2.** Demonstration: Process of building and using a shading material around outplanted seedling		Let the groups disperse to apply hole digging to outplanting techniques. If there are participants that finish faster than the others, give them some of the extra seedlings to keep them practicing. ***Note:*** *Make sure the co-facilitators are closely monitoring the participants and are ready to help ensure each step is followed. Trainer should make rounds to ensure everything is going smoothly.* IV. Protective fence and shading: Let the participants alternately build a protective fence and a shade for each of the 5 seedlings they have outplanted
Wrap-up ■ Summary of the discussion on proper tree planting and activities in the practical session	20 minutes	Group activity: let a representative from each group summarize what they have done
Open session (Q&A)	25 minutes	Check for questions and clarifications
Evaluation	15 minutes	Translate into the local language, if possible

Remarks: The site should be prepared ahead of the training. Stakes should be driven in areas where practical phases of the training session should occur. These should be planned in such a way that the holes are still well spaced but not so far that monitoring during training will be difficult.

Glossary

Agroforestry. A widely accepted term for an approach to land use involving a deliberate mix of woody perennials (trees, shrubs, palms, bamboos) with crops and/or animals in some kind of arrangement or sequence

Bare-rooted seedlings. Planting stock that has been grown in beds rather than containers and has to be uprooted from its bed for transport, with roots packed in moisture-retaining material before transport

Brushing (also weeding). Removal of undesirable shrubs and bushes growing beneath large trees at a planting site

Containerized seedlings. Planting stock that continues to develop in a bag and will be transported in that manner until it is outplanted

Contour line. Imaginary lines across a slope used as a guide to establishing canals, hedgerows, and natural vegetative strips for soil conservation

Earthball (also balling). Packing the roots of a seedling with the topsoil from where it was originally grown

Evapotranspiration. Loss of water through a plant's leaves, stems and flowers

Grading. A physical assessment and grouping of each seedling designated for outplanting

Mulching. Application of any material (mulch), organic or inorganic, spread or laid over the surface of the soil as a covering to retain soil moisture, improve soil fertility and suppress the growth of weeds.

Natural vegetative strip. A low-cost, soil conservation technique that features narrow live barriers comprising of naturally occurring grasses and herbs that are allowed to grow on contours

Outplanting. The process of moving and planting the hardened plant to another location away from the nursery.

Planting stock. Seedlings, transplants, cuttings and wildlings to plant in the field (used interchangeably with 'planting material')

Root collar. The area where the root and the main stem or trunk of the plant meet

Seedling mortality. Seedling death

Site preparation. A process that involves clearing, determining spacing, staking and digging holes at the planting site

Stand. An aggregation of trees growing in a specific area

Strip clearing. Cutting grass and other vegetation in strips of 1 to 2 meters wide

Topsoil. The topmost layer of the soil, from the top to around 10 cm deep, where most of the biological activity occurs

Vegetation. A collective term for plants, especially those found in a particular area

Waterlogged. A condition where the soil is so soaked that it cannot absorb any more water, therefore causing surface flooding

Further reading

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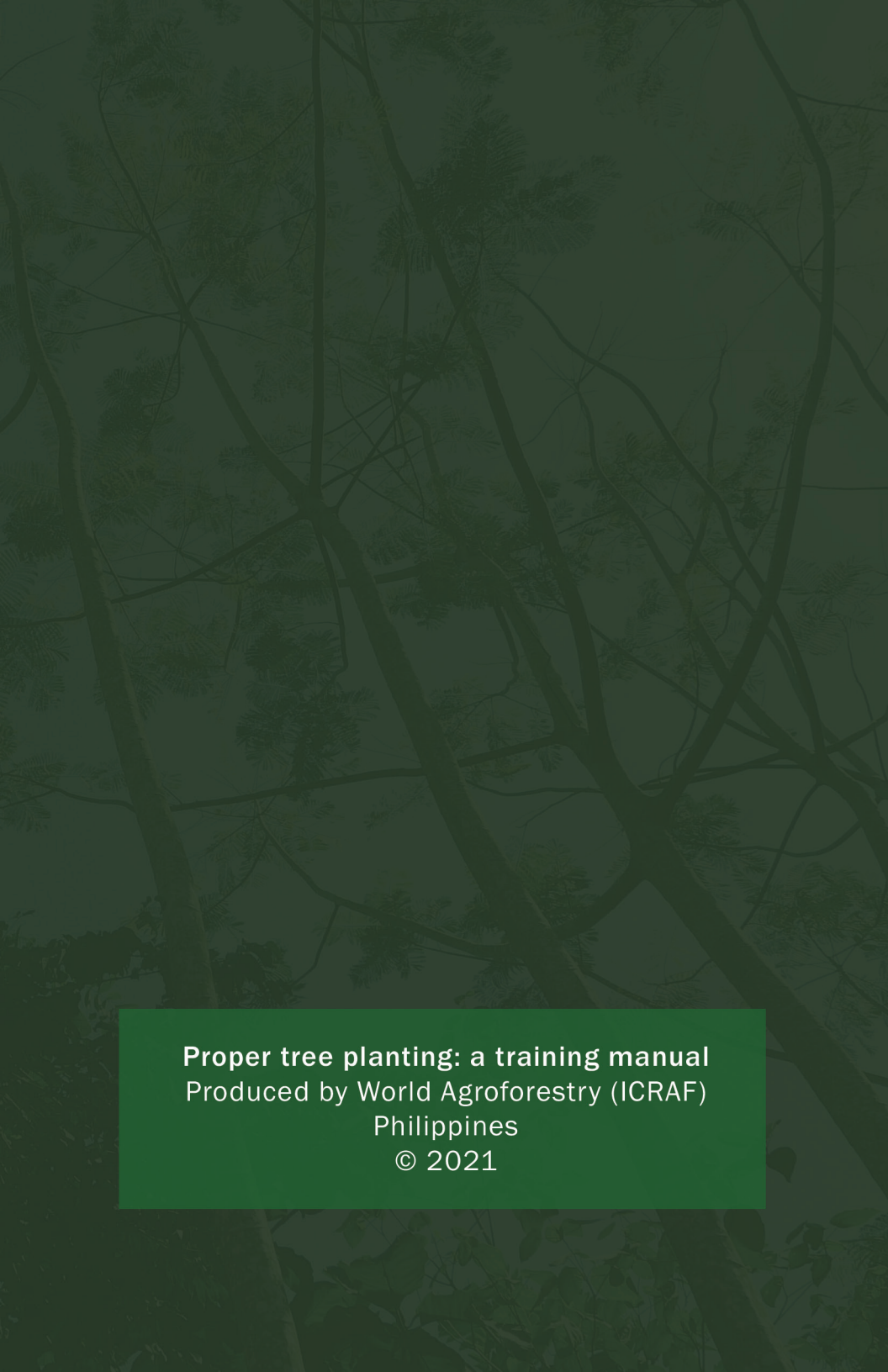
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