TREE PLANTING ACTIVITIES
TREEd PLANTING ACTIVITIES

1. PREPARATION OF THE TREE PLANTING SITE
Site preparation for tree planting is necessary to provide appropriate conditions for the seedlings to grow well. The preparation shall be completed by June at the latest. Techniques vary according to the site and planting purpose as follows:

Community Tree Planting Map
1.1. Site preparation for tree plantation

1.1.1 Identification of site and size of land for planting

We shall select the site for planting trees in the form of a square shaped annual lot that is adjacent to others used in rotation, so that the seedlings are together and easy to care for. The size of lot shall be calculated according to the number of seedlings available for planting. For example, if we have 5,000 seedlings and can plant 2,500 per hectare on average; we will prepare two hectares of land.

We shall prepare a firebreak of at least 5 metres around the annual lot, by clearing and cutting the bush and removing easily inflammmable materials. The firebreak can also be used as a road. If the community tree-planting project is expanded to 100 hectares, it is recommended to build a firebreak across the middle of the annual lot.
1.1.2 Building drainage canals
If the tree planting site accumulates water for long periods, it is necessary to build a canal to drain the water away as can be seen in the picture below.

1.1.3 Clearing the planting site and ploughing the area

1.1.4 Using lines to dig holes for planting the seedlings
For the plantation, lines are used to measure and adjust holes to be dug for the seedlings, which is helpful to enable them to grow in straight rows and to ease weeding, pest control and treatment.

1.1.5 Fencing
A fence is built to protect seedlings from animals, which should be adaptive to the availability and capacity of local people (detailed in Section 2.1, within Seedling Maintenance).
1.2 Planting seedlings
1.2.1 Open plantation
(For infertile soil, with only grass and small, unwanted plants)
- Limit the size of land to be planted and calculate the rate of seedlings to be planted per hectare;
- Construct a canal to drain water accumulating on the land;
- Clear and plough the area if possible;
- Use string to measure the positions of the planting holes in straight lines to be technically appropriate;
- Plant seedlings in this kind of soil between 1.5 – 2 meters apart; and
- Protect the seedlings, or build a fence to stop them from being destroyed by animals.
1.2.2 Tree planting in fields abundant with tall grass

- Measure the size of the land, and calculate the average number of seedlings per hectare (between 2,500 to 5,000) in order that the seedlings are capable of growing and destroying the grass;
- Construct a broad firebreak around the plantation of 6 to 10 meters in width. Fast growing species, evergreen species, or species with a thick bark, should be planted that can withstand the heat of forest fires.

- Cut and clear the grass. For large-scale state plantations, the whole area should be ploughed by tractor. However, the communities can clear off the grass, or plough the area block by block. Each block should be 2-2.5 square meters with gaps of 1.5-2 metres between each block. Each block can be planted with 2-3 rows of seedlings. The grass needs to be clear-cut for the seedlings to grow well at full capacity. It is also possible to spray pesticide to control newly grown grass, but it must be cut to allow the bud to grow, and can then be sprayed with pesticide to kill and flatten it. It is better during planting if bigger holes can be dug and all grass cleared off.
1-Clearing (block by block)

2-Plowing each block

3-Levelling weeds in each block

4-Planting 2 or 3 rows of seedling in each space
1.2.3 Planting between existing trees
This kind of planting increases the number of beneficial trees in degraded forests.

Do not plant new seedlings near the existing tree or do not remove the existing tree.

New tree shall be planted with large space from the existing tree.
When clearing the area to plant trees, keep those trees that are beneficial and dig holes between them, keeping space between as appropriate according to the planting technique. We do not have to plant the trees in straight rows.

In the case that the remaining trees have many branches but we need to grow the seedlings nearby, we shall prune the branches to allow sunlight and dew to access the newly planted seedlings.
1.2.4 Tree planting as fields in shrubland

Shrubland includes *Rhodomyrtus tomentosa*, *Maclura cochinchinensis* and *Heritiera littoralis*, which generally do not disturb the growth of big trees. Therefore, we only need to clear the forest to open spaces large enough to dig the planting holes in a straight line.
Reforestation of this kind of land shall be done throughout the area by keeping the planting spacing not smaller than 2 x 2 meters, with the number of seedlings not more than 2,500 per hectare. We shall use three measurement poles, higher than the shrubs, to make sure that the rows are straight when digging holes, and then we can use split bamboo or step to measure the space between each hole.
1.2.5 Tree planting as a wind break
For this purpose, we can plant a variety of species, such as tall or medium height species, or shrub species. The planting proportion should be 15% of tall species, 20% of medium-height species and 65% of shrub species.

The tall and medium height species should be:
- Strong and durable against the wind (tough branches);
- Fast growing;
- Able to grow shoots; and
- Economically important.

We shall not select species if the upper part of the tree is bushy and too heavy. Appropriate species are those with a lower part dense with leaves or branches, slightly thick in the middle part of the tree, and sparse at the upper part, which helps to divert the wind current away from the trees. The trees shall be planted in 1 to 5 rows.
We plant trees of five rows or more to protect against direct strong wind, known as a main windbreak. Trees planted for this purpose shall be planted in rows 300 m to 400 m from each other. Tree planting of 1-3 rows is to protect against moderate wind and these trees shall be planted in an angled position to the main wind. These species are *Cassia siamea*, *Pinus merkusii*, and *Casuarina equisetifolia*. 
Trees shall be planted 1-1.5 metres apart, in groups of 2-7, where each group consists of one species. Note: tall species are planted in the centre, with medium height and short species planted alongside.
1.2.6 Tree planting along the road

At present, the construction of roads and pathways is developing very rapidly to assist the travel of local people. Therefore, tree planting along these pathways provides various advantages such as beautifying the road, providing shade, and preventing soil erosion.

Local people should be aware of these advantages and some important techniques for planting trees along the road, as the following:

- Tree planting should start in the early wet season between May-June;
- Trees with small leaves or branches should be planted from the middle slope of the road to the base, 2-3 meters apart. However, those with large branches should be planted on the base slope of the road. If the area is adjacent to rice fields or accumulates water, the land needs to be raised to a higher level. In this case, seedlings shall be planted 3-6 meters apart (refer to figure below).

![Diagram of tree planting along the road](image)

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- We should not plant seedlings on the inner part of a bend in the road because it would be difficult for travelers to see each other;
- We shall measure planting holes from the middle of the road to the side (the measurement line shall be angled to the road) to ensure consistency. By doing so, the seedlings will be in straight rows or curved around bends; and
- We shall prepare enough protective frames for each seedling planted.
1.2.7 **Tree planting for shade on the plateau**

Tree planting for shade is conducted as follows:

- A site is prepared where seedlings can be planted in groups of 9 – 16;
- Each group should be at least 100 m apart;
- Seedlings should be 2 m apart because young trees, affected by strong sunlight, will need more shade. When they grow, we can cut some of them to reduce the density; and
- We shall build fences to protect the seedlings in each group.
1.2.8 Tree planting to prevent soil erosion and for drainage

1.2.8.1 Prevention of soil erosion along waterways

Ground alongside waterways suffers from soil erosion according to the speed of the water flow. Thus, we shall plant trees with many branches and a good root system for protection by using the following techniques:

![Diagram of soil erosion and soil accumulation along waterways]

Soil erosion and soil accumulation along waterway
(River, Lake Stream ... )
We shall plant the tree species as mentioned above to protect against soil erosion on the affected or threatened banks, because collapse of the banks can spread to other parts of the waterway. For that part which suffers severe erosion, we shall take temporary or urgent measures, at least within one year, to allow enough alluvium soil to accumulate for planting the protective trees. We shall also plant trees on the alluvium soil, which accumulates behind bamboo, or wooden barricades, which were placed as temporary protection.
Mark / Sign

Water current
- We shall plant shrub species in the lower part and large tree species in the upper part (figure A);
- On average, we should keep a space of 1 x 1 m for shrub species but if we plant in front of a strong current of water, we shall plant them close to each other in the initial stage.
- We shall quickly plant the protective trees between November and December because the plants that grow along waterways in Cambodia mostly blossom in the dry season.
1.2.8.2 Prevention of soil erosion on slopes

- In the case of planting trees on slopes to prevent erosion, we can plant trees mixed with existing ones angled in rows as in plantations in the open field.

- For slopes with no existing trees, we shall do the following:
  - Plough the area into terraces, with planting blocks between 4-6 m in length and 2-4 m in width, in an angled form.
  - Cut small branches to put on each block and place small poles around to prevent the earth from collapsing;
  - Seedlings shall be planted near to those barricades.
1.2.9 Tree planting for fodder

To plant trees for fodder, we shall use seedlings which germinate from branches;
- Fodder trees can be planted in rows between crops (figure A), as a fence around the house or plantation, or in an open field to supply fodder or as grazing land.
- We can plant in beds of 0.5-1 m width, with 2-3 rows per bed, keeping 0.5-1 m of space between each tree (figure B), for intercropping or planting along the fence.
When planting fodder trees in an open field, we shall plant groups of 4-5 trees, keeping 0.5-1 m between each tree and 2-3 m between groups (figure C). We shall plough and furrow the land carefully so that the seedlings are able to grow well.
1.2.10 Tree planting in agro-forestry systems
1.2.10.1 Agricultural land development in the slope area
In order to prevent erosion on slopes where agricultural crops are planted, we shall plant trees to stop or to slow the water run-off from removing the soil (figure A and B).
Therefore, we should implement the methods below:

- We shall plant trees in rows of equal height and shall try to prevent each barricade from allowing water to flow into the natural valley, which could cause higher soil erosion (figure C).
- The gap between rows of trees, planted as a barricade, should be 2-3 m (figure D).

- We shall plant shrub species, with 2-3 rows per block with 1 m of space between each tree, in an angled form by mixing with tall trees.
- Shrub species are those that germinate from branches or that can be cut from tree branches for planting, but tall species mostly germinate from seeds.
1.2.10.2 Multiple tree planting diversified with crops

In some cases, trees can be planted to provide shade for other agricultural crops. This technique can be practiced particularly for crops cultivated on grass land. However, we shall also seek additional advice from forest extension workers. For this purpose, we shall consider environmental and economic issues, which also require time-consuming monitoring. Thus, we shall follow the stages below:

- At first, we shall plant trees that can bear strong sunlight, which will provide shade for other plants, that we shall plant with 2-3 m spacing.
- We shall plant annual crops in between the shade providing seedlings;
- We shall apply fertilizer, and weed and trim the shade trees when they become too bushy.
- We shall continually remove unwanted plants and keep trees or crops that are more beneficial.
2 HOLE DIGGING METHODS FOR PLANTING SEEDLINGS

- Holes shall be dug at least one week before planting, in order that sunlight can decompose the organic elements in the hole, and kill viruses or other diseases.
- It is good to dig a large hole to enable the seedlings to root deeper and to absorb more nutrients. The hole shall be at least 30 square cm, with a depth of 20-30 cm (Figure A).
- We shall place the upper soil in a mound separate to the lower soil, and loosen the soil at the bottom of the hole (Figure B-C).
- The depth of holes on slopes or along steep roads should be calculated as shown in Figure D.
3 HOW TO PLANT SEEDLINGS

- We should apply fertilizer to the bottom of the hole if possible. For severely infertile soil, we shall mix the soil with one kilogram of compost (figure 1) but this is not necessary for fertile soil.
- We shall tear the plastic bag carefully, not to break the earth before placing the seedling into the hole (figure 2).
- We shall place the seedling firmly in the hole, then put in the upper soil or soil mixed with compost, and after that we can put in the lower soil. Finally, we shall compress the soil firmly with our hands so that the soil is not compacted by rain (figure 3-4-5).
- We shall be careful when placing the seedling into the hole (figure 7).

- We shall place a supportive stick to protect the seedling from the wind, which can shake the plant and disturb the rooting of the newly planted seedling. We shall cover the seedling with grass or leaves to maintain the moisture level (figure 8).