

## Training Module No. 12

### **One Day Training Programme on Plantation Technique**

**Date :** \_\_\_\_\_

**Venue:** \_\_\_\_\_

#### **Registration of Participants (30 Minutes Prior to the Start of First Session)**

##### **Participants: 30 Persons**

- Team members of Partner NGOs
- Working group members of VSS involved in direct implementation
- Concern forester and forest guard

##### **Objectives of the Training**

The objective is to enhance and improve conceptual and practical knowledge of participants on raising forest plantation and techniques involved in plantation management.

##### **Training Outcomes**

1. Participants will have clear understanding of various steps involved in raising plantation and their maintenance.
2. Enable the participant to establish plantation of different forest species.

##### **Pre-requisite for this Training:**

- The VSS should have been selected prior to the training for implementation of the scheme.
- Survey and demarcation of block plantation Area would have been completed.
- Microplan should be ready with information about the species to be raised.
- A demonstration site for the plantation should be selected for the training.
- Number of seedlings needed to be planted (species wise) should have been finalized.
- List of participants (VSS members) having inclination for plantation activities should be selected.

**Training Methodology:** On the site demonstration of plantation technique.

##### **Materials and Aids Required**

**Fencing materials:** Brushwood and other locally available fencing materials.

**For site preparation:** Ropes, cotton or steel tape, wooden pegs, Shovels, Khurpa, Spades, (small & large) etc.

### DETAILS OF SESSION PLAN

Duration (Min)	Key Steps/ Key activities	Method	Aid/ Materials Required
<b>Session 1: Introduction</b>			
<b>60</b>	<b>Introduction about plantation</b> 1 SELECTION OF SPECIES 2 SELECTION OF SITE 3 SITE DEVELOPMENT 4 DIGGING OF PITS	Lecture/Interaction and Field demonstration	<ul style="list-style-type: none"> <li>• Field note book, Pen etc.</li> <li>• Handouts</li> </ul>
<b>Session 2: Brief on protection of plantation site</b>			
<b>60</b>	5 PROTECTIONS OF PLANTATION SITES 5.1 LIVE HEDGE FENCING 5.2 SOCIAL FENCING 5.3 FIRE PROTECTION	Lecture/Interaction and Field demonstration	<ul style="list-style-type: none"> <li>• Field note book, Pen etc.</li> <li>• Field equipments</li> <li>• Handouts</li> </ul>
<b>Session 3: Brief on Plantation techniques</b>			
<b>60</b>	6 FILLING OF PITS 7 PLANTING OF SAPLINGS 8. REPLACEMENT OF DEAD PLANTS OR CASUALTY REPLACEMENT 9. SOIL WORKING AND WEEDING 10. INSECT AND DISEASES	Lecture/Interaction and Field demonstration	<ul style="list-style-type: none"> <li>• Field note book, Pen etc.</li> <li>• Field equipments</li> <li>• Handouts</li> </ul>
<b>Session 4: Maintenance of plantation</b>			
<b>60</b>	11. MAINTENANCE AND AFTER CARE 12. MAINTENANCE IN SUBSEQUENT YEARS 12.1 Second year 12.2 Third and Fourth Year	Lecture/Interaction and Field demonstration	<ul style="list-style-type: none"> <li>• Field note book, Pen etc.</li> <li>• Field equipments</li> <li>• Handouts</li> </ul>
<b>Session 6: Care and maintenance</b>			
<b>60</b>	12.3 CAUSES OF FAILURE OF PLANTATIONS 13 MAINTENANCE OF FIRE LINES 14. MAINTAINANCE OF PLANTATION JOURNAL	<b>Lecture/Interaction and Field demonstration</b>	<ul style="list-style-type: none"> <li>• Field note book, Pen etc.</li> <li>• Field equipments</li> <li>• Handouts</li> </ul>
<b>Feedbacks and Vote of Thanks</b>			

## **Course Materials**

### **Session 1: Introduction**

Forests play an important role in the economy any nation. They meet our requirement of timber, fuel wood, fodder, paper, pulp, sports goods, match wood, plywood, resin, packing cases, and agricultural implements, other minor forest produce and medicinal plants. Owing to increasing pressure on forests due to enhanced grazing and other human interference, the natural regeneration on which we had depended in the past is now at receiving end. It has therefore, become necessary to restock forest areas by planting suitable tree, shrub and grass species. Raising of block plantation is a technical process and its various components and activities are discussed below:

#### **1 SELECTION OF SPECIES**

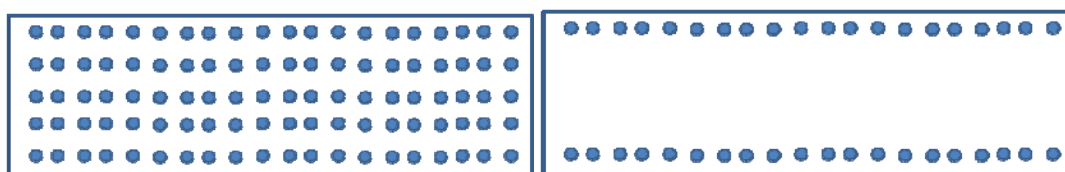
Climatic variations occurring due to altitudes, aspects, temperature, rain fall, soil types have resulted into a number of forest types and vegetation types that vary from place to place. Because of this, it is not possible to recommend any particular tree species for every area. However, while selecting the species for planting in a particular area the following points should be considered:

- The soil and climate of the area is suited to the growth of particular tree species,
- The species selected should meet the fodder, fruit and other requirements of the villagers living in the vicinity,
- The species selected suit the needs of birds and wild animals dwelling in the area. The species selected for planting should provide suitable cover and food to herbivores and carnivores.
- The species should be useful for water and soil conservation.
- The species should be able to meet the industrial and other local needs of the society.

It should be borne in mind that the growth behaviour of any plant is considerably influenced by sunlight, temperature and fertility of soil. Some species have low moisture requirement. Where as many others require sizable quantity of water at the initial years of their growth.

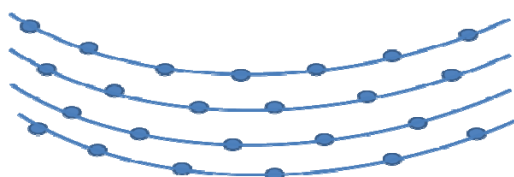
## 2 SELECTION OF PLANTING SITE

The selection of site and selection of species are interdependent. The selection of site is however more important as the selection of species depends upon the selection of site. The site selected for planting should be suitable for the growth of species desired to be planted. For this purpose, the soil type, its depth, study of vegetation in the neighbourhood, local factors and other conditions should be given due consideration and advice of the local villagers should be taken, Further soil depth and its capacity to retain moisture, texture, structure, parent material, PH, degree of compaction, and drainage, conditioning surrounding forest, existing vegetation and this composition, knowledge of water table level and its depth, factors like past history and present land use influence on the site, including fire and domestic live stock and wild animals. Selection of planting site should be done by the end of September. In case of Reserve Forests the areas to be taken up for planting are listed year wise in the working plans of the respective Forest Divisions. Therefore site selection has already been done for plantation works year wise. Plantations can be raised as a block plantation if large area is available or seedlings can be planted along the boundary of agriculture fields/bund plantation or school, offices, canal, road sides (avenue plantation)etc.



**BLOCK PLANTATION**

**AVENUE/BOUNDARY PLANTATION**



**BUND PLANTATION**

### GEOMETRY OF PLANTATION

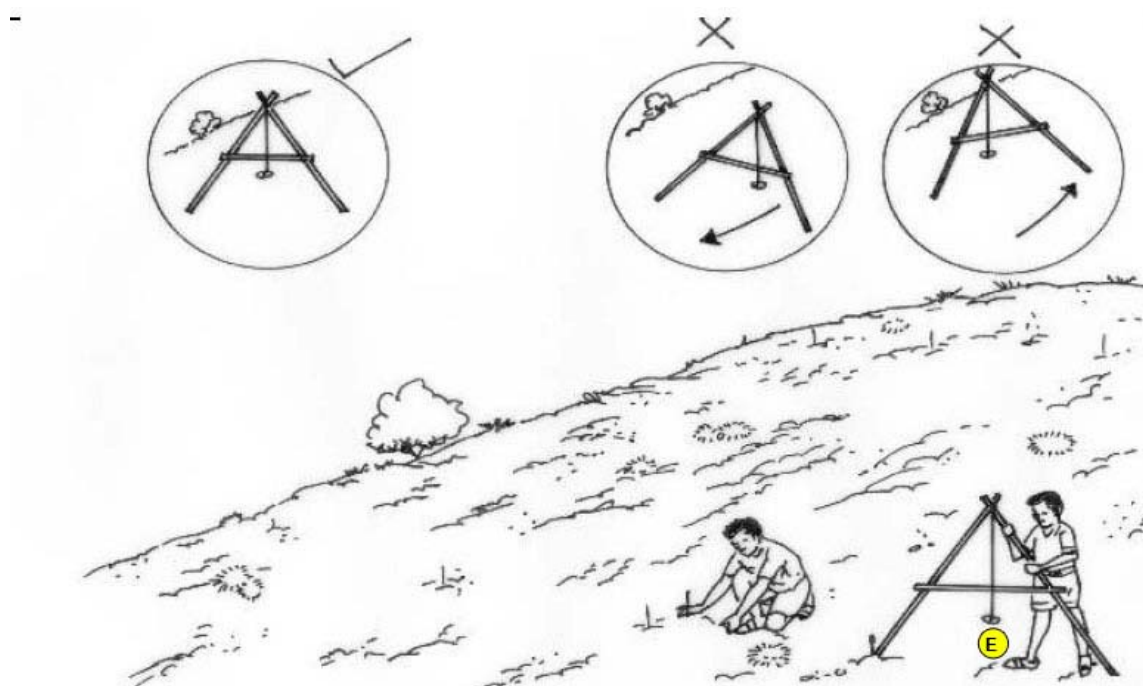
## 3 SITE DEVELOPMENT

Site development for a plantation includes clearance for planting and it involves, bush cutting, soil and moisture conservation works in 'nalas', construction of vegetative or stone check dams, marking of pits for planting of saplings etc. In addition, demarcation of boundary wall or fencing and inspection paths should be made to facilitate the movement of people engaged in plantation works. This work should be completed by the end of November. In hilly areas, Lantana, Eupatorium and other invading weeds and shrubs should be uprooted. While developing the site for planting, care should be taken to retain all

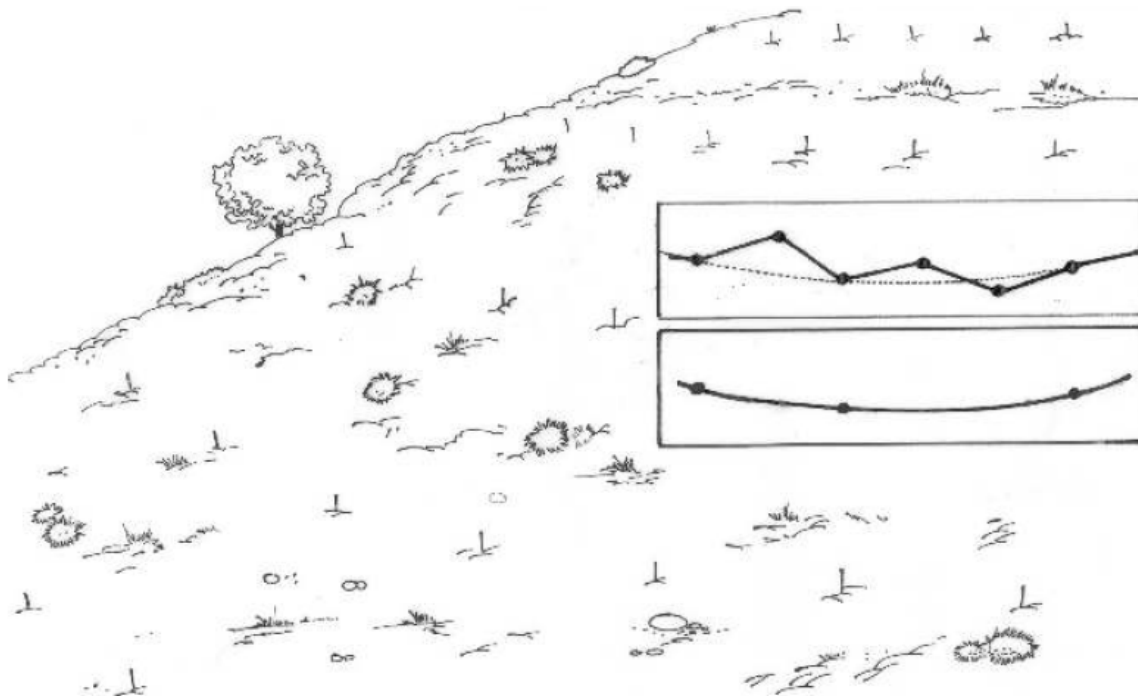
indigenous species of trees and shrubs that are naturally growing in the area. They should not be cut and burnt along with weeds and thorny species. The planting design, location of plantation and size of plot is to be verified with review of Maps and aerial photo.

#### 4 DIGGING OF PITS

After clearing the land sites for digging of pits, plantation should be marked on ground using a measuring tape to ensure the desired spacing. Wooden pegs or bamboo sticks shall be placed at the spot just at the centre of the pit. Pits of the size 30 cm x 30 cm and 30 cm depth should be dug. Pits should be deep enough to ensure that the roots of the plants do not curl up once the planting material is placed in it. The soil dug from the pits should be dumped close to the pit. While digging stones, roots of trees, grass or shrubs, if any, should be removed so that while filling the dug up earth back in the pits these are not mixed with the soil. The spacing of pits varies according to the planting scheme for different areas. Generally the spacing between pit to pit, distances between lines is around 2.5mtr x 2.5mtr along the contour line. It may not be possible to follow this spacing strictly due to presence of boulders or trees. No pit should be dug within the vicinity of five meters from a tree. It is better for complete the pitting works within end of March for better weathering of soil. The spacing between the pits should however, not be less than 2.5mtr x 2.5mtr. The size of pits may vary for Urban plantation, Bald hill plantation, Avenue plantation, and Bamboo plantation. A Pits should always be dug along the contour lines. The procedure of making the contour lines has been described below:



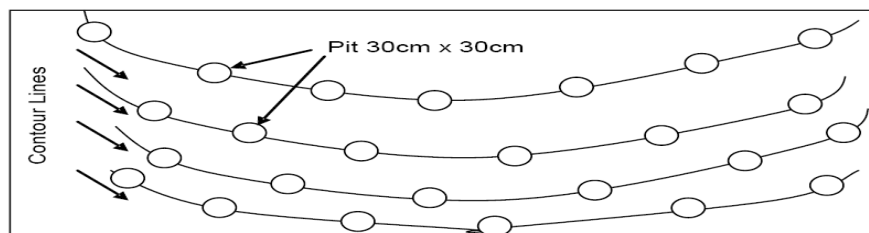
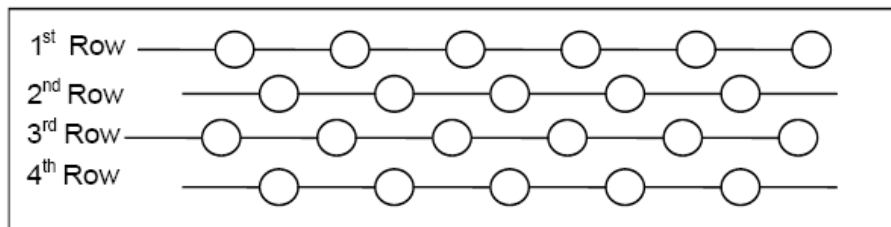
Adjust 'A' frame on the slope to bring plumb line/string to the centre of the A -frame (Point E). Mark spot on the slope. These spots will form a contour line. Distance between contour hedgerows should be approximately 4 m - 6 m.



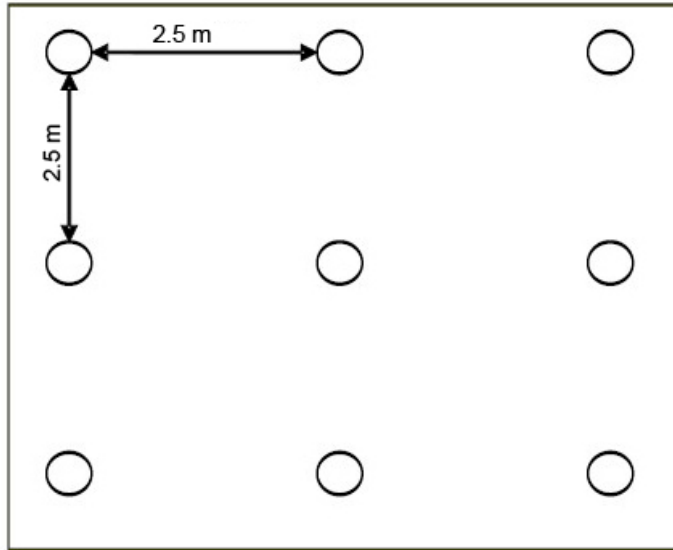
If the spots located by the A-frame zigzag too much, while planting consider only those points that form a smooth contour.

#### **ALIGNMENT OF PITS IN AREAS WITH UNDULATING TOPOGRAPHY**

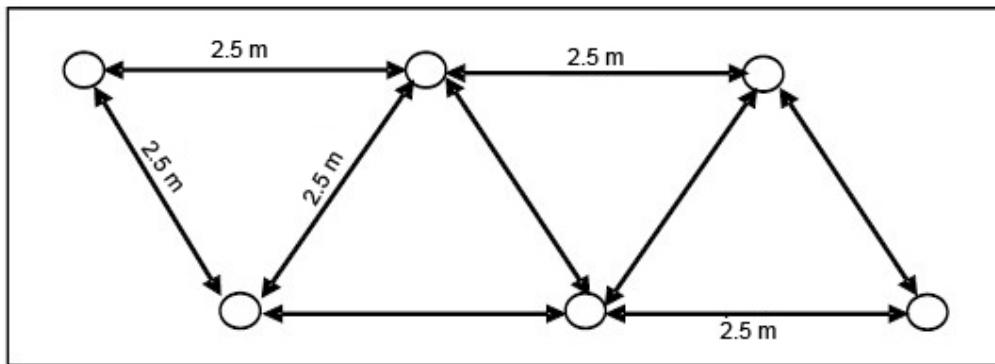
The pits in the second line should be dug in such a way that they fall between the pits dug in the first line as shown i.e., staggered. The triangular planting method, which is specially practiced in the hills, checks the flow of rain water and facilitates its percolation in the ground.



Alignment of pits in hilly areas



PITS IN ROW WITH EQUAL SQUARE SPACING



TRIANGULAR SPACING

## **Session 2: Brief on protection of plantation site**

### **5 PROTECTION OF PLANTATION SITES**

The proper fencing of plantation area is essential to protect the seedlings from damage by the cattle and wild animals. The choice of fencing depends on the type of terrain, soil depth and the kind of soil. Since most of the afforestation programmes are employment oriented, a fence type with high labour input is preferred. Cost of fencing is another important criteria, but normally no compromise should be made on this count, because if fencing is not effective, all other measures, how far effective, will come to a halt. So fencing should be done by using locally available fencing materials.

#### **5.1 LIVE HEDGE FENCING**

Live hedge fencing can be developed by planting agave or euphorbia species. For this purpose planting can be done at a spacing of 50 cm along the outer periphery of the walls during the rainy season.

#### **5.2 SOCIAL FENCING**

In community areas and areas close to habitations, local villagers must be encouraged to resolve among themselves about not sending their cattle in plantation areas and protect grasses in the plantation areas to be cut after maturity by mutual agreement. VSS should be made models of such social fencing efforts. In such cases, the money earmarked for fencing must be utilized to pay the villagers for protection of plantation site from grazing. The grasses so produced can be shared by the villagers as per the mutual agreement.

#### **5.3 FIRE PROTECTION**

A 1.5 m wide strip along the outer periphery of the fencing should be cleared of grass and bushes and the strip scrapped with spade for fire protection so that any fire from outside may not enter the plantation area. A hut should be constructed inside the plantation area, preferably at the entrance point. This can be used for the stay of the people working for plantation during rains and heat. After the plantation work is over the hut can be used for the stay of watcher looking after the plantation.

## **Session 3: Brief on Plantation techniques**

### **6 FILLING OF PITS**

This work should be completed before the first week of June i.e that is prior to onset of monsoon. The dug earth dumped near the pits should be filled back after about a month or before the monsoon, so that the pit and the earth to be filled are exposed to sunlight. Insecticides may also be mixed in the soil while filling into the pit. The pit should be filled a little above the ground level so that after the earth settles the upper surface of the pit is level to the ground thus avoiding any water logging. While filling the pits, the area surrounding the pit should be scrapped with spade to remove grasses or weeds. Top soil should be filled in the bottom of the pit and after this, subsoil should be filled.



## **7 PLANTING OF SAPLINGS**

The plantation of sapling must be done in the first week of July when monsoon rain has begun. Planting of naked root plants should be completed as early as possible so as to take full advantage of the rain. The planting work should be done either during light rain or cloudy sky. The roots of the plants should be kept straight and the plant shall be put straight in vertical position. The collar of the plant should be kept at the surface level of the pit. After planting the sapling, the earth around it should be firmly pressed by hands or feet and while doing so the plant should be pulled about half inch to make sure that its roots is not bending.

Bagged plants should be sprayed with water before planting. The polythene should be carefully removed so that the plant is not damaged. The plant with the soil intact should then be placed in the pit in straight position, the collar of the plant being in level with the ground. The soil around the plant should then be pressed firmly by hands only. Pressing by feet is likely to disturb the soil of the plant. The planted saplings should be of suitable thickness and height.

## **8. REPLACEMENT OF DEAD PLANTS/CASUALTY REPLACEMENT**

Dead, dying or dry plants should be replaced by using healthy seedlings within 15 days of completion of planting work.

## **9. SOIL WORKING AND WEEDING**

Half moon pit should be made around all the seedlings having inward slopes. For this purpose a semicircular pit about 15 cm deep, 25-30 cm apart from the plant should be dug. The earth taken out from the pit is put around the base of the plant. This has double advantages; firstly, there will be no water logging at the base of the plant which may otherwise cause damage to the plant; secondly, the rain water collected around the plant will help in retaining the moisture for the plant. Naturally growing species which have been adopted at the time of site development should also be included in half moon pit making and weeding / hoeing operations. After the rains are over, capillary actions begin in the pits. This causes loss of moisture due to evaporation in the hot sun. To check this, weeding should be done in and around the pits. During this operation, grasses and weeds should be removed and the earth clumps should not be broken. Second weeding should be done in September end..

## **10. INSECT AND DISEASE**

Insect and diseases are present in all tree planting. Their presence is harmful to plant growth. It can be very difficult to diagnose insect and disease, they may be underground, inside the tree or microscopic. Sometime the multiple factors or combination of insects and disease may be causing the problems. There are some harmful insects are stem and root feeders, shoot or branch pests and defoliators. Weevil and white grubs feedings on stems and roots are typically the most destructive insects in a tree planting. Generally common plant diseases are root rots, cankers and rusts, foliar diseases. Root rots tend to cause slow twig and leader growth and an

overall yellowing of the crown. Root rots often form in pockets rather than randomly across the planting. Controlling root rots is usually not practical. Swelling lesions, and/or weeping sap on the stems and branches could be signs of cankers and rusts. Cutting and removing infected parts of the tree is best option for control. Foliar diseases affect the needles or leaves.

Maintaining good tree health and vigour are the best prevention measures for fighting off the insects and diseases that will attack the trees. This means selecting the appropriate species for the site, obtaining healthy stock, storing and handling seedlings properly, maintaining good soil fertility, controlling competing vegetation, and preventing animal damage. Further the application of insecticide and pesticide/ Fungicide is essential to control pest and diseases. All precautionary measures to be followed along with proper doses should be prepared during application of insecticide and pesticide in field.

## **Session 4: Maintenance of plantation-**

### **11. MAINTANCE AND AFTER CARE OF PLANTATION**

After care of plants in the plantation area is important and this includes:

- Periodical weeding and removal of grasses suppressing the plants,
- Maintenance and repair of inspection paths,
- Repair of boundary wall or fencing where ever necessary,
- To protect the plantation area from grazing and damage by wild animals and villagers cutting grass.
- To protect the area from fire, cleaning of dry grass and twigs, etc. from the area and cleaning of inspection paths,
- Cleaning of the outer periphery of the plantation area in two meter width,
- Keeping regular watch over the plantation area during the fire season and
- Seeking help and co-operation of the neighbouring villagers in the protection of the plantation area
- Under AJY the VSS members are required to take after care of plantation.

### **12. MAINTENANCE IN SUBSEQUENT YEARS**

#### **12.1 Second year**

The casualty replacement works should be carried out in the second year. In this operation the dead plants are replaced by planting fresh saplings immediately at the onset of monsoon rains. Under normal conditions not more than ten per cent plants are required to be planted during the above operation in the second year. The reasons for mortality should be ascertained. The dead plants should be replaced by the species which are growing successfully. At least one weeding should be done and Half moon pit be made. The weeding, soil working and manuring operation is to be carried out within September. Fencing should be repaired where ever necessary. Proper attention is to be given for grazing and fire control.

## **12.2 Third and Fourth Year**

Normally no beatings up operations are carried out during these years but full attention is given to protect the area from grazing and fire. However, soil working and weeding around the plants during the rainy season promoted the growth of seedlings. Therefore, provision of sufficient funds should be made for this purpose too.

## **Session 6: Care and maintenance -**

### **12.3 CAUSES OF FAILURES OF PLANTATIONS**

Following are the main causes of failure of plantation works:

- Wrong selection of species in a particular site.
- Planting of weak and damaged seedling,
- Untimely planting of seedling, ie planting in Aug-Sept,
- Carelessness during transportation of seedlings. The polypot/bagged seedlings need very careful handling during loading/unloading. If, carriage is done by head load they should be carried in trays or baskets to avoid damage,
- Lack of supervision at the time of growing seedlings in the nursery and while planting in the plantation area.
- When proper shifting, grading and root cutting of plants is not done in the nursery as prescribed, before taking plants to the planting site and - Proper attention is not paid in planting, weeding and other works.
- In addition to the above, grazing, lack of desired rainfall or excessive rain and fire are other adverse factors causing failure.

## **13 MAINTENANCE OF FIRE LINES**

Forest fires are common feature. The extent of fire is generally more in the dense forests than in open forest area and the former suffered greater damage due to these fires. Most of the fires are man-caused (intentional or accidental). The total damage from forest fires is very large. Small trees and regeneration are often killed; severe fire can kill the large trees also.

Protection of forests against fires is one of the important operations in forestry. Fire lines of sufficient width are cleared of vegetation and maintained all around the forests and run criss-cross inside the forest so that a compact block or area is separated from other area. The width of these fire lines depends on many factors such as, type of forests, density, terrain, wind speed in the area etc.

Such fire lines are usually cleared before the start of the fire season in order to avoid the spread of fires from one area to another.

**14. Maintenance of Plantation journal.** The plantation journal is to be maintained citing all details of Topography/soil/Climate, Year of plantation, plantation sites, species planted and year wise expenditure. The plantation map along with the GPS readings of all plantation pillars and photograph of planting operation is to be kept in journal. All details of planting activities year wise is to be written in plantation journal.

## Participant 's Feedback

**Name of Training:** One Day Training Programme on Plantation Technique

Venue:

Date:

1) How far has this training fulfilled your demands?

Completely                       Partly                       None

2) Please mark your opinions on the contents discussed in the course:

SI No	Content	I have achieved a clear concept		
		Fully	Partly	None
1.	Introduction about Plantation			
2.	Brief on protection of plantation site			
3.	Brief on plantation techniques			
4.	Maintenance of plantation			
5.	Care and Maintenance-			

3) Give v mark in appropriate box :

Aspects	Very Good	Good	Fair
Training Room Facilities			
Quality of Food			
Lodging Facilities			

4) Mention three things during the course you liked and did not like

I Liked		I did not like	
1.	_____	1.	_____
2	_____	2.	_____.
3	_____	3.	_____

5) Of all contents discussed in the course.

You liked most \_\_\_\_\_

You disliked most \_\_\_\_\_

4) Give your overall impression about the training with V mark.

Very good		Good		Fair		Not satisfactory	
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5) If you have any additional comments, write here.

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Signature

Name