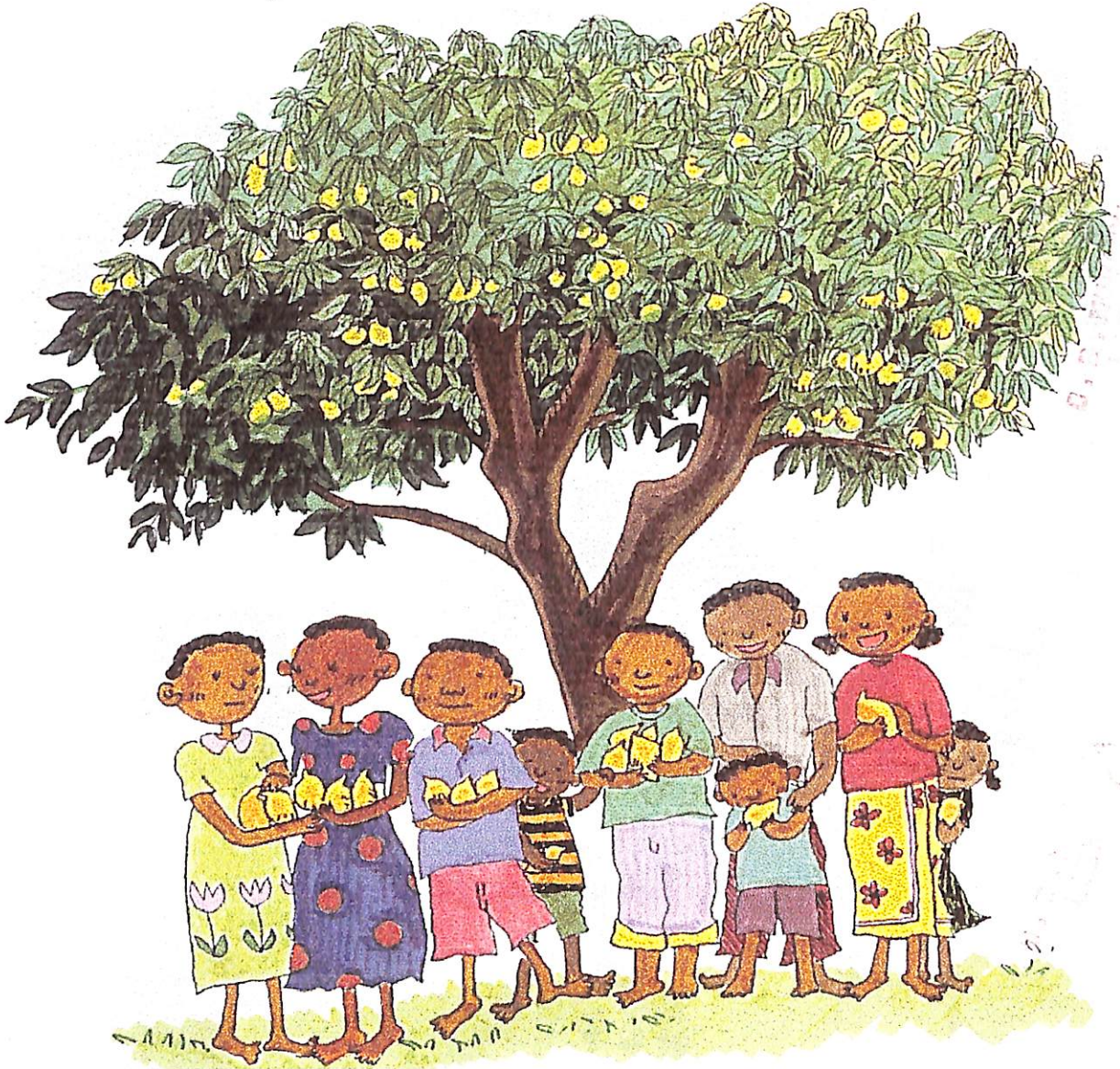


# PLANTING AND TENDING TECHNIQUES



**Improve your standard of living and environment by planting trees**



**KENYA / JAPAN**

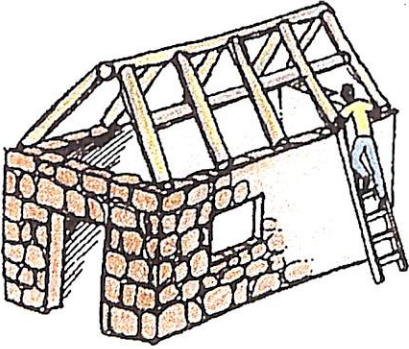


**Social Forestry Extension Model Development Project**

# More trees provide better life for you

People are living with various benefits from trees. Some of them are tangible such as timber, fuelwood, fruits and others are intangible like shade, soil conservation, etc.

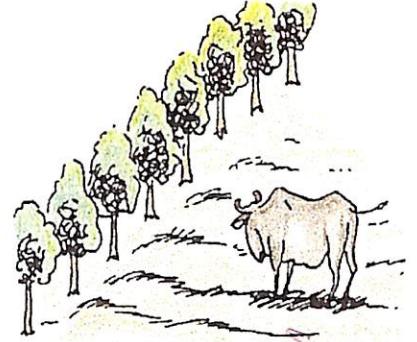
Timber



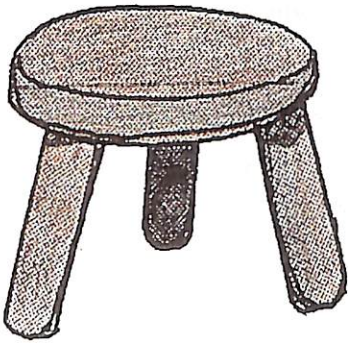
Fuelwood



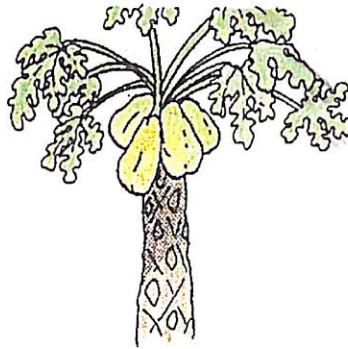
Fencing



Furniture



Fruits



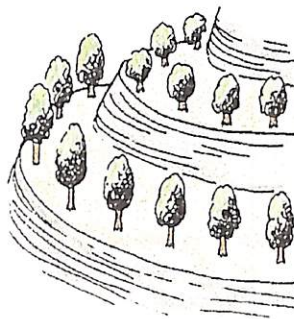
Shade



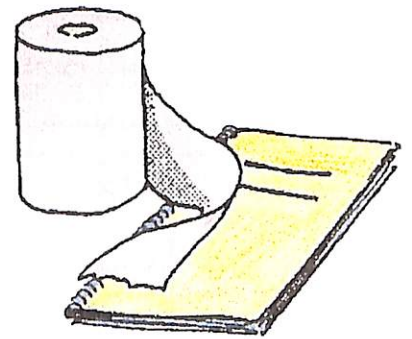
Carving



Soil conservation



Paper



However, it will become more and more difficult to get trees, because Kenya has rapidly increasing population. Therefore we need to plant more trees to make our life more pleasant and improve our living standard.

**And this work has to start now.**

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## Calender of work (Basic type)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainy Season			Short rain									
Planning	_____											
Land preparation					_____							
Staking						_____						
Pitting						_____						
Refilling						_____						
Water catchment						_____						
Planting											_____	
Slashing, Weeding	_____		(Next year)			_____						_____

## STEP 1. SELECTION OF SPECIES FOR PLANTING

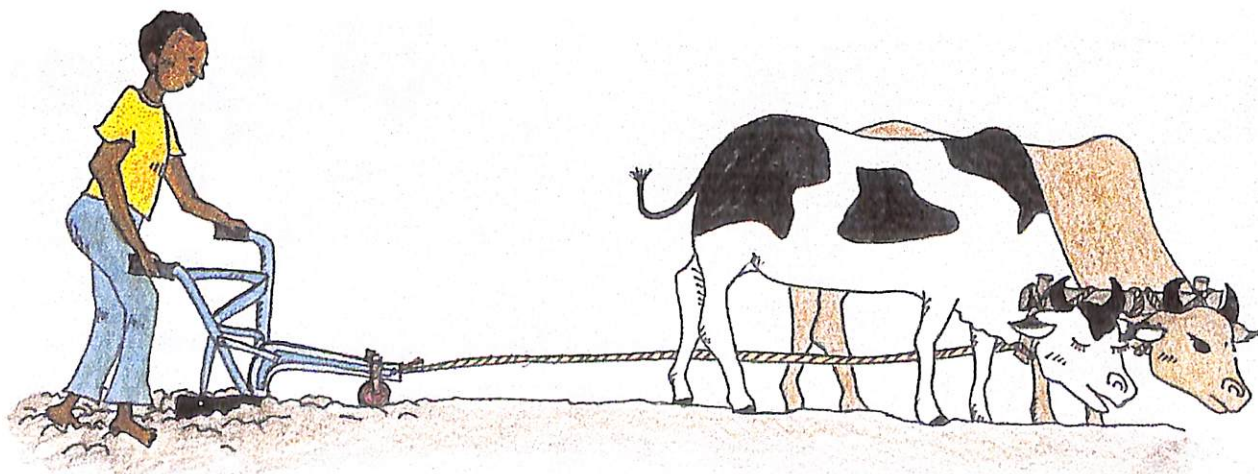
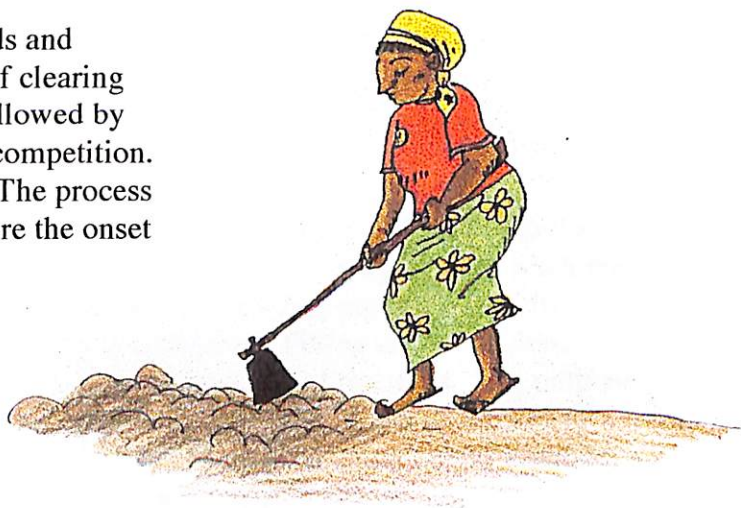
The choice of species for planting should be considered not only with regard to their suitability for growth, but also as to whether they fit, the purpose for which they are planted, e.g. timber, firewood, shade, medicinal, fruit, etc. **(Appendix 1)** At this stage it is also advisable to decide on the number of trees to be planted. It is recommended that one plant few trees that one can take care of than planting many trees which he can not take good care of resulting in low survival

## STEP 2. SITE SELECTION

The site of planting is selected based on the purpose of planting. For example, if shade trees, are desired than compound planting is preferable or if trees are planted for intercropping then planting on farm is preferred, etc. The site must be identified early enough so that tree selection is done carefully. For example, if planting is to be done near buildings then one must avoid trees with large horizontal rooting pattern which may cause cracks on buildings.

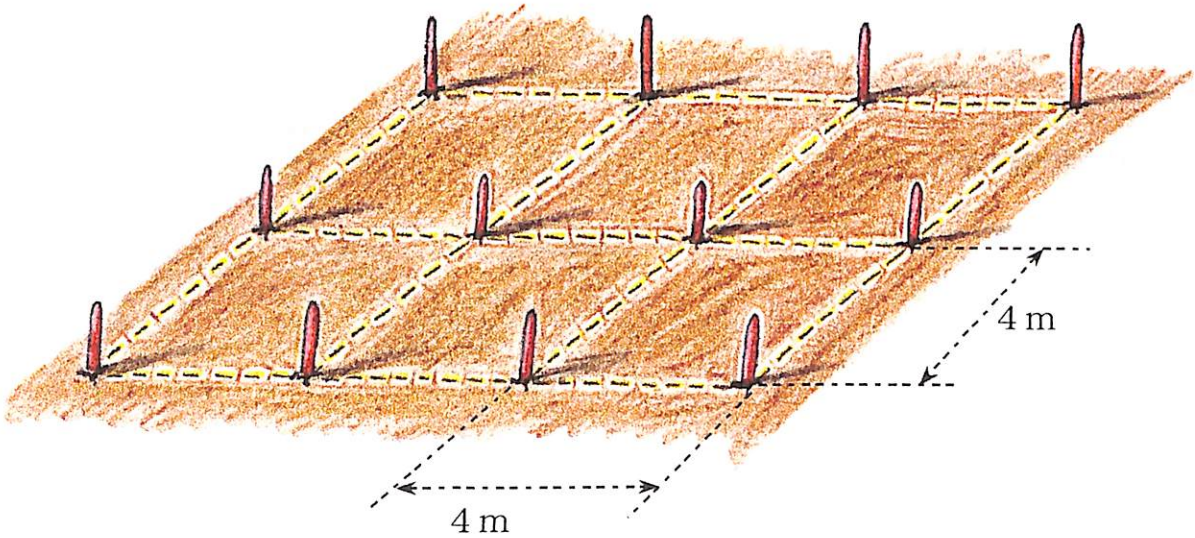
## STEP 3. LAND PREPARATION

Once the area has been determined any weeds and bushes should first be cleared. The manner of clearing depends on the type of vegetation. This is followed by ploughing to loosen the soil and reduce root competition. Oxen ploughing is preferred to hand tillage. The process of land preparation should be done early before the onset of the rains.



## STEP 4. STAKING AND PITTING

Once ploughing is done it is necessary to mark the planting spots using sticks (staking). Staking is done at a spacing of 4x4m. Starting from one end of the farm a row is established using a string. Using a 1m stick mark the first spot and count four spaces and mark the next spot. This is repeated to the end of the row and then move to the next row and do the same.



Once staking is done, pits, in which the plants are to be set, may be dug. Such pits are 45x45cm larger pits are more effective but expensive. Pitting should be done before the on-set of the rains. The purpose of planting holes is to loosen the soil to allow root penetration and to accumulate moisture. **(Appendix 2)**

## STEP 5. REFILLING AND WATER CATCHMENT CONSTRUCTION



Early in the on-set of rains after some moisture build up is attained then it is time to refill the planting holes. When refilling, use only wet top soil around the holes. Do not mix dry branches and grasses which may attract termites. **(Appendix 2)**

Once refilling is done W-shape water catchments are constructed. The catchment are laid perpendicular to the slope direction with earth embarkment on the lower side of the planting holes. Each W-catchment contains two planting pits spaced 4m apart on the lowest narrow end of the catchment. The upper wider side act as a micro-catchment collecting runoff water from the up slope.



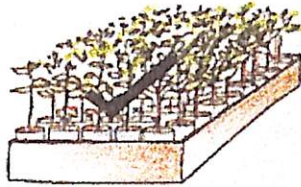
## STEP 6. SEEDLING PREPARATION AND TRANSPORTATION

Seedlings should be arranged and watering done just before transporting them from the nursery to planting site. Watering is done to protect seedlings from drying up during the transportation. Seedlings are delicate and must be handled with care. Avoid piling them up on each other when transporting, use of boxes, crates or bags are recommended, especially, when planting site is far.

Good



Good



Bad



Provisional allocation site: The seedlings should be planted on the spot shortly after arriving at the site. In case they need sometime until planting, the seedlings must be kept in a shade and protected from wind. Water if necessary to keep them moist and vigorous.

## STEP 7. PLANTING

The common planting procedure is as follows:

- (1) Make a hole of the size of the pot by panga, jembe or stick.



- (2) Hold the pot and harden the soil by two hands.
- (3) Remove the pot with razor (if available) carefully.

(4) Plant the seedlings without removing the pot soil and cover it well with wet soil. Do not mix with dry soil grasses.



(5) Push the soil around the seedlings firmly by hands to avoid leaving any space between soil and roots.



(6) Add some more wet soil and step on the soil around the seedlings so as to improve contact.  
(7) Water the seedlings if water is available.





## STEP 8 TENDING

### a) Slashing or Weeding:

Clear or remove grasses, bushes or any weed growing around the seedlings using a jembe, slasher or a panga. Weeding reduce competition for sunlight, moisture and nutrients. Precaution should be taken to avoid damaging the seedlings.

### SLASHING

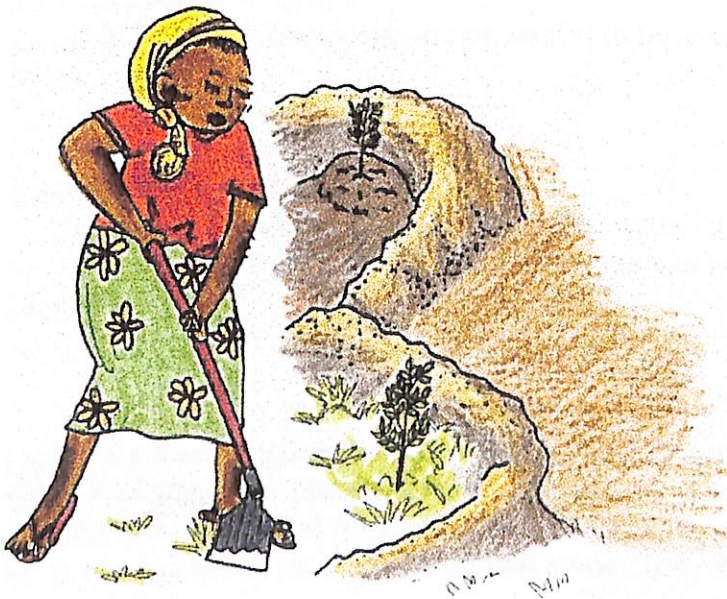
Good



Bad



### WEEDING



## **b) Water harvesting:**

In order to efficiently utilize the rain water, several types of water-catchment are used to harvest the water and make it available for the seedlings.

### **(1) Circular water-catchment (Fig-A1)**

It is applicable for individual seedling planted in flat area. A basin of about 160 cm or more in diameter is created the seedling.

### **(2) V-shaped water-catchment (Fig-B1)**

It is practiced in sloped sites. Individual catchment is open to the upper side of the slope by a Vshaped bank so it collects water downward to the seedling.

### **(3) Shallow trenches water-catchment (Fig-C1)**

It forms v-shaped trenches to collect and conduct the run-off to the planting hole. It needs less labor and time compared with V-shaped water-catchment.

### **(4) Interlinkaged water-catchment**

Individual water-catchments are interlinked in order to confine all the harvested water within the area. Interlinkaged water-catchments are most effective for controlling water run-off and erosion.

### **(4-1) Ground divisions water-catchment (Fig-A3)**

Circular water-catchments can be modified to square ones to form ground divisions water-catchment. In sloped areas, it can be modified to Turukana type and trees are planted in the lowest corners of the squares.

### **(4-2) W-shaped water-catchment (Fig-B3)**

In this design, neighboring V-shaped catchments are connected to form continuous W-shaped water-catchment.

### **(4-3) Networked water-catchment (Fig-C3)**

Trenches catchments can be easily connected to form W-shaped water-catchment or finally networked water-catchment. If the network is well made, rainwater can be controlled and distributed to the seedlings properly.

### **(5) Cultivation**

The cultivated soil permits efficient infiltration of rain water. This is usually carried out manually using jembes, forked jembes, machines or by oxen plough. Cultivation is a very costly operation but it has proved to be the most effective for enhancing early seedling growth and survival. Water-catchment may also be created around individual seedlings.

# Fig - Basic water-catchment designs

## Individual water-catchment

Circular water-catchment

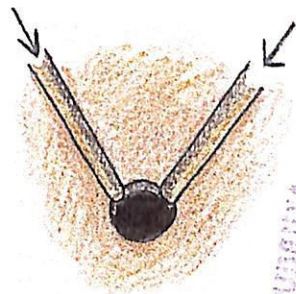
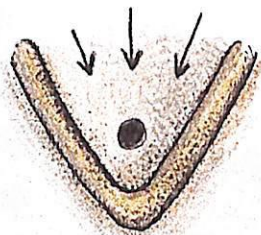
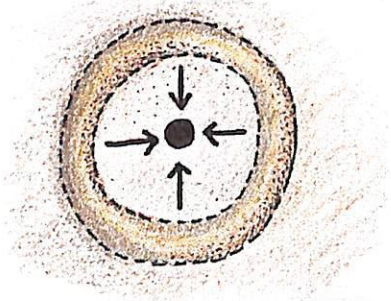
V-shaped water-catchment

Shallow trenches water-catchment

A1

B1

C1



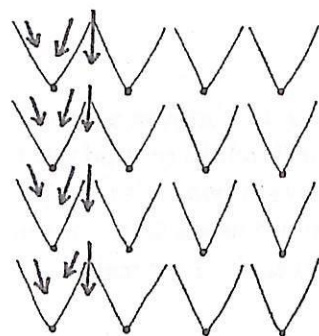
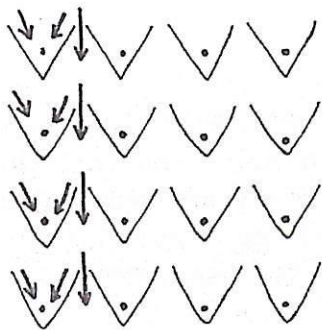
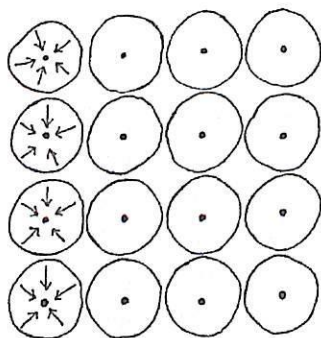
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## Unconnected water-catchment

A2

B2

C2

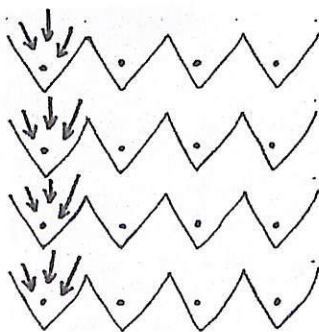
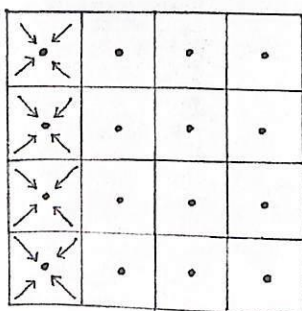


## Connected water-catchment

A3

B3

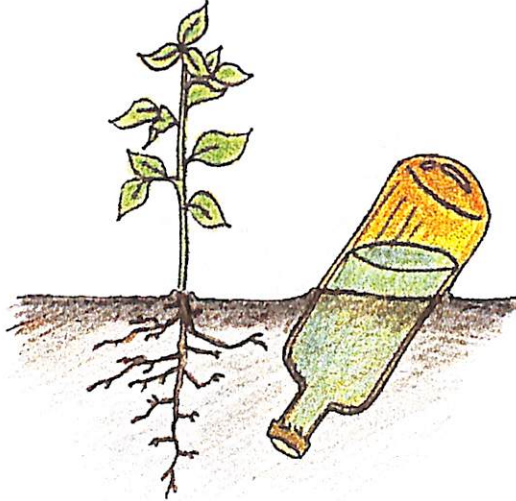
C3



### c) Watering:

This may be necessary after planting, especially, in dry seasons. Some methods to utilize limited quantity of water effectively are:

(1) **Bottle watering:** The bottle should be buried into the soil so that only a quarter of it remains above the surface. Give at least two bottles of water per week.



(2) **Can watering:** Prepare two empty cans of the same diameter. Make several holes in the base of the upper can and make three small holes on the edge of the bottom of the lower can. The top of both cans are removed. Bury the two cans into the soil near the seedlings with the three holes of the bottom nearest to the seedlings. The upper can should be about 5 cm above the ground level. Fill the cans with water and cover with stones to reduce water loss through evaporation.



#### **d) Protection:**

Many animals, insects and diseases attack young seedlings and cause damage. Among them, wild animals, livestock and termites pose the most serious problems.

**(1) Livestock and wild browsers:** To protect seedlings from livestock and wild browsing animals like antelopes, fencing is the most effective. If the number of trees is small, fencing individual trees is easier and economical. In case of large scale plantations, fencing all around the area to keep animals out is recommended. Branches of thorny trees e.g. Acacia species can be used as fencing materials which are readily available in rural areas. Live fencing should be considered where possible because it is longer lasting and pose minimal damage to the environment.



**(2) Termites:** Digging out queens of nearby colonies (termites hills) is said to be easy and effective. However, it is necessary to observe a colony after removing the queens since there are some species that substitute the lost queens with their daughters and recover their activeness.

## Appendix 1 General observations of species characteristics

SPECIES NAME	Drought	Termit	Animals	insect	Growth ②	Hard wood	Firewood	Charcaol	Timber	Fence	Medicine	Fruit, food	Fodder	Bee forage	Ornamental
	Damage ①					Uses ③									
1	A. albida (Facterbia albida	L	L	M	L	H	x	x	x		x		x		
2	A. gerradii	L	L	M	L	H	x	x	x		x		x	x	
3	A. mellifera	L	L	L	L	L	x	x	x		x		x	x	
4	A. nilotica	L	L	M	L	M	x	x	x		x		x	x	
5	A. polyacantha	L	L	L	L	M	x	x	x	x	x		x	x	
6	A. senegal	L	L	L	L	M	x	x	x		x	x	x	x	
7	A. seyal	L	L	L	L	M	x	x	x		x		x	x	
8	A. tortilis	L	L	M	L	M	x	x	x	x	x		x	x	
9	A. crassicarpa	M	L	M	L	H	x	x					x	x	x
10	A. holosericea	M	M	M	M	H		x	x	x			x		x
11	Acrocarpus fraxinifolius	M	M	M	M	M		x	x	x				x	x
12	Adansonia digitata (Baobab	L	L	L	L	L		x			x	x	x	x	
13	Albizia anthelminitica	L	L	L	L	L	x	x	x		x		x	x	
14	Albizia lebbeck	L	M	M	M	M	x	x	x	x			x	x	x
15	Azadirchta indica	L	L	M	L	M	x	x	x	x			x	x	x
16	Balanites aegyptiaca	L	L	M	L	M	x	x	x	x	x	x	x		
17	Berchemia discolor	L	L	L	L	M	x	x	x	x			x	x	x
18	Cassia siamea	L	L	L	L	H	x	x	x	x			x	x	x
19	Cassia spectabilis	L	L	L	L	H		x	x					x	x
20	Casuarina equisetifolia	L	M	M	M	H	x	x	x	x			x		x
21	Cordia ovalis	L	L	M	L	L	x	x	x	x		x	x	x	
22	Croton megalocarpus	L	L	L	L	H	x	x	x	x			x	x	
23	Dalbergia melanoxylon	L	L	M	L	L	x	x	x				x	x	
24	Delonix ragia	M	M	L	L	H	x	x						x	x
25	Dovyalis caffra	M	M	L	L	M	x				x		x	x	
26	Eucalyptus camaldulensis	M	H	M	M	H	x	x	x	x				x	
27	Ficus benjamina	M	M	M	L	M	x	x							x
28	Grevillea robusta	M	H	M	M	H	x	x	x	x				x	
29	Jacaranda mimosifolia	M	M	H	M	H	x	x	x					x	x
30	Leucaena leucocephala	M	H	H	H	H	x	x	x	x				x	x
31	Mangifera indica	L	M	H	M	M	x	x				x	x	x	x
32	Markhamia lutea	M	M	M	L	M	x	x	x	x				x	
33	Melia volkensii	L	L	H	L	M	x	x			x		x	x	
34	Moringa oleifera	M	M	M	M	H					x	x	x	x	x
35	Parkinsonia aculeata	L	M	M	M	H	x	x	x	x	x		x	x	x
36	Prosopis juliflora	L	M	M	L	H	x	x	x		x		x	x	
37	Psidium guajava	M	M	H	M	H	x	x			x	x			
38	Schnus molle	M	M	M	M	H	x	x	x		x			x	x
39	Tamarindus indica	L	L	L	M	L	x	x	x	x			x		
40	Terminalia brownii	L	L	L	L	L	x	x	x	x					
41	Terminalia mentalis	M	M	M	M	M	x								x
42	Terminalia prunioides	M	L	L	L	L	x	x	x	x					

KEY: ① Damaged level

② Growth rate

③ Uses - x

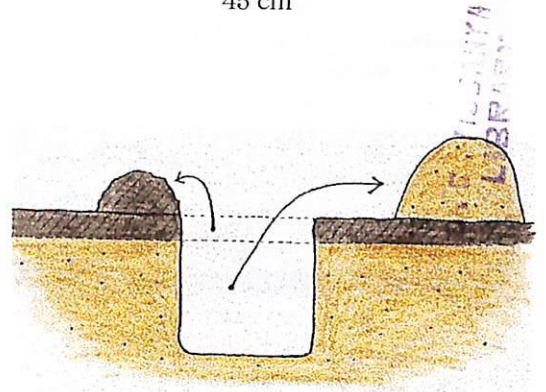
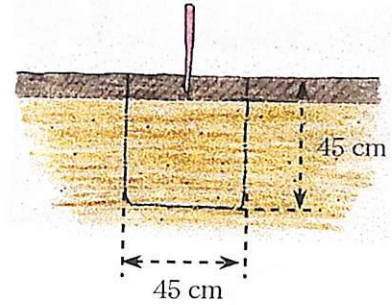
H -High  
M-medium  
L -low

H -High  
M-medium  
L -low

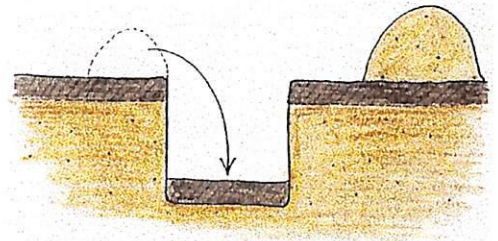
## Appendix 2 Example of an effective holes preparing method

The procedure illustrated below is recommended for use when preparing holes.

Dig a hole of 45cm diameter by 45cm depth always separating top fertile soil from sub soil.

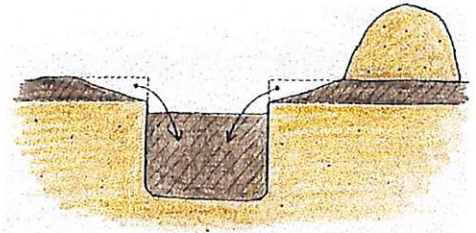


Then refill the hole with dug out top-soil first.

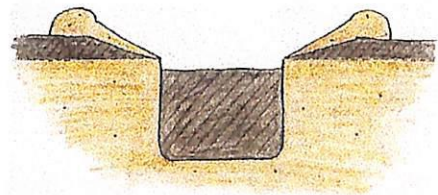


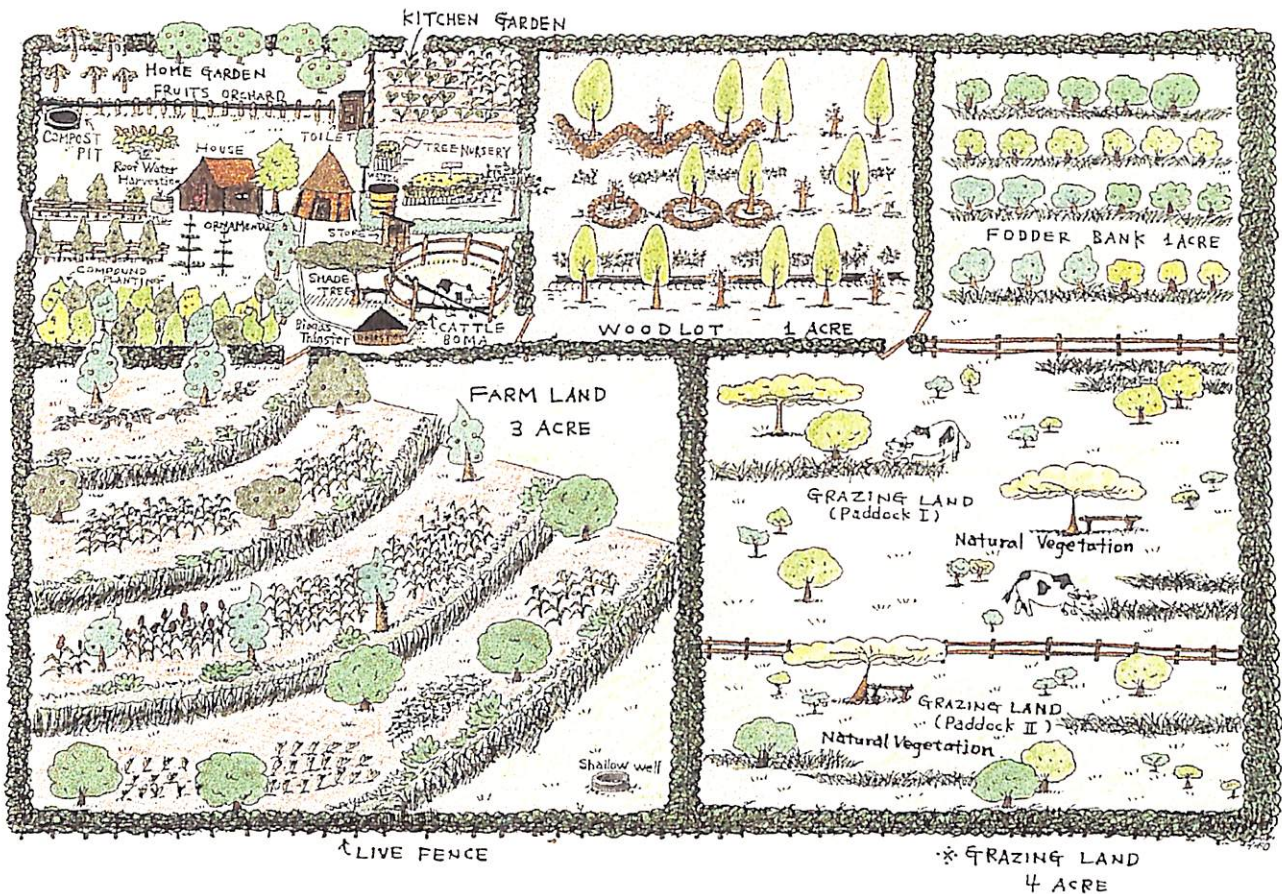
Then cut the top-soil around the hole some slant and use this soil to refill the hole about three quarter way.

This forms the initial kind of a water-catchment.



Construct water-catchment properly.





*Illustrated by Yuko Takeuchi*

**JICA**



**FD**

**SOFEM**

**KENYA/JAPAN**



**KEFRI**

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