

Quick Reference for Application of Key Techniques in CB-NRM Technical Manuals



Prepared by

The Project for Community-Based Sustainable Natural Resource Management in the Democratic Republic of Timor-Leste



From
the People of Japan

FOREWORD

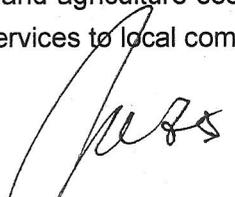
Forest degradation and deforestation is one of the critical issues that the Government of Timor-Leste (GoTL) needs to tackle to achieve sustainable socio-economic development in the country. The study made in 2013 shows that approximately 184,000 ha of forest has disappeared between 2003 and 2012 and around 170,000 ha of dense forest has been degraded into sparse canopy forests for the same period.

Community-Based Natural Resource Management (CB-NRM) is an approach to nature conservation by recognizing the rights of local communities to benefit from sustainable management of natural resources (forests, lands, water, and biodiversity) within a designated area. This is an alternative to a top-down regulatory approach, which has not been necessarily effective in many countries, especially when the regulations do not fully cope with the changes in social, cultural, and economic contexts in the countries.

The Project for Community-Based Sustainable Natural Resource Management (the CB-NRM Project) jointly implemented by the Japan International Cooperation Agency (JICA) and the Ministry of Agriculture and Fisheries (MAF), particularly the National Directorate of Forest and Watershed Management (NDFWM), has developed an operative mechanism for CB-NRM in Timor-Leste. The same project has also issued the following manuals over the course of the project to help MAF expand the same mechanism in major river basins in the country.

- ◆ Operation Manual for Establishment of the CB-NRM Mechanism at the Village Level
- ◆ CB-NRM Technical Manuals
 - Vol. 1: Seedling Production and Tree Planting Promotion
 - Vol. 2: Sustainable Upland Farming Promotion
 - Vol. 3: Income Generating/Livelihood Development
- ◆ Manual for Formation of a Watershed Management Council

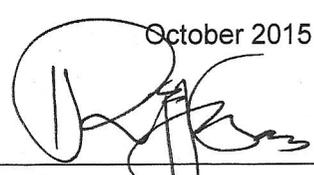
The CB-NRM Technical Manuals introduce key techniques/skills relevant to sustainable land and forest management as well as livelihood development along with the detailed procedures for provision of hands-on training. They are based on learning from experiences in the field; therefore, we, as representatives of the MAF, strongly recommend that the manuals should be widely used by field practitioners of not only MAF but also other organizations working in the forestry and agriculture sectors as a guiding tool for provision of agriculture and forestry extension services to local communities.



Manuel Mendes

National Director of National
Directorate of Forest and Watershed
Management (NDFWM), MAF

October 2015



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About the CB-NRM Manuals

The CB-NRM Manuals have been developed and published by the JICA and MAF Joint Project named the Community-Based Sustainable Natural Resource Management to provide practical and useful tools for planners and practitioners in the forest sector in Timor-Leste to enable them to protect and manage natural resources in a collaborative and sustainable manner. There are three (3) types of manuals as shown below.

- i) Operation Manual for Establishment of the CB-NRM Mechanism at the Village Level
- ii) CB-NRM Technical Manuals
 - Vol. 1: Seedling Production and Tree Planting
 - Vol. 2: Sustainable Upland Farming Promotion
 - Vol. 3: Income Generating/Livelihood Development
- iii) Manual for Formation of the Watershed Management Council

The Operation Manual is the main document which spells out the standard operation procedures for introduction and establishment of the CB-NRM mechanism at the village level. It is designed for use by planners, field practitioners, and researchers working/studying in the forest sector in Timor-Leste, especially those who engage in forest protection, watershed conservation, and community forestry in the National Directorate of Forest and Watershed Management (NDFWM).

The CB-NRM Technical Manuals supplement the Operation Manual by introducing relevant techniques and skills which can help rural communities use and manage natural resources, especially lands and forests, in a productive and sustainable manner. They will be used mainly by field extension workers (such as MAF municipal staff: namely, municipal officers, extension officers, and forest guards) and NGO staff, as technical references for their field works.

The Manual for Formation of the Watershed Management Council introduces the process to develop a collaboration platform/framework for sustainable natural resource management at the sub-municipal or sub-watershed level, which can also lay groundwork for expansion of the CB-NRM mechanism on watershed scale. As one of the key approaches to improvement of environmental governance at the watershed level by enhancing coordination and networking among local stakeholders, this manual can be of help for those who engage in watershed management.

This is a quick reference of the Technical Manuals to help users easily follow the procedures introduce key CB-NR techniques in the field.

It is to be hoped that this quick reference would be used by a wide range of stakeholders, especially those who are engaged in the extension works in the agriculture and forestry sectors, as a practical technical reference together with the CB-NRM Technical Manuals.

***Key Techniques for
Seedling Production
and
Tree Plantation***

Seedling Production and Tree Plantation

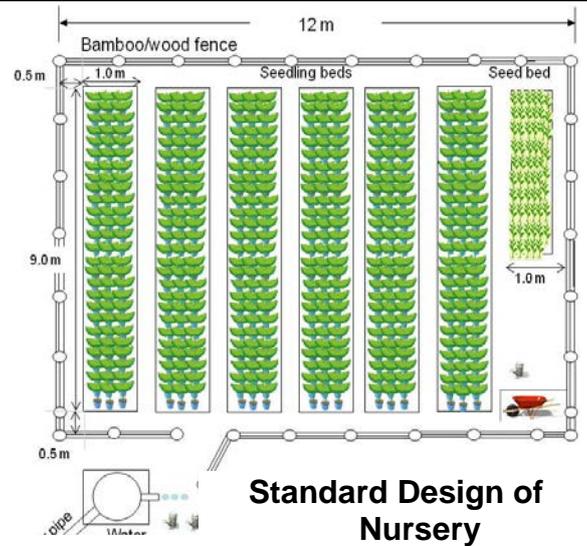
List of Techniques for Seedlings Production and Tree Plantation

Techniques	Application Month	Quick Reference No.
 <p>Nursery Establishment</p>	<p>March</p>	<p>1-1</p>
 <p>Seed Preparation and Sowing</p>	<p>March - September, May-June</p>	<p>1-2</p>
 <p>Preparation of Seedling Pot</p>	<p>May - June</p>	<p>1-3</p>
 <p>Maintenance of Seedlings and Hardening-off</p>	<p>May - October</p>	<p>1-4</p>
 <p>Compost Making and Maintenance</p>	<p>May - October</p>	<p>2-1</p>
 <p>Delineation of Contour Lines</p>	<p>September-October</p>	<p>2-2</p>
 <p>Plantation Layout</p>	<p>September-October</p>	<p>1-5</p>
 <p>Planting</p>	<p>November-December</p>	<p>1-5</p>
 <p>Tending</p>	<p>January, April-May</p>	<p>1-5</p>

1-1. Nursery Establishment

(1) Design a nursery layout

- Select tree species considering trees' suitability for site conditions and community's interest.
- Determine the target number of seedlings to be produced considering potential mortality (about 20%) and community's capacity.
- Design layout of a nursery with facilities (i.e., a water tank, seed/seedling beds, and side paths) based on the following conditions:
 - 100 seedling pots require 1 m²,
 - 50 cm-wide side path is to be placed between seedling beds, and
 - a 1-m-wide per seed bed is to be developed in a nursery.The standard design for about 5,000 seedlings is shown above.



(2) Select a site

- Select a site for the nursery considering the accessibility to a water source and members' houses, and ground conditions of the site.
- Consult with owners of the land and water source about its use.

(3) Install a water system

- Connect a water source to the nursery with bamboo pipes/ hoses.
- Place a 200 liter drum can for watering.

(4) Develop a nursery

- Clear and level the ground.
- Collect local materials such as bamboo and wood, nalo grasses/palm leaves, nails and wires.
- Put fences around the nursery and thatch its roof with nalo grasses/palm leaves.



- ▶ Roof thickness should be adjusted according to insulation intensity of the site.
- ▶ Make wind breaks made of grasses/leaves if the site for the nursery is windy.

1-2. Seed Preparation and Sowing Seed

(1) Collect seeds

- Select healthy and large mother trees which have a well-developed crown or bear quality fruits for timber and fruits species, respectively.
- Collect seeds from mother trees in the harvesting season.

Harvesting Period of Seeds

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sandalwood	-	-	X	X	-	-	-	-	X	X	-	-
Clove	-	-	X	X	-	-	-	-	-	-	-	-
Citrus	-	-	-	-	X	X	X	-	-	-	-	-
Rambutan	-	-	X	X	X	-	-	-	-	-	-	-
Longan	-	-	-	-	-	-	X	X	X	-	-	-
Teak	-	-	-	-	-	-	X	X	-	-	-	-
Mahogany	-	-	-	-	-	-	X	X	-	-	-	-

Note. X: Harvesting period

- ▶ In case of no mother tree, procure seeds from reliable sources in the country.

(2) Pre-treat seeds

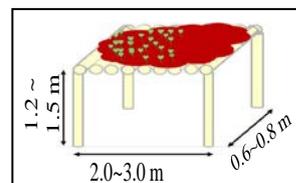
- Pre-treat seeds of the respective species in accordance with the following methods to obtain high germination rate.

Methods of Pre-treatment of Seeds

Species	Methods of pre-treatment of seeds
Sandalwood	1) Soak seeds in cool water from 12 to 24 hours
Clove	1) Remove skin of seeds 2) Soak into water for 1-2 hours
Citrus	1) Mix seeds with ash
Rambutan	Not necessary
Longan	ditto
Teak	1) Put seeds in a rice sack and soak the sack in the cool water for 72 hours. 2) After taking the sack from water, spread seeds in a black-colored container. 3) Expose seeds to sunlight for at least 2 days to dry them.
Mahogany	1) Dry seeds for 48 hours

(3) Make a seedbed

- Make a 1.2~1.5 m-high seedbed frame.
- Fill with soil mixture (top soils: sands: compost = 2:1:1) in the seedbed.



(4) Sow and maintain seeds

- Pour water on the seedbed one day before sowing.
- Sow seeds in the seedbed and cover it with dried grasses after sowing to maintain moisture and temperature.
- Water the seedbed twice a day carefully not to dislodge seeds sown.
- Periodically check the germination of seeds sown in the seedbed.

- ▶ A shallow bucket with a soft cloth could be used as a seedbed for germination of sandalwood seed in case the number of the seedlings is limited.
- ▶ For germination of teak seeds, the seedbed should be covered with a black plastic sheet for 48 hours without watering.

1-3. Preparation of Seedling Pot

(1) Collect soils and other materials

- Collect top/black soils in dense forests or coffee plantations, sub-soils near the nursery, and sands in rivers.
- Procure compost and soil amendments (e.g., rice husk and sown wood dust).

(2) Mix soils with other materials

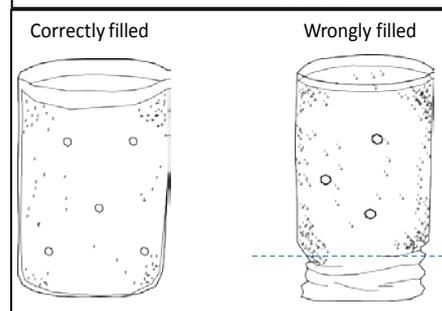
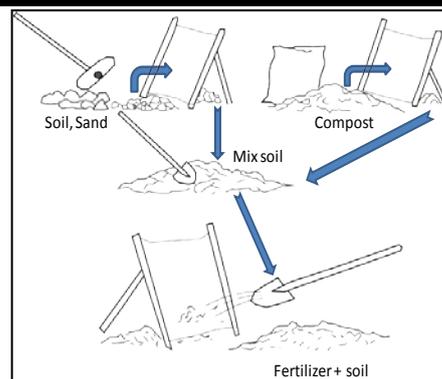
- Sieve soils, sands, and compost using a 5 mm mesh sand strainer.
- Mix top soils, sands, and compost at ratio of 3:1:2 for timber/fruit trees and 1:2:1 for sandalwood.

(3) Fill soil mixture into poly bags

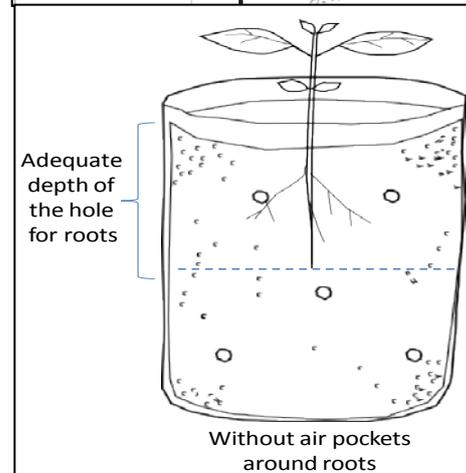
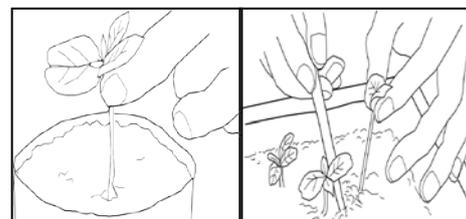
- Fill soil mixture to 1/3 height of a poly bag and shake to fill the mixture evenly.
- Fill up the poly bag with the mixture.
- Repeat b. to prepare the number of pots.
- Place the poly bags in the seedling bed and group 100 of them as one block.

(4) Transplant sprouts into pots

- Water seedling pots one day before transplanting.
- Collect host plants (*Alternanthera ficoidea*) for planting of sandalwood sprouts.
- Take sprouts from the seedbed holding the lowest leaf junction and soak them in a shallow bowl of water.
- Make a small hole in a pot with a stick.
- Put one sprout in one hole without bending its roots.
- Cover and pat the base of the sprout gently not to leave air pockets around its roots.
- Repeat d. to f. until all sprouts are planted.
- Water the seedling pots, place them in a dark area for a few days and relocate them in a partially shaded area when new leaves sprout.
- Put a label with seedlings' information at each block.



Host plant of sandalwood



► Transplanting shall be carried out in a shaded area and completed within 15 minutes after pricking.

1-4. Maintenance of Seedlings and Hardening-off

(1) Water seedlings

- a. Water seedling pots gently with a watering can until water penetrates to the bottom of the pots in the early morning or late afternoon.

(2) Weed and relocate seedling pots to keep sufficient space

- a. Hand-pick weeds on seedling pots regularly.
- b. Keep sufficient space between seedling pots.

(3) Apply liquid fertilizer and cut roots of seedlings

- a. Apply liquid fertilizer when observing nutritional disorder. The method to make liquid fertilizer is shown in Vol. 2 of Technical Manual.
- b. Cut the roots out from the pots.

(4) Control pests and diseases

Symptom	Cause	Measures
Rolling up &  discolor	Citrus leaf miner 	<u>Application</u> Spray tobacco leaves water to underside of leaves once a week for 2-3weeks. <u>Preparation</u> Mix 2 leaves of tobacco (or 8 sticks of dried leaves of cigarette) with 1 liter of water and dilute to 50% for application. <u>Species subject to be affected:</u> Orange
Spots 	 Spider	<u>Application</u> Spray vinegar water or brewed coffee from underside of leaves. <u>Preparation</u> Dilute vinegar at the rate of vinegar : water = 1: 20 <u>Species subject to be affected:</u> Teak
Holes 	Grasshopper/ Leaf roller 	<u>Application</u> Spray decoction of green banana skin to the insects. <u>Preparation</u> Boil 1 liter water and add one handful of green banana skin. Brew it for 30 minutes. Remove the banana skin by filter. <u>Species subject to be affected:</u> Mahogany, Orange
White mildew 	Fungus No image	<u>Application</u> Apply plant ash or splay diluted vinegar with 20-30 times of water. <u>Species subject to be affected:</u> Orange

▶ When finding a symptom of pests/diseases on seedlings, immediately isolate the affected ones from others to prevent spreading of pests and diseases.

(5) Harden off seedlings

- a. Reduce the frequency of watering a few weeks before planting so that the seedlings can be adapted to the external environment.
- b. Stop applying liquid fertilizer a few weeks before planting.
- c. Stop cutting roots one month before planting.
- d. Remove thatch of the nursery to expose seedlings to sunlight one month before planting.

1-5. Planting and Tending

(1) Design a plantation

a. Design a layout of a plantation according to the following guidelines.

Objective	Fruit/industrial plant production	Timber production
Target site	Home garden/ backyard farms	Shifting cultivation area
Tree species	Fruit trees, Leguminous trees, Sandalwood	Timber species (e.g., Teak and Mahogany)
Planting interval	Fruit trees: 4-7 m, Perennial crops: 1-2 m, Leguminous trees: 3-4 m	Timber trees: 3 m
Image of Plantation	<p>The diagram shows a layout for a home garden or backyard farm. It features several 'Shade tree's, a 'Coconut' tree, and 'Banana' plants. There are also 'Newly planted banana's and 'Newly planted tree's (Fast growing leguminous trees). A small house is also depicted.</p>	<p>The diagram shows a timber plantation layout on a slope. It features a grid of trees with dimensions: 3m between rows, 1.5m between trees in a row, and 2.6m between trees in a row. A contour line is delineated using an 'A-frame'. The trees are labeled as Teak (star symbol) and Mahogany (plus symbol).</p>

(2) Dig planting pits

- Dig as many pits as the number of seedlings are planted in a plot. The pit should be 40 cm in depth and 40-60 cm in diameter.
- Put top soils separately from sub soils beside the hole.

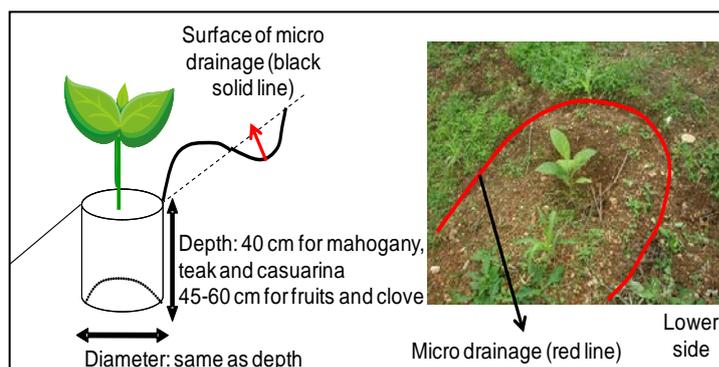
- ▶ *Pitting shall be completed a few weeks before planting.*
- ▶ *Digging sufficient size of pits is requisite for high survival of seedlings.*

(2) Refill planting pits with soils and compost

- Refill the pits with sub-soils mixed with compost, and cover them with top soils.

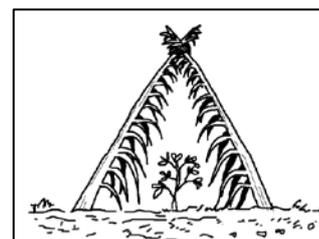
(4) Plant seedlings

- Select seedlings higher than 20-25 cm and transport to the plot.
- Dig a hole as large as the seedling pot in each pit.
- Remove plastic pots and plant seedlings in the holes.
- Make a U-shaped micro drainage area in the upper slope of each seedling.



(5) Maintain seedlings for a few years after planting

- Weed grasses within 50 cm radius from seedlings every two months during the rainy season.
- Cover the bases of seedling with weeded grasses.
- Cover seedlings with shades made of local materials (e.g., coconut leaves), if necessary.



***Key Techniques for
Sustainable Upland Farming***

List of Techniques for Sustainable Upland Farming

Techniques	Application Month	Quick Reference No.
 <p>Compost Making and Maintenance</p>	May - August	2-1
 <p>Delineation of Contour Lines</p>	July - August	2-2
 <p>Application of Contour Composting Terrace</p>	August and November	2-3
 <p>Cultivation with Compost Application</p>	August - October	2-4
 <p>Selection of Seeds/ Planting Materials</p>	October	Refer to full version of the manual
 <p>Making and Application of Liquid Fertilizer</p>	November - February	2-5
 <p>Weeding and Mulching</p>	December - February	Refer to full version of the manual
 <p>Post-harvesting and Storage of Seeds</p>	April - May	Refer to full version of the manual

2-1. Compost Making

(1) Select the location for a compost pit and digging of a hole

- Decide the location of a compost pit, which should be close to a source of water and a farm to which compost is applied.
- Dig a pit, which should be 2 m long, 1.5 m wide, and 1 m deep for 3 tons of compost.
- Make another pit next to the 1st one, if possible.



- ▶ *The volume of compost should be determined according to the size of farm. **At least 2~4 tons of compost is needed for 1 ha of farm.***
- ▶ *The 2nd pit should be as large as the 1st one.*

(2) Collect and prepare materials

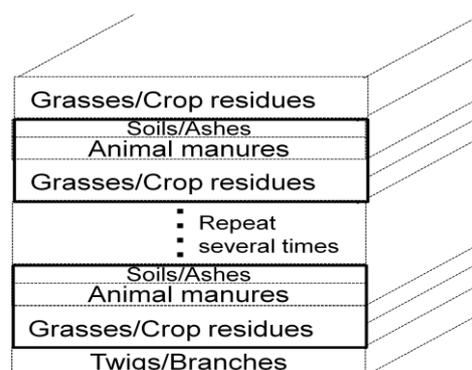
- Collect the following materials.
 - ◆ Vegetative materials (e.g., grasses/weeds, stalks of maize/banana, leaves of caliandra/ sesbania/gamal, and coffee husk)
 - ◆ Animal manure (e.g., cow dung, goat dung, and chicken dropping)
 - ◆ Top/black soils and ashes
 - ◆ EM (if possible) or tua mutin/papaya flesh
- Chop the vegetative materials into small pieces at the site.



- ◆ *The mixture ratio of vegetative materials to animal manure should be 2:1.*
- ◆ *You should use EM or tua mutin/papaya flesh to facilitate the process of fermentation and produce quality compost.*

3) Pile materials

- Stratify the materials at a height of 5~10 cm each.



Sustainable Upland Farming

- b. First put a layer of maize and banana stalks or other stuff rather difficult to decompose, and then put a layer of grasses/weeds and that of animal manure.
- c. Cover the layer of animal manure with soils and ashes, and pour a lot of water after putting the layer of soils and ashes.
- d. Repeat b and c alternately until they fills up the pit.
- e. In the course of layering, put a hollowed-out bamboo pole with holes at the center of the pit for ventilation.
- f. Pour again a lot of water on the top of the pile.
- g. Cover the surface with banana leaves or plastic cover.
- h. Put thatch over the pit to protect compost from direct exposure to sunlight.

(4) Maintain compost

- a. As compost will become very hot during its fermentation process, leave it for 3~4 weeks. But add water to the compost regularly to maintain its moisture contents.
- b. When it cools down, (i) move compost to another pit turning the inside out and the upside down (if two pits are made) or (ii) take out compost, mix it well, and refill the pit with it. (if only one pit is made).
- c. Pour a lot of water while filling the pit with compost
- d. As compost will gain heat, leave it again for about 3~4 weeks.
- e. When the temperature of compost gets cool, do activities b to d again.

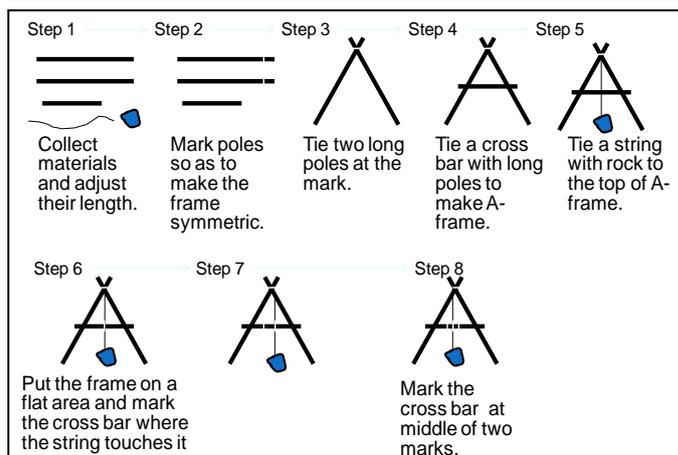


- ▶ *Compost should be mixed well when being moved or refilled in order to decompose all materials of compost evenly.*
- ▶ *You should start producing compost in May/June so that you can collect fresh grasses and weeds in the localities.*
- ▶ *You should maintain the moisture content of compost to facilitate the process of decomposition.*

2-2. Delineation of Contour Lines¹

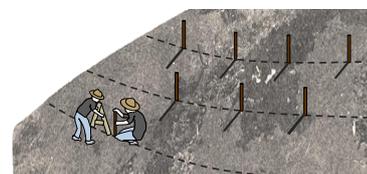
(1) Collect the following materials and make A-frames²

- ◆ Long wood/bamboo: 2 pcs. x 2 m and 1 pc x 1 m
- ◆ Fist-sized rock: 1 pc.
- ◆ String/thin rope: 2 m
- ◆ Nails/wires/binding strings
- ◆ Tools: hammer/machete/ knife
- ◆ Make A-frames as shown right.



(2) Process to Delineate contour lines using A-frame

- a. Stick the first stake at the edge of the farmland and put the left leg of an A-frame at the first stake.
- b. Adjust the right leg to make the string pass through the midpoint of the crossbar and stick another stake at the right leg.
- c. Move the A-frame to the right by placing the left leg at the stake where the right leg previously was put.
- d. Adjust the left leg again until the string passes through the midpoint, and again stick a stake at the right leg.
- e. Follow the process up to the edge of the farm.
- f. Take another point 1 m downwards in a vertical direction using a 1 m long stick. Do the activities from a. to e.
- g. Repeat the activities from a. to f. until all the contour lines are delineated.



- ▶ You should take out all grasses in a farm before using an A-frame, or you cannot delineate contour lines correctly.
- ▶ You should use a 1 meter-long stick to measure distance between contour lines.

The contour line is not correctly delineated as the lines were taken without clearing the areas.

¹ A contour line is a line that is the same level all the way across a slope.

² An A-frame is a tool used to mark places of the same level on a hillside

2-3. Application of Contour Composting Terraces

After delineating contour lines, contour compost terraces should be introduced over the entire farm.

(1) Make canals and put grasses

- Dig a canal about 50 cm wide and 30 cm deep along each contour line.
- Make a bund on the downward edge of each canal using the excavated soils.
- Dig diversion canals on the edges of a farm to drain excess water.
- Put grasses/weeds in the canals.

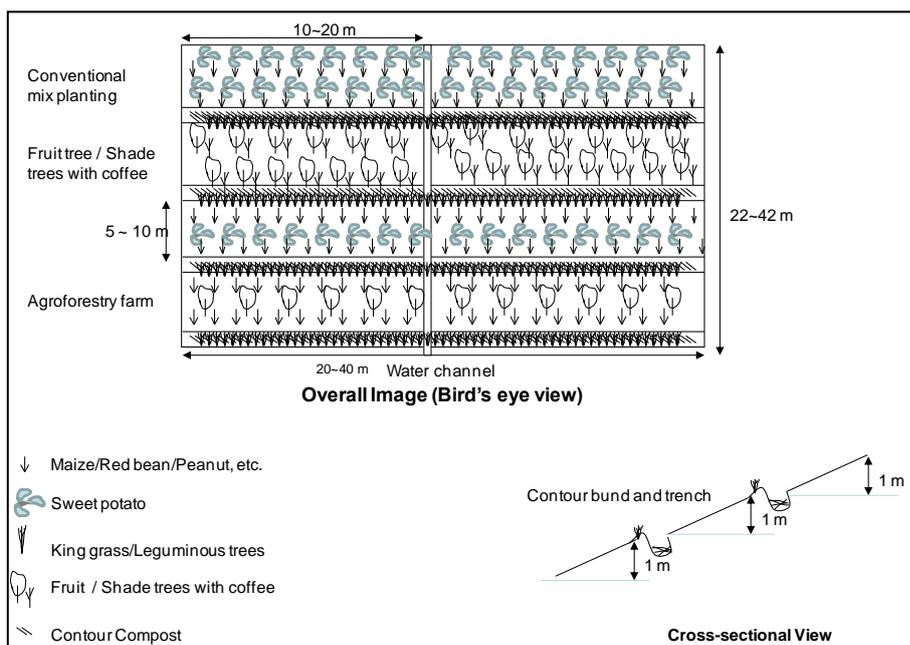
(2) Plant grasses/leguminous trees as hedgerow

- Plant king grasses on contour bunds as hedgerows and leguminous trees (gamal/caliandra) in front of the bunds to strengthen the stability of contour bunds.

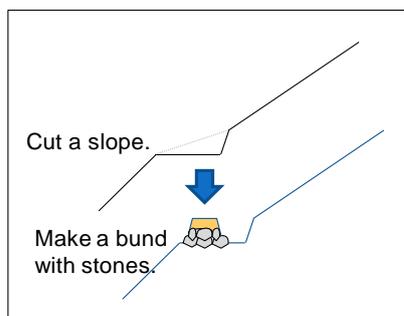


The standard design of a farm with contour compost terraces is shown right.

- ▶ *In case the contour bunds are fragile, you should apply wattles to protect bunds.*
- ▶ *In case a farm is stony, you should use stones as bases of the bunds.*



Wattles should be applied when soils are too fragile to make bunds.



Stones should be used as bases of

2-4. Cultivation, Application of Compost, and Planting

(1) Cultivate a farm

- Clear/Cut grasses in the plot in August.
- Plow the plot with a hoe and incorporate remnants of weeds into soils in September/October.

(2) Apply compost to a farm

Line application

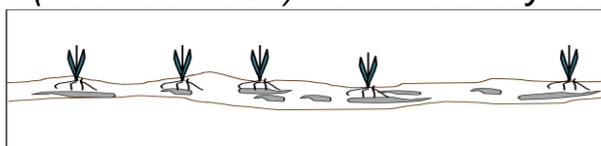
- Dig thin furrows (10 cm wide and 20 cm deep) along the lines where maize and other crops are sown.
- Put compost evenly in the furrows (50 kg or 2 sacks of compost is recommended for a 50 m-long furrow.)
- Cover compost with surface soils.

Hole application

- Dig small holes (10~20 cm in diameter and 20 cm in depth) where corn seeds are sown.
- Put 100~200 g of compost in each hole.
- Cover compost with surface soils.



- ▶ Compost should be applied at least 2 weeks before planting to ensure its effectiveness.
- ▶ Compost should be incorporated into soils (under the surface) so that root systems of crops (such as maize) can effectively absorb nutrient.



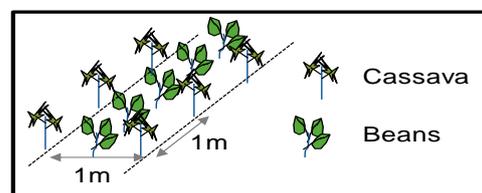
(3) Sow seeds/Plant

Crops should be planted in a semi-intensive manner as follows.

Combination	Spacing
1. Maize & Beans	Maize: 1.0 m x 0.5 m Beans (red bean): 1.0 m x 0.3 m
2. Cassava & Beans	Cassava: 1.0 m x 1.0 m Red beans (climbing type): 1.0 m x 0.3 m
3. Peanut	0.3 m x 0.3 m
4. Maize & Sweet potato	Maize: 1.0 m x 0.5 m Sweet potato/pumpkin: 1.0 m x 0.5 m
5. Cassava & Pumpkin	Cassava: 1.0 m x 1.0 m Pumpkin: 1.0 m x 0.5 m



Maize Bean Maize



2-5. Making and Application of Liquid Fertilizer

(1) Collect and prepare materials

- Procure a large-sized container, such as a plastic bucket or drum can, and clean it.
- Collect ingredients of fertilizer: 5-10 kg of cow dung/other animal manure, 30-40 kg of grasses and leaves of leguminous trees, tua mutin/tempe/EM, and 200 liters of water.



- ▶ Use fresh manure since it has more nutrients.
- ▶ If possible, mix different types of manure. Chicken droppings are more nutritious.
- ▶ Put one (1) shovel of ashes to add minerals to liquid fertilizer.

(2) Make liquid fertilizer by mixing materials

- Put a rice sack filled with animal manure into the container.
- Put chopped crop residues/grasses and leaves and tua mutin/tempe/EM into the container.
- Pour water until the container is filled.
- Cover the container to protect its contents from contamination/dilution.
- Stir the contents with a stick for 5~10 minutes every day for 2~3 weeks.
- The contents can be used 2~3 weeks later.



(3) Apply liquid fertilizer with weeding and mulching

- Weed grasses in a farm 3 weeks after planting of maize (1st weeding).
- Scoop up clear surface water in the container and dilute it with 20 times amount of water.
- Apply the diluted water to maize after the 1st weeding.
- Cover the soil surface around crops with weeded grasses (mulchig).
- Repeat items a. to d. 1 month after the 1st weeding (2nd weeding) and another 1 month after the 2nd weeding.



- ▶ Mulching is effective in controlling weeds and maintaining moisture contents in soils.
- ▶ Use the leaves of leguminous trees for mulching if available.

***Key Techniques for
Income Generation/
Livelihood Development***

**List of Techniques for
Income Generation/ Livelihood Development (IG/LD)**

Techniques	Application Month	Quick Reference No.
 <p>Identification of Potential IG/LD Activities</p>	<p align="center">April</p>	<p align="center">3-1</p>
 <p>Drying Method: Herbal Tea Production</p>	<p align="center">May - June</p>	<p align="center">3-2</p>
 <p>Drying Method: Dried Sweet Potato Production</p>	<p align="center">July</p>	<p align="center">Refer to full version of the manual</p>
 <p>Soaking Method: Salted Vegetables Production</p>	<p align="center">May and August</p>	<p align="center">3-3</p>
 <p>Soaking Method: Pickled Vegetables Production</p>	<p align="center">June</p>	<p align="center">Refer to full version of the manual</p>
 <p>Frying Method: Cassava Chips Production</p>	<p align="center">October</p>	<p align="center">3-4</p>
 <p>Home Manufacturing Option: Sewing</p>	<p align="center">December - February</p>	<p align="center">3-5</p>
 <p>Management of IG/LD Activities</p>	<p align="center">April - May</p>	<p align="center">3-6</p>

3-1. Identification of Potential IG/LD Activities

Prior to hands-on training, potential IG/LD activities shall be identified and selected through a resource inventory.

(1) Assess potential resources

- a. Conduct “resource mapping” and “transect walking” to assess land use and major resources in a village in a participatory manner.
- b. Conduct “seasonal calendar” to confirm the seasonality of major products in a village.



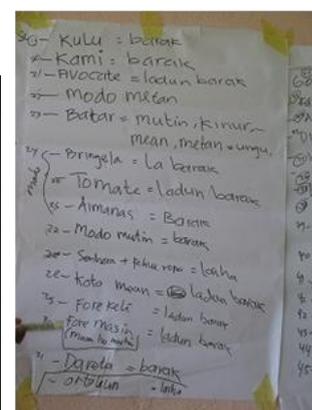
Production Schedule		Month											
Name of Crop	Time	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Cassava (Ai farina)	Sowing												
	Harvesting												
Cassavachips	Production												
	Sales												

- c. Discuss possible uses of the identified resources for production.
- d. Assess the volume of the resources available.
- e. Identify the potential IG/LD activities.

(2) Select the potential IG/LD options

- a. Make a list of resources with potential IG/LD activities (processed products).
- b. Evaluate potential IG/LD activities in terms of the following evaluation criteria.

Criteria	Point of discussions
Applicability	Possibility of applying techniques used for potential IG/LD options.
Impact	Estimated number of household who can benefit from the
Sustainability	Volume of and accessibility to resources used for production
Marketability	Possibility of marketing of processed products
Affordability	Estimated costs of start-up and operations of potential IG/LD options.



- c. Prioritize potential IG/LD activities based on the results of evaluation and select 3~5 priority ones.



3-2. Drying method: Herbal Tea Production

(1) Collect healthy leaves

- Collect healthy leaves from medicinal/herbal plants.
- Remove dirty, insect-eaten, diseased and oddly-shaped parts of leaves.

▶ *Leaves shall not be collected in unhygienic areas, such as kitchen, toilet and animal pen to prevent bacterium contamination.*

(2) Clean and sort out collected leaves

- Wash leaves well and remove foreign matters (e.g., mud, sand, worms, and insect eggs).
- Remove dirty or bad shaped ones.
- Wipe up water well from leaves.
- Cut leaves to uniform their size.

(3) Dry leaves

- Spread leaves on a mesh tray evenly.
- Cover the tray with a black cloth to protect leaves from direct exposure to sunshine. Put the tray under a roof during nights and rainy time.
- Dry leaves for 1 week until they can easily crached when grabbed.

(4) Sort out and pack them

- Put dried leaves on a white paper and check their color, and dryness to select those that meet the quality standard.
- Pack the qualified leaves into packages.
- Label the packages of product.
- Store them in a clean stocker with dry silica gel.



Standard quality

- ▶ *Do not make herbal tea when you are sick to prevent contamination.*
- ▶ *Moisture content in dried leaves should be less than 10%.*
- ▶ *At least 4-times training are needed to transfer the techniques/skills.*

3-3. Soaking Method: Salted Vegetable Production

1) Wash and dry vegetables

- a. Select fresh leafy vegetables.
- b. Cut off their roots and dirty parts and wash vegetables well.
- c. Dry vegetables for 0.5~1 day.



(2) Salt and pickle vegetables

- a. Place the semi-dried vegetables in a poly-bag in a bucket.
- b. Put salt between vegetable leaves and pour water.
- c. Close up the poly bag and press by foot until it becomes less flexible.
- d. Open the poly bag and add a pinch of chili and one spoonful of turmeric powder.
- e. Close up the poly bag loosely and place weight stones on the bag with an insect net cover.
- f. Put the container in a cool and dark place for a few months.
- g. Check the condition once a week and remove excessive water when necessary.



(3) Packing and labeling for marketing

- a. Pack the measured 200 gram of vegetables into poly bags.
- b. Label the packages of product.
- c. Keep them in a cool and dark place until they are marketed.



- ▶ *Cover a bucket with an insect net to prevent the infestation of maggot.*
- ▶ *Any leafy vegetables can be used for salted vegetables.*
- ▶ *Apply much salt if the shelf life of the products needs to be prolonged.*

3-4. Frying Method: Cassava Chips Production

(1) Wash, peel, and slice cassava

- Wash and peel cassava, and remove its dirty parts.
- Wash peeled cassava well.
- Slice them into 1 mm with a slicer.
- Remove thick and deformed slices.

(2) Pre-treat, wash and dry the slices

- Soak the slices (3 kg) into water (5 lit.) mixed with salt (1 spoon) and lime (1/2 spoon) for 10 minutes.
- Wash the slices 5 times and put them on a drainer.
- Spread the slices on a big mesh tray and dry them in the sun for 10 minutes.

(3) Make seasonings and toppings

<Lime and chili flavor seasonings >

- Remove seeds of dried chili and cut into small pieces.
- Pound dried lime leaves and mix with the sliced chili and salt.

<Garlic with pepper flavor seasonings>

- Ground pepper and salt in a stone grinder.
- Fry sliced garlic at 170-185°C until they turns golden.

(4) Fry and season chips

- Fry the slices in 2 lit of oil at 170-185°C until they turns golden.
- Drain off oils and spread them on a kitchen paper to cool them down.
- Sprinkle seasoning powder with a tea strainer before chips get cold.
- Add topping on the seasoned chips.

(5) Pack chips and label the packages

- Measure chips and pack before they get wet.
- Label the package of products.

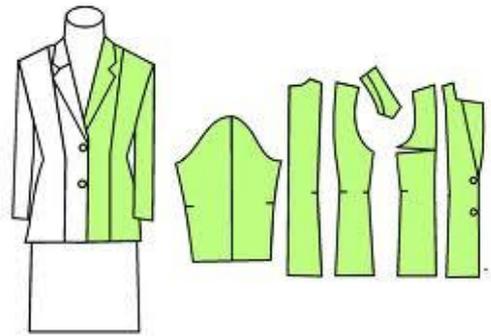


3-5. Home Manufacturing Options: Sewing Clothes

Mending and making of clothes by using a sewing machine is another option for women to earn cash income without depending on natural resources.

(1) Make a pattern of clothes and cut a cloth

- Make a pattern of clothes.
- Trace the pattern on a cloth with a chalk.
- Cut the cloth along with the drawn lines with a scissors and make parts of clothes. (Leave some seam allowance when cutting the cloth.)
- Attach the parts to each other with marking pins.



(2) Baste and fit the clothes

- Baste the parts roughly.
- Fit/Adjust the basted clothes to/with a person who put it.

(3) Sew a clothes

- Sew the parts together.
- Remove basting thread and needles.
- Press the clothes with an iron.
- Remove waste threads and clear cotton dust from the sewing machine, and oil its moving parts.



- ▶ At least 2 sets of training shall be held to enable women to acquire sewing skills.
- ▶ Check the condition of a sewing machine and also check if any needles are left after use of the machine.



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