

**COCOA NURSERY ESTABLISHMENT USING
FARMER FIELD SCHOOL APPROACH**

TRAINING MODULE

BY: PAUL L.S.NABIEU

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COCOA NURSERY ESTABLISHMENT

CONTENT AREA: COCOA NURSERY

INTRODUCTION

Cocoa (*Theobroma cocoa*) is one of the most essential cash crops grown in Liberia and is an important foreign exchange product earner. In Liberia, cocoa is produced in many parts of the country. The production belt span from Lofa County, Bong County, to Grand Gedeh counties.

With the present level of management, low inputs of labor and planting materials of unproven yield potential, yields of cocoa are low. The low yields could be increased significantly through the growing of improved varieties and good husbandry practices of which establishing high quality nursery is one.

To ensure high yields in cocoa farming, we must plant healthy seedlings, of the right age, at the right time, in the right place and free of pest, disease, nutrient or other defects. This manual will show the basic techniques and practices that will help students, farmers and nursery establishers/operators to achieve success in the production of healthy cocoa plants. It will also demonstrate common problems and how to deal with them or avoid them. To produce healthy and high quality seedlings, quality control measure needs to be enforced from the start to the end.

Target Audience:

This manual is targeted at undergraduate students, farmer-facilitators and extension officers and nursery establishers/operators.

Program Objectives

At the end of this presentation, participants will be able to:

1. Describe the techniques and practices that will help farmers and nursery operators to achieve success in the production of healthy cocoa seedlings.
2. Identify common nursery problems and how to deal with them or avoid them.

Day 1 Overview

Daily Lessons

- ✚ Lesson 1. Site Selection. An important practice in nursery operation. It enhances quality seed production.
- ✚ Lesson 2. Site Preparation and size. Timely and proper site preparation is necessary for the production of quality seedlings in the nursery. Proper clearing and leveling of the site is paramount to establishing successful nursery.

Contributes to the accomplishment of objective 1 above which will enable participants to describe the techniques and practices that will help farmers and nursery operators to achieve success in the production of healthy cocoa seedlings.

Suggested Schedule

| Time | Activity | Teaching strategy |
|-------|-------------------------------------|---|
| 8:30 | Breakfast | N/A |
| 0900 | Introduction | N/A |
| 09:30 | Lesson 1. Site Selection | Brainstorming Discussion Plenary sessions Lecture |
| 12:00 | Lunch | |
| 13:00 | Lesson 2. Site preparation and size | Discussion, brainstorming, worksheet, lecture Group activity |
| 14:45 | Break | |
| 15:00 | Lesson 2. Site preparation and size | Discussion, brainstorming, worksheet, lecture |
| 16:30 | Daily Recap | Open discussion, questions and answers |
| 17:00 | Conclude | |

Day 2: Overview

Daily Lessons

- ✚ Lesson 3: Nursery construction and design. It contains information on how to establish an excellent nursery that will enhance healthy production of cocoa seedlings.
- ✚ Lesson 4: Planting media and Poly bag. Explains about the type of planting media farmers are using and poly bags for nursery establishment.
- ✚ Lesson 5: Seed Propagation. Outlines the processes involved in seed propagation. It includes pod selection, seed selection, pre-germination of seeds, and seed sowing.

Contributes to the accomplishment of objective 1 above which will enable participants to describe the techniques and practices that will help farmers and nursery operators to achieve success in the production of healthy cocoa seedlings.

Suggested Schedule

| Time | Activity | Teaching strategy |
|-------|---|--|
| 8:30 | Breakfast | N/A |
| 09:00 | Lesson 3: : Nursery construction and design | Brainstorming, Discussion Plenary sessions , Lecture |
| 11:00 | Lesson 4: Planting media and Poly bag | Lecture, brainstorming, group activity, demonstration |
| 12:00 | Lunch | |
| 13:00 | Lesson 4. Continued | Group activity and demonstration |
| 14:45 | Break | |
| 15:00 | Lesson 5. Seed Propagation | Discussion, brainstorming, worksheet, lecture, demonstration |
| 16:30 | Daily Recap | Open discussion, questions and answers |
| 17:00 | Conclusion | |
| | | |

Day 3 Overview

Daily Lessons

- ✚ Lesson 6: Water Application: This lesson gives an overview of the importance of water to the survival of plants in the nursery. It also includes the quality of water to apply and methods of water application.
- ✚ Lesson 7: Seedling Health Management. Explains about the natural enemies of crops and their effect on cocoa seedling establishment in the nursery.

Contributes to the accomplishment of the following objective(s):

1. Describe the techniques and practices that will help farmers and nursery operators to achieve success in the production of healthy cocoa plants.
2. Identify common nursery problems and how to deal with them or avoid them.

Suggested Schedule

| Time | Activity | Teaching strategy |
|-------|--------------------------------------|--|
| 8:30 | Breakfast | N/A |
| 09:00 | Lesson 6: Irrigation | Brainstorming, Discussion Plenary sessions , Lecture |
| 11:00 | Lesson 7: Seedling Health Management | Lecture, brainstorming, group activity, demonstration |
| 12:00 | Lunch | |
| 13:00 | Lesson 7 continued | Group activity and demonstration |
| 14:45 | Break | |
| 15:00 | Lesson 7: Seedling Health Management | Discussion, brainstorming, worksheet, lecture, demonstration |
| 16:30 | Daily Recap | Open discussion, questions and answers |
| 17:00 | Conclusion | |

Lesson 1: Site Selection

Introduction

Selecting an ideal site for cocoa nursery establishment is a crucial aspect to nursery operation. This lesson will provide a clear picture on how this is done.

Learning Objectives: By the end of this lesson participants will be able to:

1. List the characteristics of good site for cocoa nursery establishment
2. Identify a suitable site for cocoa nursery establishment

Time Required: 2 hours 30 min

Materials: Tape rule, Flip chart, Manila paper, Markers/pens, White board, cutlass

Procedure

- ✚ Introduce the lesson topic and objectives and explain the procedure for this exercise to the participants.
- ✚ Brainstorm with the whole group on the important things to note when selecting nursery site for cocoa seedling establishment. Write down important indicators the group has brainstormed and agreed on. The list may include, but not be limited to, the following: Is the site easily accessible? Does it have good water facility? Is the site closer to the permanent field? Is the area exposed to intensive wind or storm? Where do we establish our nursery?
- ✚ Go with the participants to the field and ask them to observe a particular site if it is suitable for nursery establishment.
- ✚ Ask the participants to discuss in group how they have been selecting their nursery site (s) and give them 20 minutes to prepare the outcome of their outcome.
- ✚ Ask the group to present and discuss their output
- ✚ Summarize the main points discussed.

Some suggestions to facilitate the group discussion:

What is site selection?

What is the importance of site selection?

What are the characteristics of a good site?

How does site selection influence nursery establishment activity?

Assessment: Assessment will be done through questions and answers. Participants will be asked to state some features of a good site for nursery establishment.

Lesson 2: Site Preparation and size

Introduction

A well prepared site promotes easy construction and layout. It will also enhance the production of quality seedlings in the nursery.

Objectives: At the end of this lesson participants will be able to:

1. Discuss the link between site preparation and production of quality seedling
2. Explain the advantages and disadvantages of site preparation
3. Highlight activities that are involved in site preparation.

Materials: Cutlass, hoe, diggers, shovels, flip chart and markers

Time required: 3hours 15 minutes

Procedure:

- ✚ Brainstorm with farmers on the important things to note when planning to clear a site for nursery establishment. Come to an agreement on the important indicators and write them down. The list may include, but not be limited to, the following:
 - How do you prepare your nursery site?
 - Does the method of site preparation have any influence on water need?
 - When do you prepare your site? Why at that time?
 - Is weed, pest and disease management considered when planning for land preparation?
- ✚ Go with the participants to the field and ask the participants to observe newly prepared nursery site.
- ✚ Ask the participants to explain how they prepare their sites and allow them to brainstorm on it for 30 minutes. Let them prepare a presentation of the output of their observations and discussions.
- ✚ Ask the groups to present and discuss their outputs. Wrap-up, summarizing the main points discussed.

Lesson 3: Nursery Construction and Design

Introduction

Constructing a good nursery structure with excellent design, will promote easy movement and proper development of seedlings. This activity demands adequate planning.

Learning Objectives: At the end of this lesson, participants will be able to:

1. Create a simple nursery design
2. Layout a concise cocoa nursery
3. Construct an ideal nursery site
4. Share their idea on nursery construction and design

Materials: Pen, Paper, pencil, ruler, digger, hoe, shovels, wheelbarrow, sticks, pegs, palm thatch, twine.

Time Required: 2 hours

Procedure:

- ✚ Ask participants to list materials they need for constructing a cocoa nursery
- ✚ Instruct participants to make a sketch of an ideal nursery showing drainages, walkway and pathways between beds
- ✚ Carry participants to an already established nursery and divide participants into groups and asked them to observe the site and work in group to compile their observations.
- ✚ Ask participants to list the step-by-step process in constructing cocoa nursery
- ✚ Participants will be asked to list the materials the use for shade
- ✚ Instruct each group to draw and present their observations
- ✚ Complete the participant presentations with additional information if required and promote group discussion and participant-to-participant exchange of information. Share with participants your knowledge on constructing a well layout nursery for cocoa seedling establishment. Summarize the main point discussed during the section.

Lesson 4: Planting Media and Polythene Bag

Introduction

The soil is the natural home of plants that support plants growth and development. The type of planting media use and the size of polythene bag has great influence on cocoa seedling establishment in the nursery. In order to produce vigorous and high quality seedlings a soil rich in plant nutrients should be used.

Learning Objectives

At the end this lesson participants will be able to:

1. Determine the most suitable planting media for cocoa nursery establishment.
2. Share their idea on the type of planting material they have been using on their farms.
3. Identify ideal poly bag size that will support growth and easy establishment of seedlings in the nursery

Materials: Polythene bag (s), soil, hoes, shovels, cutlass, Projector and flip chart

Time: 2 hours 45 minutes

Procedure:

- ✚ Ask participants to list the type of planting media they use for nursery establishment
- ✚ If the use soil as their planting media, ask them explain how they can identify a good soil, state where the get their soils from and why the use that type of soil?
- ✚ Ask participants to explain where they normally sow their cocoa seeds?
- ✚ If they use poly bags, ask them to state the type, size and color of poly bag they use and why they use it?
- ✚ Ask them to describe the appearance of their seedlings when the use smaller poly bags as compare to the medium size bags.
- ✚ Ask participants to outline how the fill in the poly bags

- ✚ Take them to an already established nursery site having small size poly bag, divide them into groups and ask them to uproot one of the seedlings and observe the shoot and roots. Instruct them to brainstorm and indicate their findings and present in a group their observations.

Complete the participant presentations with additional information if required and promote group discussion and participant-to-participant exchange of information. Share with participants your knowledge on planting media and poly bag size (s) prepared in advance along with pictures. Summarize the main point discussed during the section.

Lesson 5: Seed Propagation

Introduction

Propagation of seeds is the multiplication of planting materials using seeds or any plant parts. For this study, propagation is limited to using seeds for establishing nursery.

Learning Objectives

At the end of this lesson participants will be able to:

1. Identify good planting material to be use as seed
2. Describe the aspect of good seed selection
3. Demonstrate seed preparation methods that will enhance rapid germination of seeds
4. Demonstrate the best way to sow pre-germinated cocoa seeds that will ensure rapid germination

Materials: cocoa pods, cutlass, blunt stick,

Time Required: 1 hour

Procedure

- ✚ Ask participants to bring cocoa pods to the training site. Tell them to describe the pods if they are mature or immature, suitable or unsuitable as planting material.
- ✚ Ask them to break the pods and select seeds for sowing. Let them explain why the selected the seeds.

- ✚ Instruct participants to explain how they can distinguish between good seeds and bad seeds for per-germination.
- ✚ Let participants explain the way the process cocoa seeds before sowing. Do they plant their seeds directly after breaking them from the pod or do they clean them. If they clean their seeds what do they use and how do they do it?
- ✚ Ask the farmers if they pre-germinate their seeds before sowing. If yes, how do they do it and how long does it take?
- ✚ Ask farmers to describe how they sow their cocoa seeds

Complete the participant presentations with additional information if required and promote group discussion and participant-to-participant exchange of information. Share with participants your knowledge on plant propagation. Summarize the main point discussed during the section.

Lesson 6: Water Application

Introduction

This explains the importance of applying water to cocoa seedlings in the nurseries. It also includes materials used for irrigation and the quality of irrigation water.

Learning Objectives

At the end of this lesson the participant will be able to:

1. State the importance of water to seeds and seedlings in the nursery.
2. Explain the sources of water and quality of water for plant use

Materials

Watering can, bore hole, bucket

Time Required: 2 hours

Procedure

- ✚ Instruct participants to list the importance of water to crops
- ✚ Ask participants to explain their source of water for nursery operation

- ✚ Ask participants to describe the quality of water they apply to their crops
- ✚ Instruct participants to list the materials they use for water application
- ✚ Ask participants to explain when they apply water to their nurseries and how many times they do this per day.
- ✚ Divide participants into 2 groups and ask them to describe seedlings suffering from water stress.
- ✚ Complete the participant presentations with additional information if required and promote group discussion and participant-to-participant exchange of information. Share with participants your knowledge on irrigation of nursery. Summarize the main point discussed during the section.

Assessment: Participants will be asked simple practical questions on the above topic.

Lesson 7: Seedling Health Management

Introduction

Healthy seedlings are free from pest, disease and weed attack. These natural enemies of crop can be put under control to ensure the production of healthy and high quality cocoa seedlings. For us to achieve this, there is need to institute proper pest, disease and weed control measures.

Learning Objectives: At the end of this lesson participants will be able to:

1. Identify the most common pests that affect cocoa seedlings in the nursery
2. Describe what parts of the seedlings pest stages are mostly found
3. Identify common diseases affecting cocoa seedlings in the nursery
4. Explain the effect of weed on seedling development
5. Practice pests and diseases control measures

Materials: Flip Charts with drawing pens and markers, affected seedlings, worksheet

Time Required: 3 hours 45 minutes

Procedure

- ✚ Take participants to an already established nursery site and divide them into 3 groups that can separately make their observations.

✚ Each group is giving one of the following tasks

- Carefully observe the cocoa nursery and identify insect pest problems. Collect samples for group discussion.
- Identify disease problems in the nursery and collect samples for group discussion.
- Observe nursery to identify weed competition. Collect weed samples and describe the nature of seedlings in competition with weeds.

✚ Group Discussion. The facilitator will use the participant's knowledge and samples collected to lead a brainstorming session. Participants will be asked to present their work and questions like this may be asked.

What are the common pest problems observed on the field?

How can we control pest problems on our field?

What are the common disease problems we observed?

How can we solve this problem?

What did we observe when weed competes with seedlings?

How can we control weeds?

How often and when do we weed our nurseries?

