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Agriculture Skill Council of India

Facilitator Guide



Sector
Agriculture

Sub-Sector
**Forest, Environment &
Renewable Energy Management**

Occupation
Agro Forestry Management

Reference ID: **AGR/Q6103**, Version **3.0**
NSQF Level: **4**

Forest Nursery Raiser



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Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”

Acknowledgements

We are thankful to all organizations and individuals who have helped us in preparation of this Facilitator Guide. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving quality, coherence and content presentation of chapters. This Facilitator Guide will lead to successful roll out of the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert for the content and helping us in preparation of this Facilitator Guide.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome the suggestions from users, industry experts and other stakeholders for any improvement in future.

About this Guide

The objective of the guide is to provide an approach map for interacting with the trainees undergoing training on the job role. The aim of the course is to provide both theoretical and practical knowledge to the trainees, and also provide them related guidance.

The guide is neither a substitute nor complete road map, but an aid to help you to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the handbook. The guide is just to indicate that how to proceed for covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension.

Facilitator with the help of this guide will be able to build among participants:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore
- **Performance Criteria:** Pick up the required aptitudes through hands on preparing and play out the required operations inside the predetermined measures
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work

The job will also help them learn more by field visits and providing hands on training. It is expected that irrespective of the region, knowledge on all aspects of this job role will be imparted to trainees.

Symbols Used



Ask



Activity



Do



Demonstrate



Explain



Elaborate



Example



Exercise



Facilitation Notes



Field Visit



Learning Outcomes



Notes



Objectives



Practical



Resources



Role Play



Summarize



Say



Team Activity



Tips

Table of Contents

S.No. Modules and Units	Page No.
1. Introduction to the Role of a Forest Nursery Raiser	1
Unit 1.1 - Size and Scope of Agriculture Industry and Its Sub - Sectors	3
2. Preparation for Setting Up the Forest Nursery (AGR/N6112)	7
Unit 2.1 - Site Selection of Forest Nursery	9
Unit 2.2 - Construction of Forest Nursery	11
Unit 2.3 - Types of Forest Nursery	13
Unit 2.4 - Seed Selection	15
Unit 2.5 - Rules Governing the Forest Nursery Establishment	17
Unit 2.6 - Detection of Pathogen and Appropriate Plants for a Nursery	19
Unit 2.7 - Planting Systems and Management	21
3. Process of Preparing the Nursery Bed and Infrastructure (AGR/N6113)	25
Unit 3.1 - Preparation of Forest Nursery Beds	27
Unit 3.2 - Systems and Processes in a Nursery	30
4. Propagation of Plants in the Forest Nursery (AGR/N6114)	34
Unit 4.1 - Pre-seed Treatment	36
Unit 4.2 - Plant Propagation in Forest Nursery	38
Unit 4.3 - Resource Optimization	41
5. Process of Maintaining the Plants in the Forest Nursery and Transplanting Them (AGR/N6115)	45
Unit 5.1 - Nursery Management	47
Unit 5.2 - Nursery Diseases	49
Unit 5.3 - Pest Management	51
Unit 5.4 - Maintenance of Clean Environment in a Nursery	53
Unit 5.5 - Weeds in a Nursery and their Remedies	55
6. Marketing and Inventory Management (AGR/N6116)	60
Unit 6.1 - Market Related Activities and Regulations	62
Unit 6.2 - Government Schemes for Forest Products	65
Unit 6.3 - How to Report Inappropriate Behaviour	67
7. Hygiene and Cleanliness (AGR/N9903)	71
Unit 7.1 - Hygiene and Workplace Housekeeping	73
8. Safety and Emergency Procedures (AGR/N9903)	77
Unit 8.1 - Emergency Procedures and First Aid	79
9. Employability Skills 60 Hours (DGT/VSQ/N0102)	84
To access MSDE Upgraded Employability Skills, click here: https://eskillindia.org/NewEmployability	
10. Annexures	86
Annexure I - Training Delivery Plan	87
Annexure II - Assessment Criteria	96
Annexure III - QR Codes & Links	97





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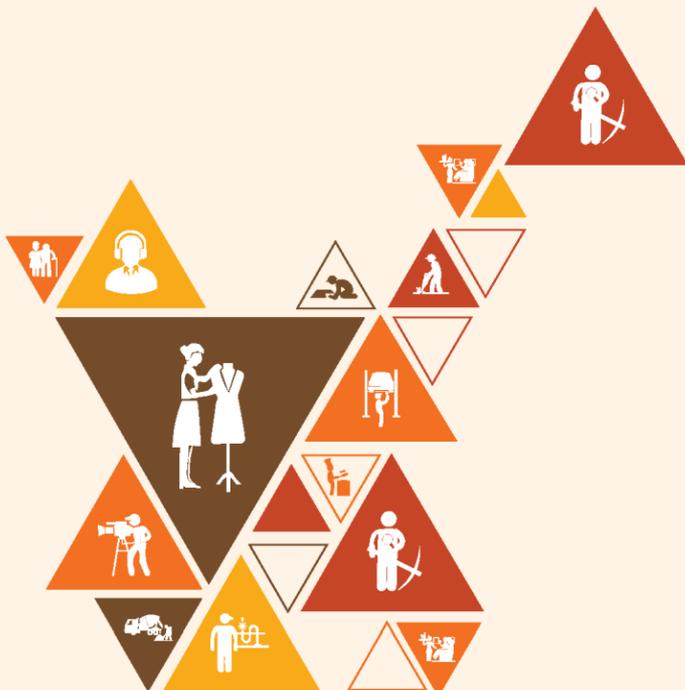
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1. Introduction to the Role of a Forest Nursery Raiser

Unit 1.1 - Size and Scope of Agriculture Industry and Its
Sub-Sectors



Bridge Module

Key Learning Outcomes



After the completion of this module, the participant will be able to:

1. Describe the size and scope of the agriculture industry and its sub-sectors.
2. Discuss the role and responsibilities of a Forest Nursery Raiser.
3. Identify various employment opportunities for a Forest Nursery Raiser.

UNIT 1.1: Size and Scope of Agriculture Industry and Its Sub-Sectors

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the size and scope of the agriculture industry and its sub-sectors.
2. Explain the role and responsibilities of a Nursery Raiser.
3. Identify various employment opportunities for Forest Nursery Raiser.

Resources to be Used

- Participant handbook, white board, marker, duster, computer, projector, flip charts, pen, notebook, etc.

Say

- Greet all participants with smile and appreciate participants for being on time and for participating in this course.
- Give your brief introduction to participants, and describe the purpose of the training session .

Ask

- In your opinion what can be role of a Forest Nursery Raiser?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Size and Scope of agriculture industry and its sub-sectors
- Role of Forest Nursery Raiser
- Employment Opportunities

Team Activity

Purpose: To learn about the role and responsibilities of forest nursery raiser.

Methodology: Group discussion for about 20- 30 minutes.

Expected outcome: Confidence building and Group involvement

Procedure:

- Divide the participants into groups and ask them to discuss among themselves on the roles and responsibilities of nursery raiser.
- Now call one volunteer from each group and ask him to tell about the same and appreciate everyone.
- Then the teacher will discuss those points with the participants and clarify their doubts.

Do

- Appreciate the students for their participation.

Notes for Facilitation

- You can invite representative of any organization who employs Forest Nursery Raiser .
- Indicate briefly the option for career progression and career mobility of Forest Nursery Raiser completing training under NSQF framework.
- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Show more innovative images as per topic requirements for better understanding of the topics.
- Ask them to answer the questions given in the participant handbook.

Exercise**Key Solutions to PHB Exercises**

1. India is an agrarian country and major part of its population depends on agriculture for the livelihood. Farming systems often consist of a range of interdependent gathering, production and post- harvest processes, so that, besides farming, rural household livelihoods can encompass various activities in other key agricultural sub-sectors including livestock, agro-forestry and fishing and aquaculture. India accounts for 2.4% of the world's geographical area and 4% of its water resources, but has to support 17% of the world's human population and 15% of the livestock. For more, Refer section 1.1.1.
2. A forest nursery is established and cared for by a Forest Nursery Raiser. In addition to basic accounting and inventory management, the employee manages the nursery and transplants the raised plants.
3. To make the seedlings available for planting outside the forest areas as e.g. farmlands and areas under the control of the departments, nurseries are needed.
4. The job role of forest nursery raiser involves a lot of technical knowhow. He works in recognizable, changeable, regular, situations of clear choice. For providing the quality seeds and seedlings to the tree grower such as farmer, Forest nursery raiser is responsible for taking care of healthy seedlings of forestry plants.



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2. Preparation for Setting Up the Forest Nursery

Unit 2.1 - Site Selection of Forest Nursery

Unit 2.2 - Construction of Forest Nursery

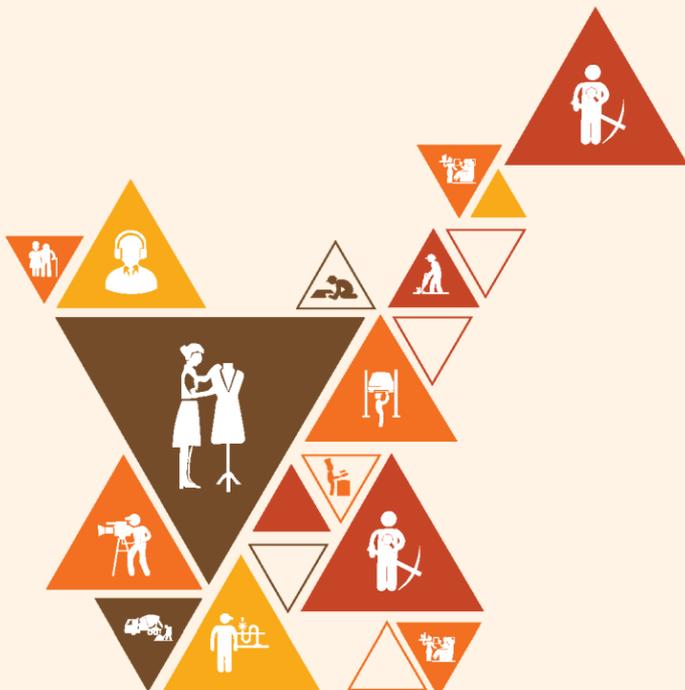
Unit 2.3 - Types of Forest Nursery

Unit 2.4 - Seed Selection

Unit 2.5 - Rules Governing the Forest Nursery Establishment

Unit 2.6 - Detection of Pathogen and Appropriate Plants for a Nursery

Unit 2.7 - Planting Systems and Management



AGR/N6112

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. State the favorable conditions, minimum area and inputs required for setting up a forest nursery.
2. Explain the approved sustainable agronomics for agro forestry species.
3. List different types of forest nurseries.
4. State various necessary details to obtain while purchasing the seeds and propagules.
5. State the laws applicable to establishing a forest nursery.
6. Explain various techniques to detect the presence of pathogens in the soil.
7. State the appropriate varieties of plants raised for different purposes in forest nurseries.
8. List different types of nursery beds.
9. Explain the benefits of polyculture and multitier planting systems.
10. Explain basic accounting and inventory management.

UNIT 2.1: Site Selection of Forest Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify and select appropriate site for nursery establishment.

Resources to be Used

- Available objects such as participant handbook, white board, duster, marker, computer, projector, flip charts, pen, notebook, sticky notes etc.
- Slides in power point presentation showing specific innovative images of tools and equipment used in nursery, factors affecting selection of nursery site, types of nurseries, etc.
- Nursery tools like spades, picks, pruning scissors, wheelbarrows, etc.

Ask

- Have you ever seen nursery? If yes, share your observations.
- What are the different factors to be considered for selection of nursery site ?
- Have you ever used any tools or implements of nursery?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Nursery Site Selection
- Some of the technical factors which need to be considered when establishing a nursery

Field Visit

Purpose : To provide live experience of Forest nursery site selection.

Methodology : Field visit and the time varies according to the location, it may be 2 hours.

- Take the participants to nearby farm/nursery.
- Show the participants the general layout of nursery.
- Ask the participants to observe the site selection characteristics .
- At the end of the field visit, answer the query of the participants.
- Encourage the participants to make notes for better recollection of the topic.

Notes for Facilitation



- Arrange relevant reference material based on content in participant handbook.
- Assist all participants to understand the concept.
- Ensure sufficient pictorial presentation for learning, arrange for visual aids, power point presentations, charts, flip charts etc.
- Ensure essential tools in the classroom for identification and explanation.

Exercise



Key Solutions to PHB Exercises

1. Criteria of site selection to establish a forest nursery are:

- Availability of land: It is important that the site selected for the nursery has enough land to raise the number of seedlings needed, and if possible, room for expansion.
- Water supply: A reliable and adequate water supply is always a requisite in nursery establishment. The nursery sites should be located near the source of water to sustain rapid and healthy growth of the seedlings.
- Topography: The area for tree nursery establishment is preferably flat with a gentle slope to allow for drainage. Contour terracing should be done if the slope is in excess of 2 per cent.
- Size: The size of the area must be large enough to accommodate any possible expansion of the nursery.
- Location: The nursery site should be located near the planting site to minimize injury in handling and during transportation.
- Availability of labour: A lot of labour is required for the construction of a nursery and subsequent nursery activities. Hence nurseries should be located where labour is available.

UNIT 2.2: Construction of Forest Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Construct forest nursery as per operational requirements.
2. Comply with the occupational health & safety requirements relevant to work.
3. Explain the prevailing state laws and legal policies in the local forest area.

Resources to be Used

- Available objects such as participant handbook, white board, duster, marker, computer, projector, flip charts, pen, notebook, sticky notes etc.
- Power point slides showing specific innovative images of various designs of nursery, type of nursery, etc.

Say

- Welcome the participants in training session “Construction of forest nursery”. Before beginning the session, recapitulate the previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Discuss about Nursery Design and Construction Design

Explain

- A well designed forest nursery should have proper roads, fencing, office, potting and cutting sheds, seed germination and growing areas, water supply, telecommunication and water sprinkler system.

Demonstrate

- Demonstrate the following:
 - ✓ Filling poly bags for seedling production
 - ✓ Materials for tree nurseries
- Motivate the participants to observe the demonstration carefully.
- Clarify the doubts of participants.

Team Activity



Purpose : To enhance the knowledge on different aspects of constructing of Forest Nursery.

Methodology : Learning by doing and the time varies according to the location, it may be 2 hours.

Procedure

- Organize a visit to forest nursery site with the participants.
- Motivate participants to observe the steps to be followed to construct forest nursery carefully.
- Divide the class into 5 groups so that they can prepare the land must first be cleared of all rocks, stumps, trees and shrubs as per the demonstrated way.
- Assist the participants to carry out the activity successfully.

Notes for Facilitation



- Ask the participants if they have any questions and clarify all the doubts of the participants.
- Arrange demonstration of potting of plants through audio visual aids.
- Fix up the meeting with KVK or some progressive farmers for timely field visit and nursery demonstration.
- Focus on learning by doing.
- Make the classroom more participatory.

Exercise



Key Solutions to PHB Exercises

1. Selection criteria for appropriate potting mixture in forest nursery:
 - Reading: If the total area of the forest nursery is more than 4.0 ha (10 acres), it is advisable for the nursery to have a proper central road and a perimeter road. The central road will divide the nursery into two to four blocks, where growing areas will be on one side, while the buildings, and germination and potting areas will be on the other side.
 - Infrastructure and Facilities: Office and store buildings should be located at the entrance of the forest nursery. However, for a large forest nursery, the office and store should be in the centre of the whole area. For a containerised planting stock nursery, a single storey building for potting activities is required. The building should have enough space for preparing and storing potting media and to carry out all potting activities.
 - Growing Beds: In tropical countries, the growing beds should be laid out in a north-south direction. This direction provides maximum sunlight to all the seedlings. The width of the growing bed should normally be 1 m. The spacing between the growing beds should be between 0.5-1 m.
 - Other Structures: A waterproof soil storage shelter is needed to store the potting mixture and to provide some working space. A large working shed as well as an office space is also required.
2. Refer unit 2.2-Materials for tree nurseries.

UNIT 2.3: Types of Forest Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the types of forest nursery.

Resources to be Used

- Available objects such as a whiteboard, duster and flip chart, paper, pen, projector, computer/laptop etc.
- Power point slides describing the different types of forest nursery.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Classification of Forest Nurseries on the basis of :
 - ✓ Area Size
 - ✓ Irrigation facilities
 - ✓ Planting stock
 - ✓ Size of seedlings
 - ✓ Ownership
 - ✓ Duration of the use

Demonstrate

- Demonstrate type of forest nursery available in demonstration area to participants in field and describe their characters.

Activity

Purpose : To learn about the classification of forest nurseries and time will be 20-30 minutes.

Methodology : Group discussion and pen and paper activity

Procedure

- Divide the participants into groups.
- Ask the participants to discuss basis of classification and enlist the points in your notebook.
- Now check the notebooks of the participants and then correct the mistake, if any.

Do

- Sum up the key learning of above activity.
- Emphasize and elaborate on important aspects of each type of forest nursery and their main key considerations.
- Emphasize and elaborate the job role of forest nursery raiser and their importance

Notes for Facilitation

- A brief general explanation of all terms used in participant manual in unit type of various forest nurseries
- Encourage participants of group discussion to ask questions so that they can clear their doubts on any topic
- Encourage peer learning among participants in the class by answering other participant's questions
- Ensure more pictorial presentation of learning where ever possible in classroom
- Ensure practical session where ever required

Exercise**Key Solutions to PHB Exercises****1. Types of forest nursery:**

- A. On the Basis of Area Size:
 - Small Nursery
 - Medium Nursery
 - Large Nursery
- B. On the basis of irrigation facility:
 - Dry Nursery
 - Wet Nursery
- C. On the Basis of Planting Stock:
 - Bareroot Nursery
 - Container Nursery
- D. On the Basis of Size of Seedlings:
 - Seedling Nursery
 - Transplant Nursery
- E. On the Basis of Ownership:
 - Institutional Nurseries
 - Government Nurseries
 - Industrial Nurseries
 - Project Nurseries
 - Community Nurseries
 - Group Nurseries,
 - Individual Nurseries
- F. On the Basis of Duration of the Use:
 - Temporary Nursery
 - Permanent Nursery

UNIT 2.4: Seed Selection

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the various essential details to be obtained while buying Seeds and Propagules.

Resources to be Used

- Participant handbook, pens, notepad, computer, projector, white board, flip charts, marker, etc.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Seed tree selection
- Selection criteria
- How to assess seedling quality
- Germination test
- Assessment of seed viability

Demonstrate

- Demonstrate Seed Tree Selection with the help of the power point presentation and ask participants to observe keen fully.

Activity

Purpose: To learn about how to assess quality of seedlings and germination test.

Methodology : Group discussion and Q/A session

Tentative time : 30-40 minutes

Procedure

- Ask the participants to discuss themselves how to assess quality of seedlings and germination test.
- Conduct a Q/A session after the discussion for 10-15 minutes.
- The questions should be related to the given topic.
- Ask the students to write down the answers on their notepad.

Do

- On the completion of the session, display the correct answers on the white screen from your laptop, via the overhead projector.
- Encourage the non-participating students to participate actively.
- Declare the name of the student, who attempted highest questions and applaud him/her for good performance.

Notes for Facilitation

- Assist all groups to understand the topic clearly through visualization.
- Answer all the questions of the participant.
- Focus on ensuring pictorial as well as live presentation for learning.
- Involve the participants through group activities, discussions and learning by doing.

Exercise**Key Solutions to PHB Exercises**

1. If the quality of a specific group of seedlings is to be assessed, destructive sampling through random selection of some seedlings of the group and computing Dickson Quality Index (DQI) as below is quite useful.

Total seedling dry weight (g)

DQI = $\frac{\text{Total seedling dry weight (g)}}{\{\text{height (cm) / stem diameter (mm)}\} + \{\text{shoot dry weight (g) / root dry weight (g)}\}}$

UNIT 2.5: Rules Governing the Forest Nursery Establishment

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe the laws applicable for setting up forest nurseries.

Resources to be Used

- Participant handbook, pens, notepad, computer, projector, white board, flip charts, marker, etc.

Say

- Greet the participants and recall the previous session learning outcomes.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Nursery Registration Act
 - ✓ Licensing requirements of nursery
 - ✓ Responsibility of the applicant
 - ✓ Location of planting
 - ✓ Refusal, suspension or cancellation
 - ✓ Civil penalties

Activity

Purpose : To understand the rules governing the forest nursery establishment. Time may be plan for 30-40 minutes.

Methodology : Quiz

- Conduct a pop quiz by displaying each question on the white display screen, from the laptop via an overhead project.
- Provide A4 sheet to every student present in the class.
- The questions will mainly in the form of multiple-choice questions (MCQ).
- The questions should be related entirely to the unit.
- Each question will carry two marks.
- There will be no negative marking.
- Ask the students to write down the answers on a white sheet provided.

Do

- On the completion of the session, ask the students to exchange their papers with the peers so that everybody gets a paper to check.
- Display the correct answers on the white screen from your laptop, via the overhead projector.
- Encourage the non-participating students to participate actively.
- Declare the name of the student, who scored the highest and applaud him/her for good performance.

Notes for Facilitation

- Assist the participants to understand the topic clearly with active participation.
- Show more innovative images as per topic requirements for better understanding of the topics.

Exercise**Key Solutions to PHB Exercises**

1. The assessment of a civil penalty, the confiscation or destruction of any plants, plant materials, or nursery stock found on the premises or contained in the shipment in question, and/or the suspension or revocation of the current nursery industry licence or any future operation privileges granted under the act are the civil penalties for violations of any section of the act not already stated.
2. For producing certified nursery stock, the fruit nurseries shall have to maintain a scion block, a seed block, and stock bed and shall have to use the propagation material only from these sources. The scion block means a planting of registered trees which serves as a source of scion wood for the propagation of certified nursery stock. The seed block means a planting of registered seed trees which serves as a source of seed for producing seedling rootstock for use in propagation of certified nursery stock. The stool bed is a mean of planting of self rooted registered mother trees/ mother stools which serves the specific purpose of producing vegetatively propagated (clonal) rootstock used in the propagation of certified nursery stock.

UNIT 2.6: Detection of Pathogen and Appropriate Plants for a Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain techniques for detecting the presence of pathogens in soil.

Resources to be Used

- Participant handbook, pens, notepad, computer, projector, white board, flip charts, marker, etc.

Say

- Greet the participants and recall the previous session learning outcomes.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Techniques to detect the presence of pathogens in the soil
- Appropriate varieties of plants raised for different purposes in forest nurseries
- ✓ Timber and Industrial Wood Tree Species
- ✓ Fuel Wood Tree Species
- ✓ Fodder Tree Species

Demonstrate

With the help of Audio-visual aids,

- Demonstrate varieties of plants raised for different purposes in forest nurseries.
- During the demonstration, encourage the students to observe it carefully.
- Clarify the doubts of participants.

Field Visit



Purpose : To learn techniques to detect the presence of pathogen in soil.

Methodology : Field visit and the time varies according to the location, it may be 2 hours.

- Organize field visit to nearby nursery.
- Ask the students to monitor for root diseases in nursery.
- Ask the students to observe techniques carefully.
- Facilitate the students to do themselves this activity successfully.
- Encourage the participants to engage well in the activity and ask questions.

Notes for Facilitation



- Assist all the participants to understand the concept clearly through visualization.
- Ask the participants if they have any questions related to the topic.
- Motivate the participants to work in teams so that they develop team building skills.

Exercise



Key Solutions to PHB Exercises

1. To monitor for root diseases in nurseries-
 - Choose a few plants from various locations, take them out of their containers, and carefully wash or scrape the soil off of them.
 - Look for any early signs of disease, such as discolouration, softness, shrivelling, or other changes in the roots or crowns.
 - Understand the appearance of healthy roots to identify unhealthy ones quickly. Depending on the species, the age of the roots, and the growing circumstances, healthy root properties may vary or alter.
 - Look for wilted or discoloured plants as well as above-ground fungal growths, as these could point to more advanced disease stages.
 - To make wise pest management choices, combine test kits with additional information. For the detection of Phytophthora diseases affecting nursery plants produced in greenhouses and containers, test kits are easily accessible.
 - Send a sample of sick plants and their roots to a reputable lab so that the pathogens can be detected and identified.
2. Fuel Wood Tree Species
 - *Acacia auriculiformis*
 - *Casuarina equisetifolia*
3. In the nursery beds in March, seedlings can be produced by sowing in drills spaced 15 cm apart, or in containers. In 4 days, germination begins, and it takes 17 days to finish. When seedlings are 7.5 cm tall, prick them out and place them in poly bags. The rapid growth of seedlings makes them vulnerable to insect attack. In July of the same year, seedlings are ready for planting.

UNIT 2.7: Planting Systems and Management

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the benefits of poly culture and multilevel planting systems.

Resources to be Used

- Participant handbook, pens, notepad, computer, projector, white board, flip charts, marker, etc.
- Plain table with accessories abneys' level, measuring tape, ranging rod, arrows , etc.

Say

- Greet the participants and recall the previous session learning outcomes.

Ask

- What do you understand by Poly culture Planting System ?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Polyculture planting system
- Multitier planting system

Activity

Purpose : To understand the difference between polyculture and multilevel planting system. This activity may be planned for 20-30 minutes.

Methodology: Group discussion

Procedure :

- Divide the participants into 2 groups.
- Ask the participants to enlist the difference between Polyculture and Multilevel Planting System.
- Get a volunteer out from every group one by one to write the points on the board.
- Then discuss those points with the participants.

Do

- Appreciate the students for their participation.
- Clear the doubts of all participants.

Notes for Facilitation

- Assist the participants to understand the topic clearly with active participation.
- Show more innovative images as per topic requirements for better understanding of the topics.
- Ask them to answer the questions given in the participant handbook.

Exercise**Key Solutions to PHB Exercises**

1. The best definition of poly culture in agriculture is the practise of simultaneously planting various crop species on the same plot of land. Adopting poly culture aims to replicate the variety present in natural ecosystems. Intercropping is another term for poly culture, which is the reverse of monoculture, in which only one type of crop or even animal is kept together.
2. The benefits of poly culture planting system :
 - Saving on resources
 - Plant competition
3. Multitier or multistoried cropping is an agroforestry technique that involves producing crops of various heights simultaneously on the same plot of ground, utilising land, water, and space in the most effective and cheapest ways possible. for example, coconut, pepper, pineapple, and grass. Typically, the shorter crops that benefit from shade and humidity are cultivated between the rows of taller crops that can withstand direct sunlight.
4. **Advantages of Multi storeyed cropping:**
 - Better use of nutrients and moisture in various soil layers.
 - More effective use of space and light.
 - Offers a balanced diet for people.
 - Soil enrichment with organic material or plant remains.
 - Increase the soil's ability to retain water



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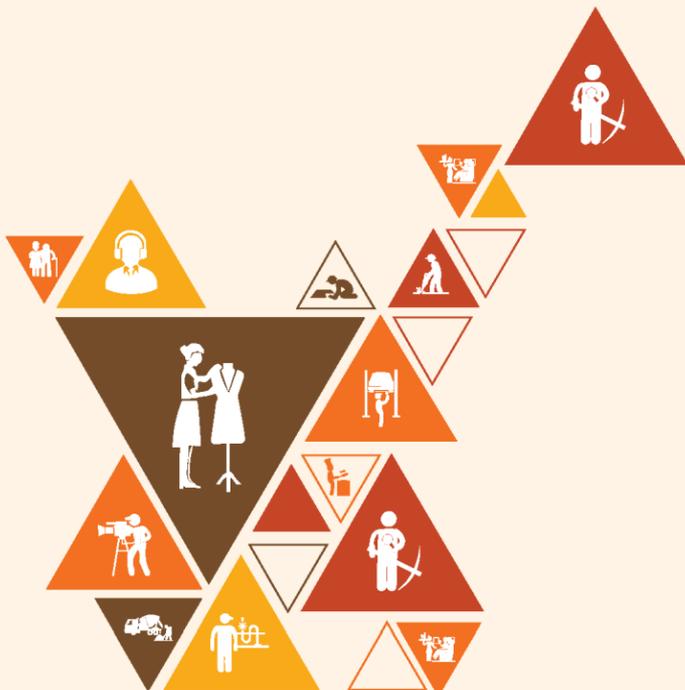
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3. Process of Preparing the Nursery Bed and Infrastructure

Unit 3.1 – Preparation of Forest Nursery Beds

Unit 3.2 – Systems and Process in a Nursery



AGR/N6113

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. State the appropriate level of soil moisture for ploughing and hoeing.
2. List different activities required to perform as part of nursery bed preparation.
3. Describe the process of sterilization of soil through solarization.
4. Explain the importance of conducting the soil test and applying necessary treatments to improve its fertility.
5. Explain the importance of installing a micro-irrigation/ fertigation system.
6. Explain the importance and ways of draining out water from a forest nursery.

UNIT 3.1: Preparation of Forest Nursery Beds

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Prepare the nursery bed preparation.
2. Explain the proper level of soil moisture for tillage and hoeing.
3. Describe the process of soil sterilization through solarization.

Resources to be Used

- Available objects such as participant handbook, pen, whiteboard, flip charts duster, marker, projector, computer, notepad, etc.
- Spades, (small & large), pickaxes, wooden hammer, ropes, cotton or steel tape, wooden pegs, shovels, khurpa, sickle, axes, etc.

Ask

- Do you know how to prepare nursery bed ?
- Can you name some tools and implements used for nursery bed preparation?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Preparing a Germination Bed
 - ✓ Types of nursery bed in India
 - ✓ Types of Mother bed
- Requirement of soil moisture for ploughing and hoeing
- Soil sterilization
- Solarization
- Selection criteria
- Identification of Seed Sourcing, Collection and Selection
 - ✓ Flootation method
 - ✓ Colour assessment method
 - ✓ Cutting method
- Seed Extraction and Processing
- Seed Treatment
- Pretreatment of Some Important Species

Demonstrate



- Take the participants to demonstration area and show them the tools and equipment used in nursery and ask them to identify.
- Demonstrate by Audio-visual aids, different types of nursery beds.

Team Activity



Purpose : To impart practical experience on seed extraction and processing to participants. This may be plan for 1-2 hours or depend on distance of location.

Methodology : Hands on practice

- Divide the class into 4-5 groups.
- Take the groups to nearby field.
- Ask the groups to complete these tasks:
 - ✓ Seed Cleaning
 - ✓ Seed Upgrading
 - ✓ Post - Harvest Care
 - ✓ Seed Storage

Do



- Supervise and guide the participants for completing their tasks.
- Ask the participants if they need any kind of help or not.
- Appreciate for their active participation in the activity.

Notes for Facilitation



- Organize visit or establish linkage to farm for technical and practical sessions and hands on experience.
- Encourage the students to prepare their own nursery.
- Ensure sufficient pictorial presentation for learning; arrange for visual aids, power point presentations, etc.
- Show photographs of different ploughing and hoeing.

Exercise



Key Solutions to PHB Exercises

1. There are three types of forest nursery beds in India. They are Raised bed, Sunken bed and level bed.
2. Seed extraction method of forest tree seeds:
 - The method of seed extraction depends on the type and nature of fruits.
 - Cones and dry fruits generally shed seeds if dried in open air or sunlight.
 - Seeds from fleshy/ pulpy fruits may be removed by macerating/crushing and washing, while the seeds borne in pods or husks can be extracted by thrashing.
 - Other methods like drying of seeds under cover (e.g. Abies, Cedrus, Dipterocarpus, Hopea, Quercus, Shorea), thrashing, de-winging and picking by hand etc. are used as per the morphology of seed/fruit.
3. Characteristic of selection of mother seed tree are:
 - Straight, cylindrical, non-forking, non-twisting bole
 - Fast growth
 - Narrow crown
 - Thin branches with wide branch angles
 - High wood density and long fiber
 - Resistance to pests and diseases
4. Seed collection methods in forestry are:
 - Floatation method – Put the seeds in water, for most species, the seeds that sink to the bottom are good seeds. Discard all floating seeds.
 - Colour assessment method – The fully mature good seeds will have the definite for the particular species.
 - Cutting method – Cutting a cross section of the seed to see as to how many seeds are hollow, empty, immature or unhealthy is one of the easiest and most reliable methods.
5. Seed dormancy breaking treatments in forestry are:
 - Cold water treatment
 - Hot water treatment
 - Boiling water treatment
 - Wet and dry treatment or weathering
 - Acid Scarification
 - Mechanical Scarification
 - Stratification
 - Light Requirements
 - Use of Hormones and chemicals
 - Cow dung slurry treatment
 - Shell cracking

UNIT 3.2: Systems and Processes in a Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of getting a soil test done.
2. Explain the importance of setting up micro irrigation/fertilizer systems.
3. Explain the importance and methods of extracting water from a forest nursery.

Resources to be Used

- Participant handbook, pen, whiteboard, flip charts, duster, marker, projector, computer, notepad.
- Power point presentation showing related images.

Ask

- What do you mean by soil testing?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Soil Testing
- Soil Testing Importance In Detail
 - ✓ Improves productivity of soil
 - ✓ Denotes the number of fertilizers to be used
- Installation of micro-irrigation/fertigation system
 - ✓ Components of the fertigation plant
 - ✓ Advantages of fertigation
- Drainage and Irrigation

Activity

Purpose : To learn about work of a fertigation plant in open field. It may be planned for 30-40 minutes.

Methodology : Group discussion

- Dive the class into 4-5 groups.
- Ask the groups to write down the components of fertigation plant and advantages of fertigation.
- At the end of the activity, ask one member from each group to share with others.
- Encourage them to participate in the discussion and clear doubts.

Say

- Thank you everyone for their activity participation.

Notes for Facilitation

- Field demonstration and hands on training is necessary.
- Motivate the non-participating students to take part in the activity.
- Clarify all doubts of the participants.

Exercise**Key Solutions to PHB Exercises**

1. To ascertain several properties of the soil, such as its composition, acidity, pH level, and nutrient content, a soil test is carried out. According to the needs of the sector, soil testing has a variety of uses. Refer section 3.2.1.
2. Soil Testing Importance In Detail
 - Improves productivity of soil
 - Denotes the number of fertilizers to be used
 For more, Refer section 3.2.1.
3. Components of the fertigation plant
 - A filtration system, maybe automatic, that can clean itself when the pressure values are unstable, which signal that there is a buildup of dirt inside the filter, is the first component of a well-designed irrigation plant for specific crops.
 - The control unit will operate both opening and closing of the electro valves, directing the water to the selected irrigation sector and controlling, with a flow meter, both water distribution and fertilizer injection.
4. Advantages of fertigation
 - Through fertigation, nutrients and water are delivered close to the active root zone, enhancing crop uptake.
 - There is a chance to acquire a 25–50% greater yield since fertigation equally distributes water and fertiliser to all the crops.
 - Fertilizer use efficiency with fertigation is in the range of 80–90%, which helps to conserve at least 25% of nutrients.
 - This also significantly reduces the amount of time, labour, and energy used in addition to using less water and fertiliser.



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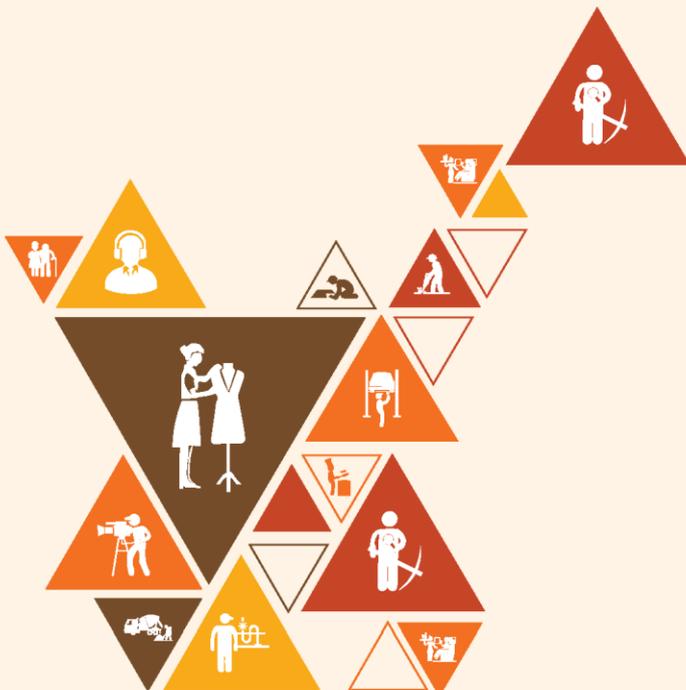
Agriculture Skill Council of India

4. Propagation of Plants in the Forest Nursery

Unit 4.1 - Pre-seed Treatment

Unit 4.2 - Plant Propagation in Forest Nursery

Unit 4.3 - Resource Optimization



AGR/N6114

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. List different ways of identifying damaged/ diseased seeds.
2. Explain different methods of treating seeds.
3. State the recommended ratio of various soil nutrients to be maintained in the soil.
4. Describe the process of raising seedlings in a nursery setting.
5. State the recommended depth for sowing of seeds in the nursery bed/ poly bags/ containers.
6. Explain various cultural practices and propagation methods such as cutting, layering, division and budding.
7. State the appropriate planting time for various types of plants.
8. Explain the benefits of resource optimization.

UNIT 4.1: Pre – Seed Treatment

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe the concept of pre-seed treatment of forest tree species.
2. Identify various tools/equipments used in forest nursery.

Resources to be Used

- Available objects such as white board, duster, marker, projector, commuter, pens, notepad etc.
- G.I. net for Sieving sand or soil, wooden seed box or metal or plastic seed tray, thick poly bags, canes, container or glass jar , etc.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Seed pre-sowing treatment
- Sowing of seeds
- Selecting pricking out and transplanting of germinated seeds to polythene pots
- Tools and equipments used in Forest Nursery

Activity

Purpose : To provide practical training on pre sowing seed treatment and its sowing process.

Methodology : Hands on experience and time may be 1-2 hrs.

- Arrange for some forestry seeds and treatment material as mentioned in treatment methods.
- Divide the participants in groups of 4-5 and give them different seeds for treatment and sowing.
- Check for any anomalies.
- Extend support to the participants while undergoing this activity.
- Assign the participants to maintain record of this practical work.

Say

- Did you find this activity helpful? I hope all of you are now acquainted method of treatment.

Demonstrate

With the help of Audio-visual aids,

- Demonstrate the different types of tools and equipments which are used in Forest Nursery.
- During demonstration, ask the participants to observe keen fully.
- Clarify the doubts the participants regarding the topic.

Notes for Facilitation

- Preplan some activities for role play and class activity.
- Encourage the participants to overcome anxiety during role play.
- Arrange relevant handouts and leaflets for better understanding of the topic.
- Arrange audio visual aids showing innovative images of different tools and equipments.
- Nearby visit to field will help the students to learn better.

Exercise**Key Solutions to PHB Exercises**

1. Various methods of pre-sowing treatments of seed are:
 - Soaking in cool water
 - Soaking in hot water
 - Boiled water treatment
 - Scarification (acid, mechanical, manual) methods
 - Fire or heating methods
 - Soaking in chemicals
 - Alternate wetting and drying
2. The tools/equipment required for Forest nursery management are water can, secateurs, spade, water sprinkler, etc.

UNIT 4.2: Plant Propagation in Forest Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify various techniques of plant propagation.
2. Apply Knowledge of propagation methods for different tree species.

Resources to be Used

- Available objects such as white board, duster, marker, projector, commuter, pens, notepad etc.
- Seed Trays, Plant Labels, Wheelbarrow, Cutting Pliers, Sharp Knife, Bill Hook , etc.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Ask

- What do you know about Plant Propagation ?

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Plant Propagation
 - ✓ Sexual Plant Propagation
 - ✓ Asexual Plant Propagation
- Grafting
- Budding
- Air layering
- Micro- propagation

Demonstrate



- Demonstrate and describe propagation techniques like cuttings, layering and stooling, grafting and budding. Also discuss and show to raise root stocks for grafting and budding.

Team Activity



Purpose : To provide practical training exposure on propagation techniques.. Time may be plan for 1-2 hrs.

Methodology : Hands on experience

Procedure

- Divide the class into three teams.
- Assign each team to perform cuttings, budding and grafting.
- Monitor the demonstration of participants carefully
- Guide them for any corrections.

Notes for Facilitation



- Ask the participants if they have any questions and clarify all doubts of the participants related to raising of forest nursery
- Encourage peer learning among participants in the class by answering other participant's questions

Exercise



Key Solutions to PHB Exercises

1. Various techniques of plant propagation to develop forest nursery are:
 - Sexual Plant Propagation-Sexual plant propagation means developing plant from seed.
 - Asexual Plant Propagation-Vegetative parts of plants such as leaves, stems, and roots are used for propagation. The vegetative methods most often used to produce trees are cuttings, air layering, grafting and micro-propagation.
 - Grafting-Grafting is the joining of parts of plants together in such a way that they unite and continue to grow as a single plant. The part of the plant that becomes the upper portion or top of the new plant is called the scion and the part which becomes the lower portion that includes the root is called the stock or root.
 - Budding-Budding differs from grafting in that only a single lateral bud is used instead of a portion of a stem with several lateral buds as well as a terminal bud.
 - Air layering-In air-layering, the branch to be propagated is girdled by removal of a ring of bark 25 to 38 mm in width.
 - Micro-propagation-It is vegetative propagation under in vitro conditions wherein plants are propagated using miniature plant tissues called explants grown aseptically in test tube or another container.

2. Pre-treatment of *Tectona grandis*:

- Seeds are immersed in cold water for several days
- Weathering method- In the weathering method, seeds are spread over on the ground or a cemented platform in the first week of August. The thickness of spread should be nearly 6 to 9 inches. The seeds are allowed to be weathered up for 6-8 weeks. The seed is turned upside down after every two to three days so that every seed, gets sunlight and shade alternately and constantly.
- Seeds can be placed in a paste of cow dung and water or in fresh dung heap for a few days.
- Teak seeds can be treated with conc. Sulphuric acid or boiling water.
- Alternate soaking and drying for 48 hours each, for 15 days or more.

Pre-treatment of *Acacia nilotica*:

- Immersed in boiled water for 24 to 48 hours.
- Babul seeds obtained from goat pens also germinate well.
- Keeping the seed in moist cow dung heap for 2-3 days
- Putting the seeds in conc. Sulphuric acid for 10-15 minutes.

Pre-treatment of *Melia dubia*:

- Soak the seeds in Cow dung slurry for 48- 72 hours or 4 to 5 days

3. The procedure of stump planting in *Tectona grandis*:

For field planting only stumps prepared from one-year old seedlings are used as these promote faster growth and ideal bole form. Stumps are prepared by cutting away from the seedling everything except 2.5 cm of the shoot and 22.5 cm of the root. The stem portion receives an oblique cut and the root portion a horizontal cut. All laterals from the tap root are pruned away. The stumps should preferably be planted within 2 to 3 days.

4. Mini-stem cutting in *Eucalyptus tereticornis*:

The plants used to set up the micro-clonal hedge are raised from micro-propagated plants from axillary buds or conventional method. The stools are coppiced at a height of 15 cm from ground level. The cut end should be given anti-fungal treatment (blue copper). The coppiced shoots are watered regularly. After 15 days, juvenile shoots are ready for harvest (5 to 10 cm). Each stool would yield 5-14 juvenile shoots. The juvenile cuttings of 5- 8 cm are treated with fungicides and their ends are treated with IBA (4000 ppm). They are then immediately placed in root trainers. The root trainers are kept in controlled/automated mist chambers (more than 80% humidity) at 25-30 °C for 20-25 days and in hardening chambers for up to 20 days and watered twice a day. They are then transferred to open conditions and kept for 5 months to harden before planting in field.

5. Nursery techniques of *Populus deltoids*:

The best time for planting of cuttings is January-February. Spacing for setting of cuttings in nursery beds should be 80 × 60 cm. Planting rods with the lower ends flattened and sharpened like a screwdriver should be used for making the planting holes. Planting rods should have a ring of paint at 22 cm length from the bottom and the same should be given to laborers engaged in planting operation. Planting rod should be inserted at the point of the stake up to the marked with paint, so that the planting holes are neither too long nor too short. Each cutting with its thinner end up should be planted in the hole in such a way that the upper portion is just 2 cm above the ground level. After planting, the soil around each cutting should be compacted gently but firmly without injuring the bark of the cutting. The soil all around the cutting should be drenched with Aldrex emulsion immediately after planting the cutting. 0.2% Aldrex emulsion may be used for this prophylactic measure against termites.

UNIT 4.3: Resource Optimization

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain about resource optimization and its benefits.

Resources to be Used

- Available objects such as white board, duster, marker, projector, commuter, pens, notepad etc.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Resource optimization
- Benefits of Resource optimization

Activity

Purpose : To recall the benefits of resource optimization. This activity may be planned for 20-30 minutes.

Methodology: Pen and paper activity

Procedure :

- Divide the participants into 2 or 3 groups.
- Ask the participants to enlist the benefits of resource optimization
- Get a volunteer out from every group one by one to write the points on the board.
- Then discuss those points with the participants.

Notes for Facilitation

- Arrange relevant handouts and leaflets for better understanding of the topic.
- Arrange audio visual aids showing innovative images.
- Ask them to answer the questions given in the participant handbook.

Exercise



Key Solutions to PHB Exercises

1. Resource optimization is the set of processes and methods to match the available resources (human, machinery, financial) with the needs of the organization in order to achieve established goals. Optimization consists in achieving desired results within a set timeframe and budget with minimum usage of the resources themselves.
2. The benefits of resource optimization are-
 - **Resource scheduling-** Resource scheduling is the process of assigning the right resources to the right tasks. This is done based on the resources' skills, availability, and capacity.
 - **Reduced Overheads And Increased Revenue-** Inefficient use of resources eventually lead to higher expenses in every aspect of running a business. Instead of utilizing the available resources, there might arise the need to buy more resources. However, efficient resource utilization can help reduce these costs along with producing desired results.
 - **Resource leveling-** A mitigation strategy called resource leveling requires a thorough awareness of resource availability and the critical path of the project. When you try to comprehend these components during the project planning stage, the resource leveling process actually starts.



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5. Process of Maintaining the Plants in the Forest Nursery and Transplanting Them

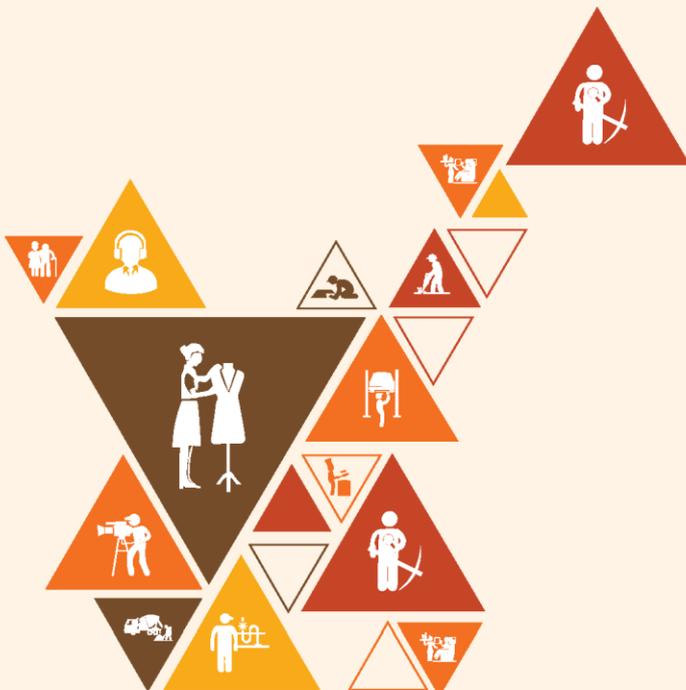
Unit 5.1 - Nursery Management

Unit 5.2 - Nursery Diseases

Unit 5.3 - Pest Management

Unit 5.4 - Maintenance of Clean Environment in a Nursery

Unit 5.5 - Weeds in a Nursery and their Remedies



AGR/N6115

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. Explain the importance of checking nursery plants regularly for healthy growth.
2. State the water requirements of different types of nursery plants.
3. Explain the importance of using green waste/ dried leaves for composting/ organic manure.
4. State the recommended amount of fertilizers/ manure/ compost to apply to nursery plants.
5. Explain the importance of ensuring adequate sunlight and shading for nursery plants.
6. List various signs of insect/ pest/ fungus/ disease infestation in a forest nursery.
7. Explain the importance and ways of maintaining a clean environment along with good air circulation in the nursery to prevent the growth of pathogens.
8. List different types of weed found in a forest nursery and their remedies such as the application of mulch.
9. List the maturity indicators for different varieties of nursery plants.
10. Explain the criteria for segregating waste into appropriate categories.

UNIT 5.1: Nursery Management

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of regular inspection of nursery plants.
2. Explain the importance of using green waste/dried leaves for composting.
3. Explain the importance of ensuring adequate sunlight and shading for nursery plants.

Resources to be Used

- Available objects such as white board, duster, marker, projector, computer, flip charts, pens, papers etc.
- Pruner, Sprayer, Spade, Wheel Barrow, Seed Trays, Plant Labels, Water Pumps And Equipment, Water Cans, Polythene Pipe, etc.

Say

- Greet all participants with smile and appreciate participants for being on time and for participating in this course.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Importance of checking nursery plants regularly
- Leaf Compost/ manure
- Importance of ensuring adequate sunlight and shading for nursery plants

Field Visit

Purpose : To provide practical exposure to different forest nursery management.

Methodology : Field visit and the time varies according to the location, it may be 2 hours.

- Take the participants to nearby nursery.
- Show the participants the leaf compost/manure and some nursery plants.
- Ask the participants to observe nursery carefully.
- At the end of the field visit, answer the query of the participants.

Notes for Facilitation



- Arrange relevant reference material based on content in participant handbook.
- Assist all participants to understand the concept.
- Ensure sufficient pictorial presentation for learning, arrange for visual aids, power point presentations, charts, flip charts etc.

Exercise



Key Solutions to PHB Exercises

1. A nursery plant should be regularly checked and looked out for the following reasons-
 1. To check pest or disease infestation if any.
 2. To ensure the growth and development of seedlings.
 3. To ensure the availability of appropriate conditions for growth.
2. Seedlings that are germination and have recently been transferred require some defence against the bright heat (particularly in the tropics), intense rain, and hard frost (in the temperate regions). The seedlings can benefit from some type of shade to help shield them from the elements. Shading frequently aids in lowering transpiration losses through the leaves, as well as soil and plant temperatures with adequate sunlight,
 1. Plants will have proper growth
 2. Impart attractive colors
 3. Helpful in hardening process of seedlings
3. Leaf compost is made entirely of composted leaves and garden waste. This is used to improve the soil naturally. In our leaf composters, good leaf compost develops over the course of a year. Leaf compost is a fantastic soil improvement that will enable plant roots to absorb more nutrients.

UNIT 5.2: Nursery Diseases

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify various pest and disease in forest nursery.
2. Identify stress conditions, disease symptoms and their causes.

Resources to be Used

- Available objects such as white board, duster, marker, projector, computer, flip charts, pen, notebook etc.
- Power point slides showing related images.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Important Diseases of Trees in Forest Nurseries in India
 - ✓ White Grubs
 - ✓ Cutworms
 - ✓ Termite
 - ✓ Crickets
 - ✓ Minor and Non-insect Pests
 - ✓ Leaf rust
 - ✓ Leaf spot, blight
 - ✓ Powdery mildew etc.

Activity

Purpose : To identify symptoms of pests and diseases and time will be 40-50 minutes.

Methodology : Practical demonstration

- Divide the participants into groups.
- Ask to collect the leaves with demonstrated symptoms.
- Ask the participants randomly to identify the diseases and pest attack based on these symptoms.
- Discuss and clarify all pertaining queries/doubts.

Say



- Thank you everyone for their activity participation.

Notes for Facilitation



- Redirect the questions to other participants to encourage active learning in the class.
- Ask the participants to complete their activities within the given time frame.
- Field demonstration and hands on training is necessary.
- Motivate the non-participating students to take part in the activity.
- Clarify all doubts of the participants.

Exercise



Key Solutions to PHB Exercises

1. Major diseases in forest nursery

- leaf rust- Severely infected and dead seedlings can be burnt away from the nursery. The disease may be controlled in the nursery by the application of Sulfax on both sides of the leaves.
- White root rot- Affected plants should be uprooted and destroyed. Drenching of soil around affected plants with 0.1 per cent Bavistin was also found effective to check the disease.
- Alternaria leaf spot- Application of Blitox fungicide (0.2%) at fortnightly intervals is found very effective.
- Damping off- The disease has been managed through cultural practices aimed at favouring plant growth and discouraging the growth of plant pathogen
- Powdery mildews- Sulphur dust was most effective in controlling powdery mildew in two-year-old seedlings
- Major pests in forest nursery:
 - White grubs- Deep ploughing, soil solarisation, poisoning and using light traps are some control measures against white grub attack.
 - Cutworms- Dusting of seed bed with a mixture of quicklime and ash or 1.5% quinalphos will control the insect
 - Termite- It can be controlled by keeping the nursery cleared of wood debris and application of termiticides such as chlorpyrifos.
 - Crickets- Deep ploughing during nursery site preparation, application of 200 g phorate can control the pest.
 - Defoliators (beetles, weevils and caterpillars)- Apply of 100 g dose per bed of phorate 10% Teak

2. The various nursery pest and disease of *Tectona grandis* are teak leaf rust, leaf blight, leaf spots, powdery mildew, white grub, crickets, teak defoliators, etc.

UNIT 5.3: Pest Management

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the use of appropriate disease control measures.
2. Explain the use approved techniques to inspect quality of soil.
3. Identify composition and ensure sterilization of nursery bed & soil mixture.

Resources to be Used

- Available objects such as white board, duster, marker, projector, laptop etc.
- Power point presentation showing specific innovative images of diseases in different tree species.

Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Nursery Pests and their Managements
 - ✓ White Grubs
 - ✓ Cutworms
 - ✓ Termite
 - ✓ Crickets
 - ✓ Minor and Non-insect Pests
- Management of Poplar Diseases

Field Visit

Purpose: To provide practical exposure to different forest nursery diseases and pest management control measures. This activity may be planned for 1-2 hours or depends on the distance of location.

Methodology : Field visit

- Organize a field visit to forest nursery with the participants.
- Arrange for some recommended chemical pesticides and demonstrate solution preparation method for spray.
- Show how diseased patches are treated and soil is drenched.
- Give chance to participants for practicing disease management techniques.

Notes for Facilitation



- Redirect the questions to other participants to encourage active learning in the class.
- Ask the participants to complete their activities within the given time frame.
- Field demonstration and hands on training is necessary.
- Motivate the non-participating students to take part in the activity.
- Clarify all doubts of the participants.

Exercise



Key Solutions to PHB Exercises

1. Various types of irrigation methods in forest nursery are: Overhead irrigation sprinkler, Hand watering, Drip irrigation or Micro irrigation.
2. Integrated nutrient management in nursery:

Sixteen plant food nutrients are essential for proper seedling development. Each is equally important to the plant, yet each is required in vastly different amounts. Among them the primary (macro) nutrients (nitrogen, phosphorus, and potassium) are most frequently required in nursery. Any deficiency of nutrients will be expressed by seedlings through deficiency symptoms; accordingly, the relevant fertilizer should be applied as per requirement. For general nutrient support, FYM and compost is mostly used in nurseries where the available soils are either too sandy or too heavy and of low quality. It helps to build a good soil structure, improves water holding capacity of the soil and provides nutrients for plants. It greatly reduces the need for chemical fertilizers and, when mixed with small amounts, dilutes the fertilizer, making it available in much larger useful quantities. It is therefore an economic way of using available chemical fertilizers and is itself a natural fertilizer, very similar to humus. Meanwhile, using of bio-fertilizers such as *Azotobactor*, *Azospirillum* and *Phosphobacteria* @ 5 to 10 g and vermicompost, VAM @ 10 to 50 g per container raised seedlings are also suggested to boost the growth of seedlings.

UNIT 5.4: Maintenance of Clean Environment in a Nursery

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance and ways of maintaining a clean environment along with good air circulation in the nursery.

Resources to be Used

- Available objects such as white board, duster, marker, projector, laptop etc.
- Power point presentation showing related images.

Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

Ask

- What do you understand by waste ?

Explain

- A product or substance that is no longer suitable for its intended use is referred to as waste.

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Importance and ways of maintaining a clean environment in the nursery
- Definition and criteria for waste segregation

Activity



Purpose: To acquaint about criteria for waste segregation. This activity may be planned for 20-30 minutes.

Methodology : Pen and Paper activity

- Ask each participants to list out the criteria for waste segregation.
- Ask 4-5 participants to stand randomly and share the findings among their peers.
- Encourage them to participate in the discussion and clear doubts.

Notes for Facilitation



- Redirect the questions to other participants to encourage active learning in the class.
- Ask the participants to complete their activities within the given time frame.
- Field demonstration and hands on training is necessary.
- Motivate the non-participating students to take part in the activity.
- Clarify all doubts of the participants.

Exercise



Key Solutions to PHB Exercises

1. Importance of maintaining clean environment in a nursery:
An often-overlooked requirement for a healthy nursery is good air circulation. Air movement around plants is just as crucial as sunlight, water, and organic matter. For nursery plants, air circulation not only regulates the temperature but also stops moisture and humidity from promoting the development of mold and bacteria. Refer section 5.4.1.
2. At all entrances to clean areas, provide disinfection footbaths or other decontamination tools (brushes and disinfectant sprayers) for cleaning shoes. Refer section 5.4.1.
3. A product or substance that is no longer suitable for its intended use is referred to as waste. While trash from human activities is frequently very robust and takes a very long time to disintegrate in natural ecosystems, waste from human activities is typically used as food or a reactant (e.g., oxygen, carbon dioxide, and dead organic matter).
4. Criteria for waste segregation :
 - Keep dry and moist garbage in different containers in the kitchen.
 - For the remainder of the household waste, keep two bags for dry waste collection: one for paper and one for plastic.
 - Drop clean, dry plastic from the kitchen into the dry waste container. Keep all glass and plastic containers well cleaned of food.
 - Every day, remove wet waste from the house. Once per week, store and remove dry waste from the house.

UNIT 5.5: Weeds in a Nursery and Their Remedies

Unit Objectives

After the completion of this unit, the participant will be able to:

1. List different types of weed found in a forest nursery.

Resources to be Used

- Available objects such as white board, duster, marker, projector, computer, flip charts, pens, papers etc.
- Power point slides on weeds and its types.
- Teaching aids such as charts/posters showcasing methods of eradication of weeds.
- Samples of different herbicides used to control weeds.

Ask

- What is weed?
- What are different types of weed?
- How weeds can be controlled?

Explain

With the help of PHB or Audio-Visual aids, explain:

- Weed definition.
- Perennial and Annual weeds

Elaborate

With the help of PHB or Audio-Visual aids, elaborate:

- Importance and ways of maintaining a clean environment in the nursery
- Definition and criteria for waste segregation

Activity

Purpose : To know about different weed control methods.

Methodology : Pen and paper activity and it may be planned for 30 minutes.

- Divide the participants into 6 groups.
- Ask each group to write short note on a given topic.
- No group should be given the same topic.
- Topics will be different control methods :
 - ✓ Preventive measures
 - ✓ Mechanical measures
 - ✓ Physical measures
 - ✓ Mulches
 - ✓ Biological weed control
 - ✓ Herbicides
- Ask each participant to maintain the records with the help of Participants handbook.
- Facilitate the participants to help them to maintain the record.
- Address any queries of the participants.

Notes for Facilitation

- Encourage participants to use biological methods to control weeds.
- Involve participants in different weed control programs for providing assistance.
- Put a chart of chemicals in the workshop with regard to uses and their doses required for different categories or types of weeds.
- Give project to trainees to collect information on the presence of different kinds of weeds in agricultural fields.

Exercise

Key Solutions to PHB Exercises

1. *Sorghum halepense*, *Cynodon dactylon*, *Alopecurus myosuroides*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, *Poa annua*, and *Setaria spp.* are the most prevalent grass weed species found in the forest nurseries.
2. **Preventive measures:**
Preventing the spread of weeds is the major objective of preventive methods. Preventive measures include any actions taken to protect a surface from weeds, i.e., to stop the spread of weed seeds in a field. The following are preventative techniques for weed control in forestry: -
 - Control is facilitated by sowing only pure crop seeds, which stops weeds from spreading over sowed surfaces.
 - Weeds that are a persistent source of weediness and the transmission of seeds to arable lands are eliminated from non-agricultural areas.

Mechanical measures

Basic weed control techniques like as ploughing, disking, tilling, and others are used mechanically. Hoeing and farrowing, which are done throughout the majority of the vegetation period and are particularly stressed over the entire spring and in the early summer, are additional frequent actions in forest nurseries and plantations.



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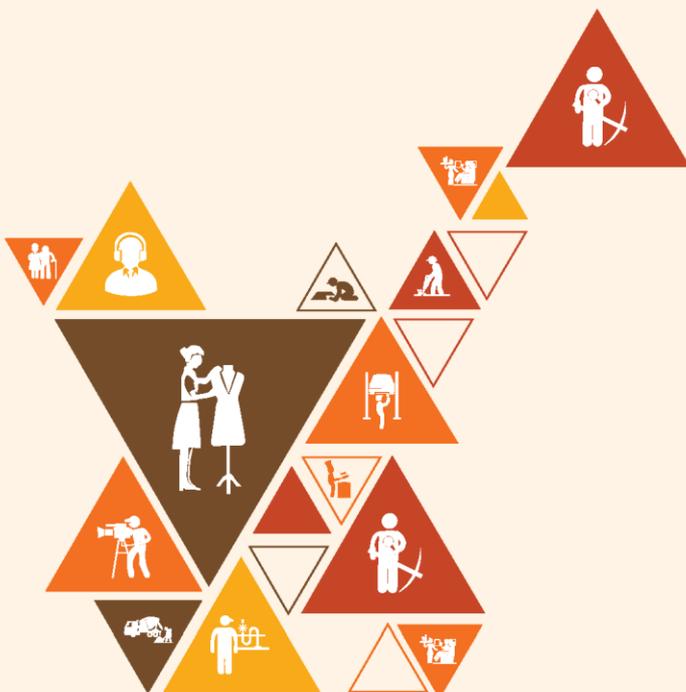
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6. Marketing and Inventory Management

Unit 6.1 - Market Related Activities and Regulations

Unit 6.2 - Government Schemes for Forest Products

Unit 6.3 - How to Report Inappropriate Behaviour



AGR/N6116

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. State the applicable government schemes/ assistance offered in the marketing of forest nursery produce.
2. State the relevant regulations governing the collection and trading of agro forestry produce.
3. Describe the process of identifying market demand for plant species and subsequently deciding the quantity and time of supplying.
4. List various labeling requirements for forest nursery produce.
5. Explain how to set a price for the forest nursery to produce in compliance with the guidelines of the market control body.
6. State various costs to account for while setting the price of forest nursery to produce.
7. Explain how to identify the demand and market rate for nursery plants.
8. State different ways of connecting with potential buyers.
9. Explain how to assess a buyer's need.
10. Describe the process of accepting and fulfilling orders.
11. State relevant laws applicable to the sale and purchase of nursery plants.
12. Explain the procedure to report inappropriate behaviour e.g., harassment.

UNIT 6.1: Market Related Activities and Regulations

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the relevant regulations governing the collection and trading of agro forestry produce.
2. Describe the process of identifying market demand for plant species.
3. List various labeling requirements for forest nursery produce.
4. Identify the demand and market rate for nursery plants.
5. Explain different ways of connecting with potential buyers

Resources to be Used

- Available objects such as white board, duster, marker, overhead projector, laptop, pen, notebook etc.
- Power point presentation showing related images.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Elaborate

With the help of PHB or audio-visual aids, elaborate :

- Regulations governing the collection and trading of agroforestry produce
- How to Estimate Market Demand of Plant species
 - ✓ Use past sales to estimate future demand
 - ✓ Use publicly available market data
 - ✓ Conduct market studies
- What is FSC ?
- Track Prices Prevailing in the Market and Formulate Competitive Pricing Mechanism
- Process of accepting and fulfilling orders
 - ✓ Receiving Inventory
 - ✓ Inventory Storage
 - ✓ Order Processing
 - ✓ Packing
- Laws applicable to the sale and purchase of nursery plants

Team Activity

Purpose : To remember market related activities and regulations . The tentative time will be 1 hour.

Methodology : Quiz

Procedure :

- Divide the class into two groups.
- In turns ask the quiz questions to the groups.
- If the answer is incorrect pass the questions to other group.
- Share the answer if the groups are not able to answer.
- Congratulate the participants who answered correctly

Do

- Encourage the students to actively participate in the activity.
- Encourage the non-participants to open up and speak up.
- Share your own thoughts and view points related to the topic.

Notes for Facilitation

- Help the participants to complete all the tasks involved in the participant hand book.
- Motivate the participants by involving them in sense of participation and the realization of the importance of their work .
- Assist all participants to understand the concept.
- Ensure sufficient pictorial presentation for learning, arrange for visual aids, power point presentations, charts, flip charts etc.

Exercise

Key Solutions to PHB Exercises

1. Laws applicable to the sale and purchase of nursery plants-Refer section 6.1.4.
2. By asking questions about the personal needs and preferences, taking into consideration the market demand one can assess the buyer's needs. The creation of buyer personas, which are comprehensive representations of the various audience segments, is a fantastic place to start when determining the demands of your customers. These personas can comprise client demographic data as well as their objectives, needs, and pain points.
3. In one or more distribution centres, the process of filling orders takes place. It often entails inventory management, supply chain management, order processing, quality control, and assistance for customers who need to report issues or exchange or return products. Refer section 6.1.3.
4. Any wood or paper product with the FSC mark has been produced using the highest sustainability standards, with raw materials sourced from sustainably managed forests and by businesses along the supply chain. In this approach, FSC certification promotes the health and vitality of forests while giving manufacturers, brands, and consumers access to a range of sustainable and ethical forest products. The Woodland Trust, Greenpeace, and WWF are just a few of the prominent environmental charities that support the FSC wood certification programme.

5. With faster economic growth and population growth, there is a rising need for wood-based products. In addition to destroying forests for soyabean and palm oil plantations, the demand for forest-related products like timber, pulp, paper, and rubber is causing a loss of natural forest resources that cannot be replaced.
6. Demand estimation has several advantages. However, it might be challenging to actually estimate demand. Fortunately, there are numerous approaches that may be used to predict demand because it is such a crucial business function. For more, refer section 6.1.2.

UNIT 6.2: Government Schemes for Forest Products

Unit Objectives

After the completion of this unit, the participant will be able to:

1. State laws applicable to the sale and purchase of nursery plants.

Resources to be Used

- Available objects such as white board, duster, marker, projector, laptop, charts, pen, notepad etc.
- PowerPoint slides indicating different governments schemes.

Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

Elaborate

With the help of PHB or audio-visual aids, elaborate :

- Applicable government schemes offered in the marketing of forest nursery produce

Activity

Purpose : To recall the different government schemes. Time may be plan for 15 minutes.

Methodology : Pen and Paper activity

- Ask each participants to enlist different government schemes.
- Ask 4-5 participants to stand randomly and share the findings among their peers.

Do

- Encourage the non-participating students to participate actively.
- Appreciate the efforts the students participating in the activity.

Notes for Facilitation



- Check out different Government schemes. Share the information with the participants.
- You can tell them about the government websites like Start Up India, mudra.org.in etc.
- Discuss about various schemes and policies by the Government of India for forest nursery produce.

Exercise



Key Solutions to PHB Exercises

1. Some schemes applicable for sale and purchase of forest products
 - Haryana Integrated Natural Resource Management and Poverty Reduction Project
 - Rajasthan Forestry and Biodiversity Project
 - Tamil Nadu Afforestation Project II
 - Karnataka Sustainable Forest Management and Biodiversity Conservation Project
 - Swan River Integrated Watershed Management Project

UNIT 6.3: How to Report Inappropriate Behavior

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the procedure to report inappropriate behavior.

Resources to be Used

- Available objects such as white board, duster, marker, projector, laptop, pen, papers, etc.

Say

- Greet the participants and revise the key learnings of previous session discussion.

Explain

With the help of PHB or audio-visual aids, explain :

- Procedure to report inappropriate behaviour

Activity

Purpose : To learn how to make a report of inappropriate behaviour. Time may be plan for 15 minutes.

Methodology : Pen and Paper activity

- Ask each participants to write the procedure to report inappropriate behaviour.
- Ask 4-5 participants to stand randomly and share the findings among their peers.

Do

- Appreciate the students for the participating in the activity.

Notes for Facilitation



- Ask the participants if they have any questions and clarify all doubts of the participants.
- Encourage the non-participants to participate in the activity.
- Prearrange pictures, posters, power point slides related to topic.
- Clarify the doubts the participants regarding the topic.

Exercise



Key Solutions to PHB Exercises

1. Any inappropriate behavior at workplace must be formally reported to forest supervisor. The supervisor/incharge will take responsive actions according to the anti harassment policy of the area according to the type of harassment (verbal, non-verbal and sexual) reported. The senior should treat all these complaints with utmost confidentiality and disclose the information strictly on need to know basis. All the information pertaining to complain or ongoing investigation under this policy is to be maintained under secure files. Written complaints should be submitted as soon as possible after an incident has occurred. Then, the senior/supervisor must notify about the same to senior management and discuss the case with legal team. After confirmation of alleged violation in policy through investigation, written reports of findings are submitted. Appropriate action is then taken on the basis of severity, frequency, pervasiveness of conduct and quality of evidence. Same report is also reviewed by senior management and disciplinary action is taken. Complainant and respondent, both may pursue formal legal procedures outside the policy through local, state and federal agencies or court.



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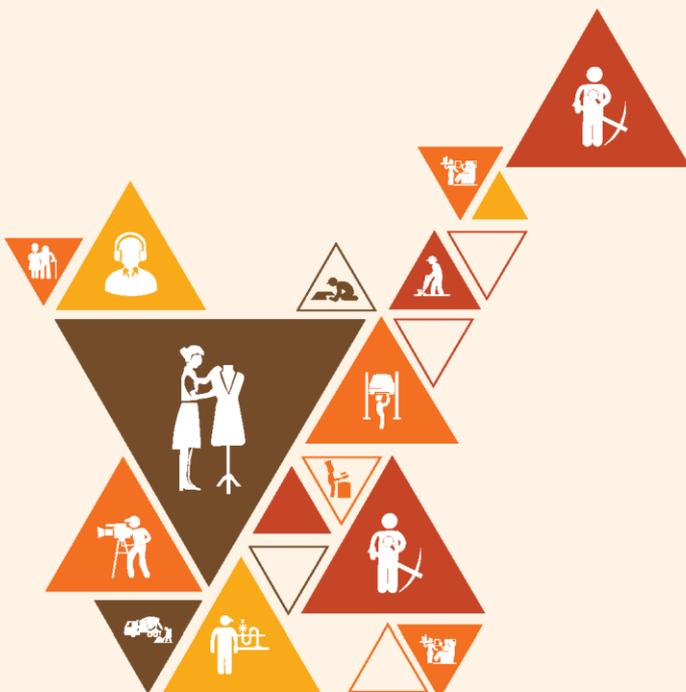
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7. Hygiene and Cleanliness

Unit 7.1 - Hygiene and Workplace Housekeeping



AGR/N9903

Key Learning Outcomes



After the completion of this module, the participant will be able to:

1. Explain the requirements of personal health, hygiene and fitness at work.
2. Describe common health-related guidelines laid down by the organizations/ Government at the workplace.
3. Explain the importance of good housekeeping at the workplace.
4. Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases.

UNIT 7.1: Hygiene And Workplace Housekeeping

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the requirements of personal health, hygiene and fitness at work.
2. Describe general health guidelines set by organizations / Govt. at the work place.
3. Explain the importance of Good Housekeeping at the work place.
4. Explain the importance of notifying the designated authority on personal health issues related to injuries and infectious diseases .

Resources to be Used

- Available objects such as computer, projector, pens, paper, white board, marker, flip chart, audio-visual aids, etc.

Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

Elaborate

With the help of PHB or audio-visual aids, elaborate :

- What is personal hygiene ?
- How to manage your personal hygiene
- General health guidelines at workplace by organizations/Government
- Importance of Good Housekeeping at Workplace
- Notifying designated authority on personal health issues related to injuries and infectious diseases

Activity

Purpose : To learn about how to manage personal hygiene. Time may be plan for 15 minutes.

Methodology : Pen and Paper activity

- Ask each participants to write down how to manage your personal hygiene.
- Ask 4-5 participants to stand randomly and share the findings among their peers.

Do

- Appreciate the efforts the students participating in the activity.
- Discuss management of personal hygiene practices.

Notes for Facilitation

- Familiarize all the participants with hygiene and workplace housekeeping.
- Ask the participants if they have any questions and clarify all doubts of the participants.
- Clarify the doubts the participants regarding the topic.

Exercise**Key Solutions to PHB Exercises**

1. Manage your personal hygiene :
 - Wash daily
 - Clean hair
 - Clean clothes
 - Keeping nails clean
 - Oral hygiene
2. Refer section 7.1.3.
3. Effective housekeeping can help control or eliminate workplace hazards.

Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. List the PPE required at the workplace.
2. Describe the commonly reported hazards at the workplace.
3. Describe the hazards caused due to chemicals/pesticides/fumigants.
4. Describe the basic safety checks to be done before the operation of any equipment/machinery.
5. Describe the common first aid procedures to be followed in case of emergencies.
6. State measures that can be taken to prevent accidents and damage s at the workplace.
7. Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures.
8. State common health and safety guidelines to be followed at the workplace.

UNIT 8.1: Emergency Procedures and First Aid

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain site inspection and reporting on a regular basis.
2. Ensuring prevention of accidents and loss.
3. Explain workplace safety using Personal Protective Equipment (PPE).
4. Explain dealing with accidents, fires and emergencies.
5. Explain use of emergency evacuation.
6. Explain administer first aid.
7. Follow the do's and don'ts related to security.

Resources to be Used

- Available objects such as a participant handbook, white board, duster, flip chart board/paper etc.
- Slides in power point presentation showing relevant images.

Say

- Good day and welcome all the participants to the training session. Recall the key points of previous session discussion.

Elaborate

With the help of PHB or audio-visual aids, elaborate :

- Workplace Investigation and Reporting Issues
- Prevention of Accidents and Losses
- Personal Protective Equipment
- Hazards, Accidents, Fires and Emergencies
- Emergency evacuation routes and exit signs
- First Aid
- India emergency helpline number

Activity

Purpose : To learn about the purpose of first aid . Time may be plan for 15 minutes.

Methodology : Pen and Paper activity

- Ask each participants to write down purpose of first aid
- Ask 4-5 participants to stand randomly and share the findings among their peers.

Do

- Appreciate the efforts the students participating in the activity.
- Discuss general rules to be followed as a first aid provider

Notes for Facilitation

- Describe all the mentioned topics with the help of appropriate audio-visual aids.
- Arrange the personal protective equipment for live demonstration of using PPEs.
- Prepare a chart describing basic emergency first aid procedure.
- Arrange first aid kit to demonstrate first aid technique.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. General hygiene steps in the workplace include washing hands regularly, keeping the workplace clean and tidy , wearing appropriate personal protective equipment , using proper waste disposal methods, and avoiding touching your face.
2. If you suspect a case of COVID-19 at the workplace , the courses of action to be taken include immediately isolating the suspected case, providing medical attention, informing local health authorities, conducting contact tracing, and following the guidance of public health officials.
3. First aid refers to the immediate and temporary care given to a person who has been injured or taken ill. The goal of first aid is to preserve life, prevent further injury , and promote recovery . Example of first include controlling bleeding, performing CPR, and treating burns or shock.
4. Fire extinguisher categories are Class A (for fires involving ordinary combustibles such as wood or paper), Class B (for fires involving flammable liquids or gases), Class C (for fires involving electrical equipments), Class D (for fires involving flammable metals), and Class K (for fires involving cooking oils or fats).
5. The first aid measures in case of a fracture include immobilizing the injured area with a splint or sling, applying ice to reduce swelling, providing pain relief medication, and seeking medical attention as soon as possible. It is important to avoid moving the injured person and to keep them warm and comfortable until medical help arrives.

B. Fill in the blanks

1. Emergency Evacuation
2. Hazard Control Program
3. Ordinary Combustibles
4. 112
5. 101
6. 18004251213



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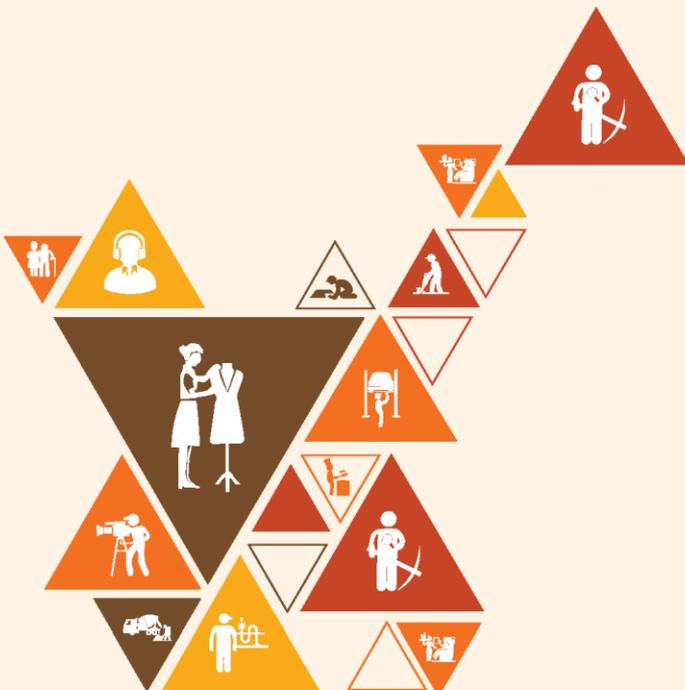
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9. Employability Skills (60 Hours)

To access content on Employability Skills, click here:

<https://eskillindia.org/NewEmployability>

Scan the QR code below to access the ebook



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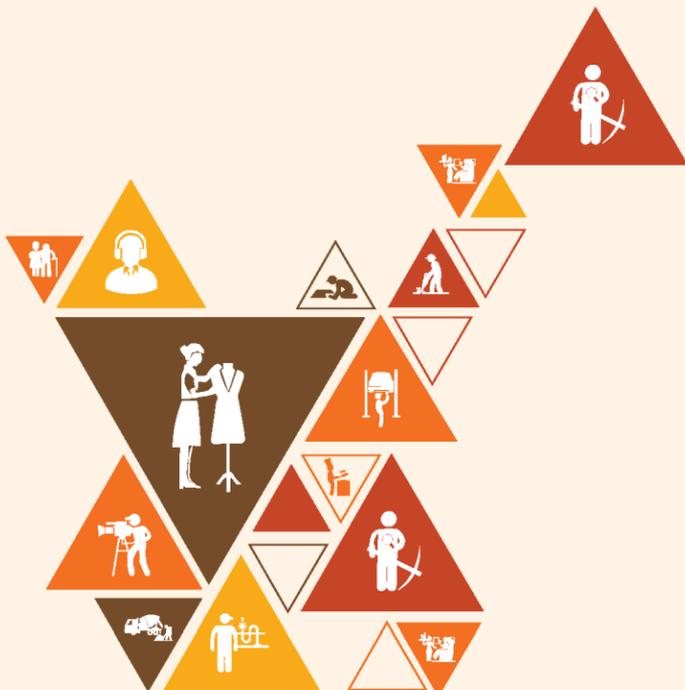
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10. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - QR Codes –Video Links



Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	Forest Nursery Raiser		
Qualification Pack Name & Ref. ID	AGR/Q6103		
Version No.	3.0	Version Update Date	17/11/2022
Pre-requisites to Training (if any)	10th Class (Pass) with 2 Years of experience in the relevant field OR 10th Class + I.T.I (1 year after Class 10th) with 1 Year of experience relevant experience OR 10th Class + I.T.I (2 years after 10th Class) OR 10th Class (pass and pursuing continuous regular schooling) OR 8th Class (Pass + I.T.I- 2 years) with 2 Years of experience relevant experience OR Certificate-NSQF (Level-3) with 2 Years of experience relevant experience		
Training Outcomes	<p>At the end of the program, the learner should have acquired the listed knowledge and skills to:</p> <ul style="list-style-type: none"> Describe the process of preparing for setting up the forest nursery. Demonstrate the process of preparing the nursery bed and infrastructure. Demonstrate the process of propagating plants in the forest nursery. Demonstrate the process of maintaining plants in the forest nursery and transplanting them. Demonstrate the process of performing marketing and inventory management. Describe the process of undertaking employability and entrepreneurial practices. Demonstrate various practices to maintain personal hygiene, cleanliness, and safety at the work. 		

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
1	Introduction to the role of a Forest Nursery Raiser T: 05:00 (HH:MM)	1. Size and scope of Agriculture Industry and its Sub- Sectors-I	<ul style="list-style-type: none"> Explain the size and scope of the agriculture industry and its sub-sectors 	Bridge Module	Classroom lecture, discussion, team activity	Participant handbook, white board, marker, duster, computer, projector, flip charts, pen, notebook, etc.	T: 2:00
		2. Size and scope of Agriculture Industry and its Sub- Sectors-II	<ul style="list-style-type: none"> Explain the role and responsibilities of a Nursery Raiser Identify various employment opportunities for Forest Nursery Raiser 		Classroom lecture, discussion, team activity	Participant handbook, white board, marker, duster, computer, projector, flip charts, pen, notebook, etc.	T: 3:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
2	Preparation for setting up the forest nursery T: 15:00 P: 40:00 (HH:MM)	1. Site Selection of Forest Nursery	<ul style="list-style-type: none"> Identify and select appropriate site for nursery establishment 	AGR/N6112 PC1-PC4, KU1, GS1- GS10	Classroom lecture, field visit	PHB, White board, duster, flip chart board/paper etc., PPT showing related images.	T: 2:00 P: 5:00
		2. Construction of Forest Nursery-I	<ul style="list-style-type: none"> Construct forest nursery as per operational requirements 	AGR/N6112 PC10, KU10, GS1-GS10	Classroom lecture, field visit, demonstration	PHB, White board, duster, flip chart board/paper etc., Plastic Sheet, Spades, Barbed Wire, Mesh Wire, Wooden or R.C.C. Poles, "U" Nails, Hammer, etc.	T: 1:00 P: 5:00
		3. Construction of Forest Nursery-II	<ul style="list-style-type: none"> Comply with the occupational health & safety requirements relevant to work Explain the prevailing state laws and legal policies in the local forest area 	AGR/N6112 PC3, PC24, KU7, GS1- GS10	Classroom lecture, field visit, demonstration	PHB, White board, duster, flip chart board/paper etc., Prismatic Compass, Plain Table with Accessories Abneys' level, Measuring Tape, Ranging rod, Arrows, etc.	T: 2:00 P: 5:00
		4. Types of forest nursery	<ul style="list-style-type: none"> Explain the types of forest nursery 	AGR/N6112 PC8, KU9, GS1-GS10	Classroom lecture, activity, demonstration	PHB, White board, duster, flip chart board/paper etc, PPT showing related images.	T: 2:00 P: 5:00
		5. Seed selection	<ul style="list-style-type: none"> Explain the various essential details to be obtained while buying Seeds and Propagules. 	AGR/N6112 PC5, PC22, KU5, GS1- GS10	Classroom lecture, activity, demonstration	PHB, White board, duster, flip chart board/paper etc., PPT showing related images.	T: 2:00 P: 5:00
		6. Rules governing the forest nursery establishment	<ul style="list-style-type: none"> Describe the laws applicable for setting up forest nurseries. 	AGR/N6112 PC3, KU7, GS1-GS10	Classroom lecture, activity, presentation	PHB, White board, duster, flip chart board/paper etc., PPT showing related images.	T: 2:00 P: 5:00
		7. Detection of pathogen and appropriate plants for a nursery	<ul style="list-style-type: none"> Explain techniques for detecting the presence of pathogens in soil. 	AGR/N6112 PC5, KU8, GS1-GS10	Classroom lecture, field visit, demonstration	PHB, White board, duster, flip chart board/paper etc., Strainer or Cable Puller or Iron Rod Hook, Coaster, Enamel Paints, etc.	T: 2:00 P: 5:00
		8. Planting systems and management	<ul style="list-style-type: none"> Explain the benefits of poly culture and multilevel planting systems 	AGR/N6112 PC11, KU13, GS1-GS10	Classroom lecture, activity, presentation	PHB, White board, duster, flip chart board/paper etc., PPT showing related images.	T: 2:00 P: 5:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
3	Process of preparing the nursery bed and infrastructure T: 10:00 P: 20:00 (HH:MM)	1. Preparation of Forest Nursery Beds-I	<ul style="list-style-type: none"> Prepare the nursery bed preparation 	AGR/N6113 PC10, PC11, KU5, KU6, GS1-GS9	Classroom lecture, team activity, practical, demonstration	PHB, White board, duster, flip chart board/paper etc., Spades, (Small & Large), Pickaxes, Wooden Hammer, Ropes, Cotton Or Steel Tape, Wooden Pegs, Shovels, Khurpa, Sickle, Axes, Wooden Planks, Bricks, Stones, etc.	T: 2:00 P: 4:00
		2. Preparation of Forest Nursery Beds-II	<ul style="list-style-type: none"> Explain the proper level of soil moisture for tillage and hoeing. Describe the process of soil sterilization through solarization. 	AGR/N6113 PC2, PC3, PC7, KU1, KU3, GS1-GS9	Classroom lecture, team activity, practical, demonstration	PHB, White board, duster, flip chart board/paper etc., Boxes, Plastic Buckets, Watering cans, Wire Cutters, etc.	T: 2:00 P: 4:00
		3. Systems and Process in a nursery - I	<ul style="list-style-type: none"> Explain the importance of getting a soil test done 	AGR/N6113 PC8, KU4, GS1-GS9	Classroom lecture, activity, presentation	PHB, White board, duster, flip chart board/paper etc., PPT showing related images.	T: 2:00 P: 4:00
		4. Systems and Process in a nursery - II	<ul style="list-style-type: none"> Explain the importance of setting up micro irrigation/ fertilizer systems 	AGR/N6113 PC12, KU7, GS1-GS9	Classroom lecture, activity, presentation	PHB, White board, duster, flip chart board/paper etc., PPT showing related images, Germination Trays, Iron Pan, etc.	T: 2:00 P: 4:00
		5. Systems and Process in a nursery - III	<ul style="list-style-type: none"> Explain the importance and methods of extracting water from a forest nursery 	AGR/N6113 PC14, KU8, GS1-GS9	Classroom lecture, activity, presentation	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 2:00 P: 4:00
4	Propagation of plants in the forest nursery T: 10:00 P: 20:00 (HH:MM)	1. Pre-seed Treatment - I	<ul style="list-style-type: none"> Describe the concept of pre-seed treatment of forest tree species 	AGR/N6114 PC2, KU2, GS1-GS8	Classroom lecture, activity, demonstration	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. G.I. Net For Sieving Sand And Soil, Wooden Seed Box, etc.	T: 2:00 P: 4:00
		2. Pre-seed Treatment - II	<ul style="list-style-type: none"> Identify various tools/equipments used in forest nursery 	AGR/N6114 PC11, KU10, GS1-GS8	Classroom lecture, activity, demonstration	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Knife, Wire, Pruning Scissor, Secateurs, Seed Trays, Plant Labels, etc.	T: 2:00 P: 4:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
		3. Plant Propagation in Forest Nursery - I	<ul style="list-style-type: none"> Identify various techniques of plant propagation 	AGR/N6114 PC7, KU6, GS1-GS8	Classroom lecture, team activity, demonstration, practical	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Thick Poly Bags, Canes, Container Or Glass Jar, etc.	T: 2:00 P: 4:00
		4. Plant Propagation in Forest Nursery - II	<ul style="list-style-type: none"> Apply propagation methods for different tree species 	AGR/N6114 PC7, KU6, GS1-GS8	Classroom lecture, team activity, demonstration, practical	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Thick Poly Bags, Canes, Container Or Glass Jar ,etc.	T: 2:00 P: 4:00
		5. Resource Optimization	<ul style="list-style-type: none"> Explain about resource optimization and its benefits. 	AGR/N6114 PC10, KU9, GS1-GS8	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 2:00 P: 4:00
5	Process of maintaining the plants in the forest nursery and transplanting them T: 10:00 P: 20:00 (HH:MM)	1. Nursery Management	<ul style="list-style-type: none"> Explain the importance of regular inspection of nursery plants Explain the importance of using green waste/dried leaves for composting Explain the importance of ensuring adequate sunlight and shading for nursery plants 	AGR/N6115 PC1, PC3, PC4, KU1, KU3 – KU5, GS1-GS9	Classroom lecture, field visit, practical	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Pruner, Sprayer, Spade, Wheel Barrow, Seed Trays, Plant Labels, etc.	T: 2:00 P: 4:00
		2. Nursery Diseases	<ul style="list-style-type: none"> Identify various pest and disease in forest nursery Identify stress conditions, disease symptoms and their causes 	AGR/N6115 PC7-PC9, KU6, KU7, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Water Cans, Polythene Pipe, Sprinkler, etc.	T: 2:00 P: 4:00
		3. Pest Management	<ul style="list-style-type: none"> Explain the use of disease control measures Explain the techniques to inspect quality of soil Identify composition and ensure sterilization of nursery bed & soil mixture 	AGR/N6115 PC9, PC10, KU7, KU8, GS1-GS9	Classroom lecture, field visit, practical	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Atomizer For Irrigating Minute/Small Seeded Nursery, etc.	T: 2:00 P: 4:00
		4. Maintenance of Clean Environment in a Nursery	<ul style="list-style-type: none"> Explain the ways of maintaining a clean environment along with good air circulation in the nursery 	AGR/N6115 PC10, KU8, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 2:00 P: 4:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
		5. Weeds in a Nursery and their Remedies	<ul style="list-style-type: none"> List different types of weed found in a forest nursery 	AGR/N6115 PC13-PC16, KU11, KU12, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Shears, Chemicals , etc.	T: 2:00 P: 4:00
6	Marketing and inventory management T: 20:00 P: 10:00 (HH:MM)	1. Market Related Activities and Regulations - I	<ul style="list-style-type: none"> Explain the relevant regulations governing the collection and trading of agro forestry produce 	AGR/N6116 PC1, PC2, KU1, KU2, GS1-GS9	Classroom lecture, presentation, team activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 4:00 P: 2:00
		2. Market Related Activities and Regulations - II	<ul style="list-style-type: none"> Describe the process of identifying market demand for plant species. List various labeling requirements for forest nursery produce. 	AGR/N6116 PC3, PC10, KU3, KU4, GS1-GS9	Classroom lecture, presentation, team activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related Images. Plant Labels, Tray.	T: 4:00 P: 2:00
		3. Market Related Activities and Regulations - III	<ul style="list-style-type: none"> Identify the demand and market rate for nursery plants. Explain different ways of connecting with potential buyers. 	AGR/N6116 PC3, KU7, KU8, GS1- GS9	Classroom lecture, presentation, team activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images. Plant Labels, Tray.	T: 4:00 P: 2:00
		4. Government schemes for forest products	<ul style="list-style-type: none"> State laws applicable to the sale and purchase of nursery plants. 	AGR/N6116 PC20, KU14, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 4:00 P: 2:00
		5. How to report inappropriate behaviour	<ul style="list-style-type: none"> Explain the procedure to report inappropriate behaviour. 	AGR/N6116 PC19, KU12, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., PPT slides show related images.	T: 4:00 P: 2:00
7	Hygiene and cleanliness T: 03:00 P: 03:00 (HH:MM)	1. Hygiene and Workplace Housekeeping	<ul style="list-style-type: none"> Explain the requirements of personal health, hygiene and fitness Describe general health guidelines set by organizations / Govt. Explain the importance of Good Housekeeping Explain the importance of notifying the designated authority on personal health issues related to injuries and infectious diseases 	AGR/N9903 PC1-PC4, KU1, KU2, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., slides in PPT showing relevant images PPE, Cleaning Equipment and Materials, Sanitizer, Soap, Mask	T: 3:00 P: 3:00

S.No.2	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
8	Safety and emergency procedures T: 17:00 P: 07:00 (HH:MM)	1. Emergency Procedures and First Aid-I	<ul style="list-style-type: none"> Explain site inspection and reporting on a regular basis Ensuring prevention of accidents and loss 	AGR/N9903 PC20, KU3, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., slides in PPT showing relevant images. PPE, First Aid Kit, Equipment used in Medical Emergencies.	T: 6:00 P: 2:00
		2. Emergency Procedures and First Aid-II	<ul style="list-style-type: none"> Explain workplace safety using Personal Protective Equipment (PPE) Explain dealing with accidents, fires and emergencies 	AGR/N9903 PC6, PC16, KU8, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., slides in PPT showing relevant images. PPE, First Aid Kit, Equipment used in Medical Emergencies.	T: 6:00 P: 2:00
		3. Emergency Procedures and First Aid-III	<ul style="list-style-type: none"> Explain use of emergency evacuation Explain administer first aid Follow the do's and don'ts related to security 	AGR/N9903 PC20, KU15, GS1-GS9	Classroom lecture, presentation, activity	PHB, White board, duster, flip chart board/paper etc., slides in PPT showing relevant images. PPE, First Aid Kit, Equipment used in Medical Emergencies.	T: 5:00 P: 3:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
							HH:MM
9.	Employability Skills (60hrs)	Introduction to Employability Skills	<ul style="list-style-type: none"> Describe importance of Employability Skills Prepare a note on different industries, trends, required skills 	DGT/VSQ /N0102	Classroom lecture, Team Activity	White-Board and, Markers, Chart Paper and Sketch pens, LCD Projector	1:30
		Constitutional Values: Citizenship	<ul style="list-style-type: none"> Detail the principles of constitution of India Identify the various environmentally sustainable practices 		Classroom lecture, Team Activity	Laptop, PPT, White board Markers, note pad, pen etc.	1:30
		Becoming a Professional in the 21st Century	<ul style="list-style-type: none"> Discuss relevant 21st century skills required for employment Practice critical thinking and decision making skills 		Classroom lecture, Team Activity	Laptop, PPT, White board Markers, note pad, pen etc.	2:30
		Basic Skills-I	<ul style="list-style-type: none"> Read English text with appropriate articulation Practice basic English words, sentences, punctuation 		Classroom lecture, Team Activity, Role play, video session	Laptop, PPT, White board Markers, note pad, pen etc.	5:00
		Basic Skills-II	<ul style="list-style-type: none"> Demonstrate active listening and reading skills 		Practical, demonstration, role play		5:00
		Career Development and Goal Setting	<ul style="list-style-type: none"> Identify well-defined short- and long-term goals Explain how to build a career pathway Conduct job market research Discuss how to set career goals. 	DGT/VSQ /N0102	Class room lecture, discussion, demonstration, practical	Laptop, PPT, White board Markers, note pad, pen etc.	2:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
							HH:MM
		Communication Skills	<ul style="list-style-type: none"> Explain the importance of communication at workplace Demonstrate effective communication strategies Demonstrate how to communicate effectively using verbal and nonverbal communication 	DGT/VSQ /N0102	Class room lecture, discussion, demonstration, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
		Diversity and Inclusion	<ul style="list-style-type: none"> Explain the need of diversity at workplace Identify the various PwD policies applicable at workplace Discuss the significance of the POSH Act 	DGT/VSQ /N0102	Class room lecture, Inter-active discussion	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	2:30
		Financial and Legal Literacy	<ul style="list-style-type: none"> Discuss various financial institutions, products, and services Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions 	DGT/VSQ /N0102	Class room lecture, demonstrations, group discussion, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
		Essential Digital Skills-I	<ul style="list-style-type: none"> Detail the use and features of various MS Office tools, like MS Word, MS Excel, MS PowerPoint, etc. Demonstrate how to operate digital devices Create an e-mail id and follow e- mail etiquette to exchange e -mails Describe the role of digital technology in day-to-day life and the workplace 	DGT/VSQ /N0102	Class room lecture, discussion, Demonstration, practical, learning by doing	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	6:00
		Essential Digital Skills-II	<ul style="list-style-type: none"> Practice Digital skills 		Demonstration, practical, learning by doing		4:00

S.No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
							HH:MM
		Entrepreneurship	<ul style="list-style-type: none"> Describe the types of entrepreneurship and enterprises Describe the 4Ps Of Marketing- Product, Price, Place and Promotion and Apply the mas Per requirement Create a sample Business plan, For the selected business 	DGT/VSQ /N0102	Class room lecture, discussion, Demonstration, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	7:00
		Customer Service	<ul style="list-style-type: none"> Identify types of customers and how to deal with them Identify methods to get customer feedback and how to implement them Explain various tools used to collect customer feedback Discuss the significance of maintaining hygiene and dressing appropriately 	DGT/VSQ /N0102	Class room lecture, activity, role play, video session	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
		Apprenticeships and Jobs	<ul style="list-style-type: none"> Practice personal grooming strategies Illustrate the use of online platforms for job hunting Detail the concept of Apprenticeship Demonstrate how to enroll for Apprenticeship programs. Draft a professional Curriculum Vitae (CV) Role play a mock interview 	DGT/VSQ /N0102			8:00

Annexure II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

(For Updated 'Assessment Criteria', please refer to Qualification Pack of this Job role available at <https://www.nqr.gov.in/>)

Assessment Criteria for ASCI- Forest Nursery Raiser	
Job Role	Forest Nursery Raiser
Qualification Pack	AGR/Q6103
Sector Skill Council	Agriculture

S.No.	Guidelines for Assessment
1.	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Assessment will be conducted for all compulsory NOS, as well as the selected elective NOS/set of NOS.
4.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria.
6.	To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7.	In case of <i>unsuccessful completion</i> , the trainee may seek reassessment on the Qualification Pack.

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N6112.Prepare to set up the forest nursery	30	40	-	30	100	20
AGR/N6113.Prepare the nursery bed and infrastructure	30	40	-	30	100	15
AGR/N6114.Propagate plants in the forest nursery	30	40	-	30	100	15
AGR/N6115.Maintain plants in the forest nursery and transplant them	30	40	-	30	100	20
AGR/N6116.Perform marketing and inventory management	30	40	-	30	100	20
AGR/N9903.Maintain health and safety at the workplace	40	25	-	35	100	5
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	5
Total	210	255	-	185	650	100

Annexure-III

QR Codes & Links

Chapter No.	Unit No.	Topic	URL Links	QR code (s)
Chapter -1 to 7	Unit 1.1 to 7.2	Nursery Manual, Govt. of Tripura	https://forest.tripura.gov.in/root/doc/8b827e5f9696.pdf	 Nursery Manual, Govt. of Tripura
		Production of Quality Seed and Planting Materials	https://ciah.icar.gov.in/publication/Technical_bulletin/2018/production_of_quality_seed.pdf	 Production of Quality Seed and Planting Materials
		Plant Nursery Management-Principles and Practices	http://www.cazri.res.in/publications/PRathaKrishna_n.pdf	 Plant Nursery Management-Principles and Practices
Chapter -2 Preparation for Setting Up the Forest Nursery	Unit 2.2 - Construction of Forest Nursery	Nursery Techniques	https://www.youtube.com/watch?v=OWiebc7TUH	 Nursery Techniques (1)
			https://odishaforest.in/media/filer_public/8d/bc/8dbcf26c-2cd2-407c-80c8-9a5603ec6d1e/book_nt266117.pdf	 Nursery Techniques (2)
Chapter -3 Process of Preparing the Nursery Bed and Infrastructure	Unit 3.1 - Preparation of Forest Nursery Beds	Preparation of Forest Nursery Beds	https://www.youtube.com/watch?v=v1quro1C5jM	 Preparation of Forest Nursery Beds
	Unit 3.2 - Systems and Processes in a Nursery	Prosperity through Quality Seedling Production	https://www.youtube.com/watch?v=QKKGlrBU_s_c	 Quality Seedling Production
Chapter -4 Propagation of Plants in the Forest Nursery	Unit 4.1 - Pre-Seed Treatment	Beejamrutha Preparation Method Organic Seed Treatment Methods	https://www.youtube.com/watch?v=ssDHd6jWQm	 Beejamrutha Preparation Method Organic Seed Treatment Methods
	Unit 4.2 - Plant Propagation in Forest Nursery	Plant Propagation	https://ncert.nic.in/vocational/pdf/kegr103.pdf	 Plant Propagation
		Regeneration	https://www.youtube.com/watch?v=riRbMZyl&yY	 Regeneration



Skill India

कौशल भारत - कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



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ASCI

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