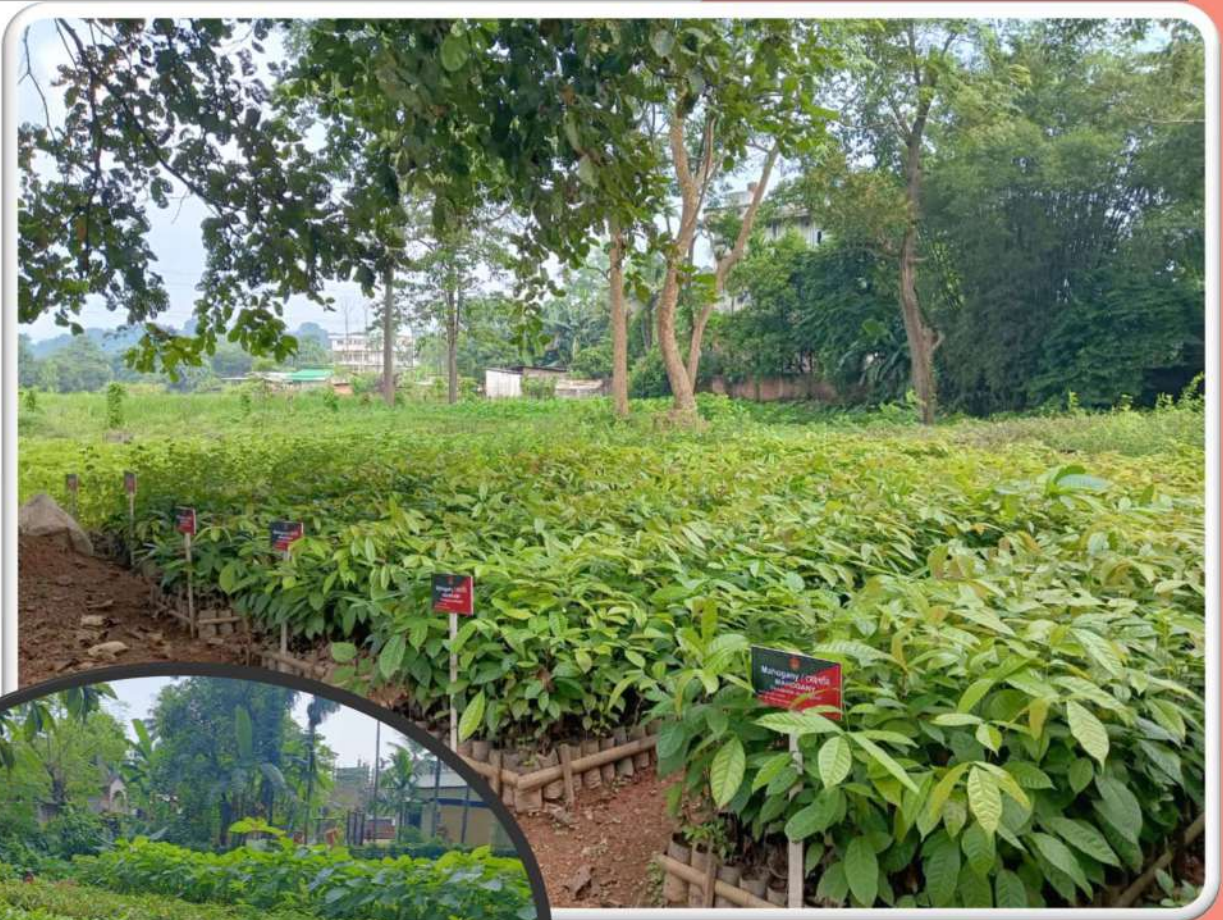




A COMPREHENSIVE GUIDE TO THE ACCREDITATION OF FOREST NURSERIES



O/O THE SILVICULTURIST, ASSAM

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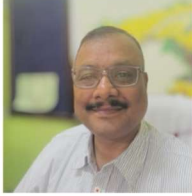
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Preface

Forests are the lungs of Assam. They give us clean air, protect our water, provide homes to countless animals, and support the lives of many people. But a strong forest starts with one small but powerful thing—a healthy seedling. And that seedling comes from a well-run nursery.

This guide, *A Comprehensive Guide to the Accreditation of Forest Nurseries*, is our step forward to make sure every nursery in Assam grows strong, healthy, and suitable planting stock. When nurseries follow the same high standards, we can be sure that every tree planted is more likely to grow, survive, and thrive. That's how we create better forests, for today and for future generations.

This document brings together ideas and knowledge from many reliable sources. We've looked at national guidelines like the Nursery Accreditation System for Bamboo (2018) by the Ministry of Agriculture. We've also learned a lot from the recent training in Guwahati, where experts from CIFOR-ICRAF, CAFRI, and our own Forest Department worked together to develop a clear process for nursery accreditation in Assam.

I want to sincerely thank Ms. Himamoni Handique, Research Officer, for her support in coordination and Ms. Nigar Sultana, Forest Ranger, for her help with field information and designing the evaluation system. Their work has made this guide more practical and easier to use. Many others from our forest divisions and supporting teams have also contributed—this is a shared effort, and I thank everyone involved.

We hope this guide becomes a useful tool for all nursery managers, forest staff, and community members. With your support, we can raise better seedlings, build stronger forests, and help Assam grow greener.

Dibakar Deb, IFS

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PREFACE

Forests form the foundation of a sustainable environment, playing a crucial role in biodiversity conservation, climate regulation, and livelihood sustenance. The quality of forest is directly linked to the quality of planting stock used in afforestation and reforestation initiatives. The absence of a structured and standardized nursery accreditation system has led to disparities in seedling quality, affecting plantation success rates, ecosystem stability, and long-term forest sustainability.

This document presents a comprehensive framework for accrediting forest nurseries, ensuring they adhere to stringent scientific and operational standards. The **Nursery Accreditation Protocol** detailed in this document is intended to serve as a guiding document for policymakers, forestry officials, nursery managers, researchers, and environmental organizations involved in large-scale afforestation projects. Through this accreditation system, we aim to institutionalize best practices, enhance accountability, and establish a mechanism to assess, monitor, and improve the quality of forest nurseries. This document is a step toward realizing the vision of a greener, more sustainable future through better forest management and nursery practices.

BACKGROUND OF NURSERY ACCREDITATION IN INDIA AND ASSAM.

- Indian Nursery Accreditation Scheme: Department of Agriculture Cooperation & Farmers Welfare, under the Ministry of Agriculture & Farmers Welfare, drafted the National Accreditation System for Bamboo Nurseries and Certification of Quality Bamboo Planting Material in September 2018. This draft underscore the government's commitment to ensuring the availability of quality planting materials.
- In a bid to promote sustainable and resilient agroforestry practices in Assam, a three-day training on Nursery Accreditation and Rating was held in Guwahati from September 26-28. Organized by the Centre for International Forestry Research & World Agroforestry (CIFOR-ICRAF), the Central Agroforestry Research Institute (CAFRI), and the Assam Environment and Forest Department, the training aimed to equip professionals from various organizations with the knowledge and skills necessary to assess and accredit nurseries.

1. INTRODUCTION

Forests cover about 36% of land area of Assam and provide invaluable ecological, economic, and social benefits. Effective forest management depends significantly on the quality of planting materials, which are largely produced in nurseries. However, the variability in nursery practices has often led to inconsistent seedling survival rates, poor forest productivity, and inefficient use of resources.

Nursery accreditation guarantees that seedlings meet stringent quality standards for afforestation, agroforestry, and reforestation initiatives. To ensure high-quality planting stock for successful plantations, nurseries funded under CAMPA, SOPD, and AGRO-FORESTRY schemes must undergo accreditation, now or in the near future. As the designated Silviculturist, Assam, we serve as the primary authority in formulating and overseeing the Nursery Accreditation Protocol, ensuring scientific precision, operational viability, and compliance with national and international forestry standards. In line with this mandate, a comprehensive draft protocol has been developed for certifying nurseries across both governmental and private sectors. This document provides an in-depth guide to the accreditation of forest nurseries, covering:

- The rationale behind nursery accreditation
- The step-by-step methodology for accreditation

- Quality assessment criteria and performance evaluation
- Implementation strategies and governance mechanisms
- Long-term benefits and sustainability of the accreditation system

By establishing a standardized accreditation system, it is aimed to improve plantation success rates, reduce mortality in newly planted forests, and enhance ecosystem restoration outcomes.

2. THE NEED FOR NURSERY ACCREDITATION

The success of forestry programs relies on the availability of high-quality seedlings. Despite significant investments in afforestation projects, many plantations fail to achieve their full potential due to poor nursery management and substandard planting stock. The need for nursery accreditation arises from several key challenges:

2.1 Quality Assurance

Ensuring the production of robust, healthy, and genetically diverse planting material is fundamental to the success of afforestation, reforestation, and ecological restoration initiatives. High-quality seedlings enhance plantation survival rates, improve forest productivity, and contribute to long-term ecosystem stability. However, variations in nursery practices can lead to inconsistencies in seedling vigour, adaptability, and overall resilience.

Nursery accreditation establishes a standardized quality benchmark that all nurseries must meet to be certified, ensuring that planting material adheres to the highest scientific, genetic, and physiological standards.

2.2 Standardization of Nursery Practices

The success of afforestation and reforestation programs depends on the consistency and quality of planting stock. However, without standardized nursery practices, significant variations in seed collection, propagation techniques, plant nutrition, and overall nursery management can lead to inconsistencies in seedling health, survival rates, and forest productivity. To address these challenges, the Nursery Accreditation Protocol establishes a uniform framework that all nurseries.

2.3 Resource Optimization

Efficient nursery management is essential for maximizing productivity while minimizing resource wastage. Without structured protocols, nurseries often experience high seed wastage, inefficient water use, excessive fertilizer application, and unoptimized labour deployment, leading to financial losses and environmental degradation. The Nursery Accreditation Protocol ensures that nurseries adopt scientifically approved best practices, optimizing resource utilization and enhancing overall efficiency.

2.5 Government and Private Sector Participation

A robust nursery accreditation system plays a pivotal role in promoting both public and private sector involvement in nursery management. By setting clear quality standards, the accreditation framework encourages systematic investment in nursery development, ensuring the availability of high-quality

planting material for afforestation, reforestation, and commercial forestry initiatives. This enhances economic opportunities, employment generation, and sustainable growth in the forestry sector.

3. THE ROLE OF CERTIFICATION BY THE FOREST DEPARTMENT

The Forest Department, as the legitimate authority in forestry governance, is entrusted with the responsibility of ensuring that nurseries adhere to the highest quality standards. By implementing a structured certification process, the department plays a pivotal role in safeguarding forest health, promoting afforestation, and supporting sustainable forestry practices. The certification of nurseries by the Forest Department serves multiple important functions, ensuring that only high-quality, genetically diverse, and ecologically suitable planting materials are used in various forestry and agroforestry programs.

3.1 Legitimacy and Standardization

The certification of nurseries by the Forest Department serves as an essential mechanism for ensuring scientific credibility, operational transparency, and regulatory compliance in the forestry sector. By granting official legitimacy, the certification process validates nursery operations and enforces standardized protocols that govern seed quality, plant growth standards, and sustainable nursery management.

A structured accreditation framework not only enhances trust and reliability among stakeholders—including government agencies, private forestry enterprises, research institutions, and local communities—but also ensures that nursery production aligns with national and international forestry guidelines.

3.2 Compliance with Government Regulations

A formal certification process for nurseries plays a critical role in ensuring adherence to national and state-level forestry laws, afforestation policies, and environmental conservation guidelines. The Forest Department, as the statutory authority, enforces these regulations to maintain quality control, ecological sustainability, and legal accountability in nursery operations.

3.3 Assurance of High-Quality Planting Stock

The success of afforestation, reforestation, and ecosystem restoration initiatives largely depends on the quality of planting stock used in these programs. Ensuring that only certified nurseries supply seedlings for large-scale government-funded afforestation projects is essential for maintaining genetic, physiological, and morphological integrity in planting material.

3.4 Accountability and Monitoring

Ensuring the long-term sustainability, quality, and reliability of accredited nurseries requires a robust accountability and monitoring framework. Certification is not just a one-time approval; it establishes a structured system of periodic assessments to ensure that nurseries adhere to prescribed standards, improve continuously, and integrate scientific advancements.

3.5 Facilitating Funding and Institutional Support

Government-accredited nurseries play a pivotal role in national afforestation programs, biodiversity conservation, and sustainable forestry initiatives. Accreditation not only establishes quality assurance but also unlocks financial and institutional support to strengthen nursery operations, improve

efficiency, and enhance overall productivity. This aspect explores the various funding mechanisms, institutional support frameworks, and capacity-building opportunities available to accredited nurseries.

3.6 Market Recognition and Sustainability

Certified nurseries gain a significant competitive advantage by establishing themselves as trusted sources of high-quality, genetically diverse, and healthy planting material. Accreditation serves as a seal of credibility, assuring government agencies, private organizations, and individual buyers that the seedlings meet scientifically approved quality benchmarks. This recognition enhances market demand, ensuring a steady flow of orders for large-scale afforestation projects, corporate environmental initiatives, and commercial forestry ventures. With higher buyer confidence, certified nurseries can command premium pricing, further strengthening their financial sustainability. Additionally, accreditation opens doors for long-term partnerships with government bodies, NGOs, and private sector investors, ensuring business continuity and economic resilience. By adhering to sustainable nursery practices, certified nurseries contribute to environmental conservation while ensuring their own growth, profitability, and long-term viability in the forestry sector.

4. ACCREDITATION METHODOLOGY

The accreditation process follows a structured, multi-step evaluation system to ensure that nurseries meet predefined scientific, technical, and operational criteria essential for producing high-quality planting material. It begins with the submission of an application, followed by a preliminary assessment to verify compliance with basic infrastructure, seed sourcing, and nursery management standards. A detailed field inspection is then conducted by an expert evaluation team to assess soil quality, seedling vigour, pest and disease management, irrigation efficiency, nutrient application, and adherence to sustainable nursery practices. The process also includes an audit of record-keeping systems, ensuring that seed provenance, propagation methods, and growth cycles are meticulously documented. Nurseries must demonstrate compliance with government regulations, environmental sustainability guidelines, and best practices in afforestation and reforestation efforts. Based on inspection findings, a comprehensive scoring system determines eligibility for certification. Accredited nurseries receive official recognition, periodic monitoring, and opportunities for capacity-building programs to ensure continuous improvement. This rigorous methodology guarantees that only nurseries maintaining the highest standards receive accreditation, reinforcing the credibility and sustainability of the forestry sector.

4.1 Adherence to Departmental Prescribed Guidelines

All nurseries seeking accreditation must strictly comply with the guidelines prescribed by the Department of Forests, ensuring that scientific, technical, and operational best practices are uniformly implemented across all nursery operations. These guidelines establish standardized protocols for site selection, soil preparation, seed collection, treatment, propagation methods, irrigation techniques, nutrient management, pest and disease control, hardening of seedlings, and transportation procedures to ensure the production of healthy, genetically diverse, and climate-resilient planting stock. The department mandates adherence to species-specific propagation techniques, particularly for rare, endemic, and ecologically significant species, to support biodiversity conservation and afforestation initiatives. Additionally, nurseries must maintain comprehensive documentation of their activities, including seed sourcing records, germination success rates, growth monitoring data, and quality control measures, facilitating traceability and accountability. Regular inspections and audits are conducted to assess compliance, and non-adherence may result in suspension or revocation of accreditation. By

enforcing these guidelines, the Department of Forests ensures that all accredited nurseries operate at optimal efficiency, contribute to sustainable forestry objectives, and provide high-quality planting material for government and private-sector afforestation programs.

4.2 Seed Selection and Origin Certification

Nurseries must procure seeds exclusively from certified and scientifically verified sources to ensure genetic purity, species authenticity, and high germination success rates. The selection process must adhere to species-specific guidelines, considering factors such as seed viability, origin, adaptability to local climatic conditions, and resistance to pests and diseases. Seeds should be sourced from registered seed production areas, seed orchards, or natural forests with known genetic superiority to maintain the integrity of afforestation and reforestation programs. Proper seed certification and documentation are mandatory, including records of collection date, source location, parent tree characteristics, and seed treatment methods to establish traceability and quality assurance. Germination testing must be conducted periodically in controlled conditions to assess seed vigour, and only batches meeting prescribed germination thresholds should be used for propagation. Additionally, nurseries must implement proper storage techniques, such as maintaining optimal temperature and humidity conditions, to prevent seed deterioration and ensure long-term viability. Strict adherence to these protocols guarantees that only high-quality, genetically superior, and ecologically suitable planting material is utilized, ultimately supporting the success and sustainability of afforestation initiatives.

4.3 Soil and Water Management Standards:

Effective soil and water management is fundamental to producing healthy, vigorous, and stress-resistant seedlings, ensuring their successful establishment in afforestation and reforestation projects. Nurseries must adhere to departmental protocols for soil conditioning, fertility enhancement, and moisture conservation to create an optimal growing environment. Soil analysis is mandatory to determine texture, pH, organic matter content, and nutrient availability, allowing for appropriate amendments such as organic compost, bio-fertilizers, and soil enhancers to improve structure, aeration, and water retention. Sustainable practices like mulching, green manuring, and microbial inoculation must be adopted to maintain soil health and microbial diversity.

In parallel, nurseries must establish efficient water management systems that minimize wastage while ensuring adequate hydration. Drip irrigation, misting systems, and rainwater harvesting should be implemented to optimize water use, with a preference for low-energy and automated irrigation technologies. Water quality testing is essential to detect impurities or pH imbalances that may affect seedling growth. Additionally, nurseries must incorporate proper drainage systems to prevent waterlogging and root rot, ensuring a well-aerated root zone. Adherence to these soil and water management standards enhances seedling survival rates, resource efficiency, and long-term plantation success.

4.4 Pest and Disease Control Measures

Ensuring healthy and disease-free seedlings is critical for successful afforestation, making pest and disease management a key component of nursery accreditation. Nurseries must adopt scientific, eco-friendly, and regulatory-compliant pest control strategies that prioritize organic and integrated pest management (IPM) techniques over chemical interventions. This includes the use of biological control agents such as beneficial insects, nematodes, and microbial bio-pesticides to naturally suppress pest

populations. Regular monitoring and early detection through systematic field inspections help in identifying pest infestations and disease outbreaks before they spread. The implementation of cultural control practices, such as crop rotation, intercropping, and maintaining proper spacing, reduces the likelihood of pathogen proliferation.

Nurseries must also ensure soil sterilization, seed treatment, and sanitation protocols to eliminate potential sources of infection. The use of organic fungicides, neem-based bio-repellents, and herbal extracts is encouraged to mitigate the impact of pests and fungal infections while maintaining ecological balance. Where chemical control is deemed necessary, nurseries must strictly adhere to forestry regulations regarding the type, dosage, and application of pesticides, ensuring minimal environmental impact and preventing residual toxicity in seedlings. Proper record-keeping of all pest control measures, including dates, treatment methods, and effectiveness assessments, is mandatory to maintain transparency and accountability. By integrating these sustainable and scientific approaches, accredited nurseries can produce resilient, pest-free planting stock while aligning with broader forest health and biodiversity conservation goals.

4.5 Monitoring and Record-Keeping:

A robust monitoring and record-keeping system is essential for ensuring transparency, traceability, and continuous improvement in nursery operations. Accredited nurseries must maintain both digital and manual documentation of all critical aspects of seedling production, growth metrics, and plantation success rates, following standardized departmental protocols. This includes detailed records of seed collection and sourcing, germination rates, propagation methods, nutrient application schedules, pest and disease management measures, irrigation regimes, and hardening processes. Each batch of seedlings must be tagged with unique identifiers, allowing for accurate tracking from sowing to field transplantation.

Nurseries are required to conduct periodic assessments of seedling health, vigour, and survival rates, documenting parameters such as stem height, root-shoot ratio, foliage density, and stress tolerance to ensure compliance with quality benchmarks. Digital tools, including GIS mapping, mobile applications, and cloud-based databases, should be leveraged to enhance real-time data collection, remote monitoring, and analytical reporting. Additionally, post-plantation survival studies must be conducted to evaluate the long-term performance of nursery-raised seedlings in different ecological zones, thereby refining future nursery practices. Regular audits and third-party inspections will verify the accuracy of records, ensuring accountability and adherence to accreditation standards. By implementing a comprehensive monitoring and record-keeping framework, accredited nurseries contribute to data-driven decision-making, enhancing the overall success and sustainability of forestry and afforestation initiatives.

4.6 Infrastructure Standards:

A well-established and adequately maintained nursery infrastructure is fundamental for ensuring high-quality seedling production, resource efficiency, and overall operational effectiveness. Accredited nurseries must comply with prescribed infrastructure standards outlined by the Department of Forests, which include proper fencing, seed storage facilities, irrigation systems, polyhouses, shade houses, and camp hut facilities to safeguard and optimize the growing environment. Fencing is mandatory to prevent animal intrusion, unauthorized access, and physical damage to seedlings, ensuring the protection of

nursery stock. Additionally, nurseries must have a designated seed storage facility with controlled temperature, humidity, and pest protection measures to maintain the viability and genetic integrity of seeds. The storage facility must also have proper labelling and documentation systems to ensure traceability of seed lots.

The establishment of polyhouses and shade houses is crucial for raising high-value and delicate species, ensuring that seedlings are protected from adverse climatic conditions, pest attacks, and physical damage. These structures must be ventilated, light-optimized, and fitted with micro-irrigation facilities to maintain ideal growth conditions. For large-scale operations, automatic mist chambers, root trainers, and hardening beds are recommended to enhance seedling survival rates. Additionally, nurseries must have a dedicated campout facility to accommodate nursery workers, field staff, and inspection officers, ensuring uninterrupted nursery operations.

A scientifically designed irrigation system is mandatory, with a strong preference for drip irrigation, micro-sprinklers, and rainwater harvesting systems to ensure optimal water use efficiency and avoid waterlogging issues. Proper drainage systems must also be installed to prevent root rot, soil erosion, and water stagnation. The infrastructure should also include composting units, potting sheds, and packaging areas for efficient management of potting mixtures, organic manure, and hardening materials. Moreover, each accredited nursery must ensure that their infrastructure is disaster-resilient, minimizing potential losses from heavy rainfall, flooding, heatwaves, or storms. Periodic infrastructure audits will be conducted by the Forest Department to ensure that the infrastructure remains functional, well-maintained, and compliant with the department's guidelines. Strict adherence to these infrastructure standards not only improves seedling quality and survival rates but also enhances the overall operational efficiency, scalability, and sustainability of nursery production.

To ensure compliance with infrastructure standards, periodic inspections and audits must be conducted by certification authorities, verifying that the infrastructure meets species-specific propagation requirements, operational safety standards, and environmental sustainability norms. This will significantly enhance the survival rate, health, and genetic strength of planting stock, ultimately contributing to the success of large-scale afforestation, reforestation, and landscape restoration programs across the region.

5. EVALUATION CRITERIA

Accreditation is granted based on a rigorous assessment of various parameters:

5.1 Site Selection & Essential Infrastructure

5.1.1 Site Selection

The selection of an appropriate nursery site is critical for ensuring optimal seedling growth, operational efficiency, and easy logistical access. Accredited nurseries must adhere to the site selection guidelines prescribed by the Department of Forests, ensuring that the location fulfils key ecological and operational requirements. The site must have a suitable land area, as per the prescribed standards, to accommodate seed beds, polyhouses, storage facilities, and working space without congestion. It should be geotagged to enable real-time monitoring, traceability, and mapping of the nursery's location. The site must be located within 10 to 200 meters

proximity to the nearest Beat Office, ensuring convenient supervision, frequent monitoring, and operational assistance by forest officials.

The selected site should receive ample sunlight exposure, essential for vigorous seedling growth, while simultaneously being protected from harsh weather conditions through shade houses or natural windbreaks. Areas prone to waterlogging must be strictly avoided, and the site must have natural or engineered drainage systems to prevent root rot and soil erosion. The recommended land slope for nurseries should range between 5 to 15 degrees, ensuring adequate surface drainage and soil stability while preventing excessive erosion. Additionally, the nursery should ideally be located adjacent to nearby forest areas, promoting site-specific species selection, ease of out planting, and natural biodiversity enhancement. Site selection in line with these scientifically guided criteria ensures high seedling productivity, easy monitoring, and long-term plantation success.

5.1.2 Fencing/ Boundary Wall

The nursery must have a properly constructed fencing or boundary wall to ensure protection against animal intrusion, unauthorized access, and physical damage to seedlings. The presence of fencing or boundary wall is a mandatory requirement, and nurseries must use durable materials such as Galvanized Pipe Tubes (GPT), Barbed Wire, Electric Perimeter Fencing (EPT), Concrete Wall, Bio-fencing, or any other prescribed fencing type as per the approved estimate. The fencing type must align with the specifications mentioned in the project estimate, and non-compliance will result in scoring deductions. Additionally, the length of the fencing must correspond to the perimeter mentioned in the approved estimate. The quality of the fencing must meet the prescribed strength, durability, and longevity standards, ensuring long-term protection of nursery stock.

Furthermore, the fencing must be properly maintained at all times, ensuring that damaged, broken, or fallen parts are immediately repaired or replaced. The nursery authority must conduct periodic inspections to ensure that the fencing remains intact and functional. Points will be awarded based on the presence of fencing (1 point), its conformity to the approved type (0.5 points), length as per estimate (0.5 points), quality as per estimate (0.5 points), and proper maintenance (0.5 points). Nurseries failing to meet these standards will receive lower scores, impacting their eligibility for accreditation.

5.1.3 Water Storage & Supply Network

Accredited nurseries must ensure the availability of a reliable and sustainable water supply system to support seedling production, maintenance, and hardening processes. The presence of an accessible water source such as a hand pump, tube well, borewell, pond, or other recognized water sources is mandatory, for which a maximum score of 2 points shall be awarded. The source of water must align with the guidelines prescribed by the Department of Forests, and if the source conforms to the recommended standards, 0.5 points will be assigned; otherwise, no score will be awarded. Additionally, the presence of a dedicated irrigation network, such as a drip irrigation system, micro-sprinklers, or other controlled irrigation methods, is crucial for efficient water utilization, and the nursery will be awarded 1 point for fulfilling this criterion. The presence of a water storage tank for uninterrupted supply during peak demand periods is

equally essential, and 1 point will be granted if such a facility exists. The tank capacity must also conform to the prescribed guidelines, and compliance will earn the nursery an additional 0.5 points. Furthermore, the presence of a rainwater harvesting system for promoting sustainable water usage and groundwater recharge will be highly encouraged, and nurseries with such provision will be awarded 0.5 points. Collectively, this criterion ensures that accredited nurseries have a secured, uninterrupted, and sustainable water supply system, optimizing seedling health, water-use efficiency, and long-term sustainability of nursery operations.

5.1.4 Uninterrupted Power Supply

A reliable and uninterrupted power supply is essential for the smooth functioning of nursery operations, particularly for irrigation systems, polyhouses, mist chambers, seed storage facilities, and office operations. Accredited nurseries must ensure the availability of consistent electricity supply through grid connection, solar power, or generator backup, for which a maximum score of 2 points is allocated. Nurseries utilizing renewable or green energy sources such as solar panels, biogas, or wind energy to reduce their carbon footprint and operational costs will be awarded 0.5 points. Additionally, the power supply network must be in good operational condition to ensure uninterrupted functioning of critical nursery infrastructure, which carries a score of 1 point. In case of a power outage, the presence of a backup energy source, such as a diesel generator, battery inverter, or solar power backup, will attract an additional 0.5 points. Ensuring a stable and sustainable power supply is crucial for maintaining optimal seedling growth conditions, efficient water management, and uninterrupted day-to-day operations, directly influencing the overall productivity and sustainability of the nursery.

5.1.5 Office/Camp Hut Facility

An adequately constructed and maintained office or camp hut is essential for ensuring smooth operational management, record-keeping, and staff accommodation in the nursery. Accredited nurseries must have a functional office/camp hut, the presence of which will be scored based on specific criteria. Firstly, the physical existence of the office/camp hut is mandatory, and nurseries will be awarded full marks (1 point) if it is present and zero (0 points) if absent. The dimension of the camp hut must conform to the estimated departmental standard, with nurseries scoring 0.5 points for compliance and zero points otherwise. Proper ventilation in the camp hut is essential to ensure a comfortable and healthy working environment, and compliance with ventilation standards will be awarded 0.5 points. Additionally, the hut must be well-maintained to ensure functionality, with 0.5 points granted for proper maintenance and zero points if neglected. The location of the camp hut should also be strategically positioned within the nursery premises, ensuring easy accessibility, visibility, and operational efficiency, and this criterion carries another 0.5 points for proper location. Meeting all these parameters collectively ensures that the nursery's camp hut serves as an effective operational centre, facilitating efficient management, record-keeping, and monitoring of nursery activities.

5.1.6 Seed Storage Unit

The seed storage unit is a critical component of nursery infrastructure, and its assessment is based on multiple operational and quality parameters. The presence of a dedicated seed storage unit is mandatory, and its availability is scored as 1 point if present and 0 points if absent.

The dimension of the storage unit must conform to the estimated capacity as per the departmental guidelines, earning 0.5 points if compliant and 0 points if non-compliant. Proper ventilation within the storage unit is essential to prevent seed deterioration, with 0.5 points awarded if well-ventilated and 0 points otherwise. Additionally, the unit must be well-maintained, with periodic cleaning and upkeep, ensuring it is free from physical damage, earning 0.5 points if maintained properly.

The method of stacking seeds must be systematic, ensuring organized, species-wise segregation to minimize damage and facilitate easy identification, earning 0.5 points if the stacking practice is proper. The quality of stored seeds must align with the prescribed protocol, ensuring high germination potential, genetic purity, and seed viability, with 0.5 points awarded for protocol adherence. The storage unit must be free from any insect, pest, or fungal attacks, and in case of any such infestations, the nursery scores 0 points, whereas a pest-free condition scores 0.5 points. The diversity of seed species stored must align with the departmental species guidelines, ensuring a balanced and ecologically representative stock, with 0.5 points awarded for meeting the species diversity standard. Additionally, there must be a display of seed samples that accurately corresponds with the species being raised in the nursery, allowing easy verification of seed identity, with 0.5 points awarded if the display tallies with the nursery species list.

5.1.7 Store House

Accredited nurseries must establish a dedicated store house for the secure storage of planting materials, fertilizers, tools, and equipment. The presence of a functional store house is mandatory, with a standard dimension as prescribed in the departmental estimates to ensure adequate space utilization and organized storage. The store house must be well-ventilated to maintain optimal temperature and humidity levels, preventing material decay, or pest infestation. Additionally, the store house must be properly maintained, ensuring clean, clutter-free, and moisture-resistant conditions to safeguard stored materials. Regular inspection and maintenance protocols must be implemented to prevent infrastructural degradation. Evaluation of compliance will be based on the presence of a store house (1 point), adherence to prescribed dimensions (0.5 points), adequate ventilation (0.5 points), and proper maintenance (0.5 points), accumulating a total of 2.5 points. Non-compliance with any of these parameters will result in a deduction of the corresponding points during the accreditation assessment.

5.1.8 Labourer Shed

Accredited nurseries must have a dedicated labour shed to ensure shelter, rest, and operational convenience for nursery workers. The presence of a labour shed is a mandatory criterion, with nurseries scoring 1 point if the shed exists and 0 points if absent. The shed must conform to the prescribed dimensions as per the departmental estimate, for which 0.5 points are awarded upon compliance and 0 points if not met. Adequate ventilation is essential to ensure worker comfort and air circulation; hence, 0.5 points will be allocated if the shed is well-ventilated, and 0 points if otherwise. Additionally, the shed must be properly maintained, clean, and structurally sound, for which 0.5 points will be granted if the standard is met, and 0 points in case of poor maintenance. Adherence to these criteria ensures safe working conditions, contributing to worker efficiency and operational sustainability in nursery management.

5.1.9 Green House & Mist Chamber

The presence of a functional greenhouse or mist chamber is a critical infrastructure requirement for ensuring optimal growing conditions for seedlings, particularly during their early stages. Accredited nurseries must demonstrate the physical presence of a greenhouse or mist chamber, scoring 1 point if present and 0 points if absent. The dimensions of the greenhouse or mist chamber must align with the prescribed departmental estimates, earning an additional 0.5 points for compliance and 0 points if the dimension is inadequate. The facility must be properly maintained, free from structural damage, and in good operational condition, securing 0.5 points for proper maintenance and 0 points otherwise. Additionally, the presence of a sprinkler system within the greenhouse or mist chamber is mandatory to ensure uniform irrigation and humidity control, awarding 0.5 points for availability and 0 points for absence. All sprinklers and related equipment must be in good working condition, with 0.5 points assigned for functionality and 0 points if dysfunctional. Furthermore, the entire setup must adhere to modern standards as per the prescribed nursery accreditation protocol, ensuring optimized growing conditions, resource efficiency, and minimal seedling mortality. Nurseries meeting modern infrastructure standards will receive 0.5 points, while non-compliance will result in 0 points. This comprehensive assessment ensures that greenhouses or mist chambers in accredited nurseries align with scientific standards and contribute to the production of healthy and high-quality planting material.

5.1.10 Soil Mixing Shed

The presence of a dedicated soil mixing shed in the nursery is a critical infrastructure requirement to ensure systematic and contamination-free preparation of potting mixtures. Nurseries must have a designated soil mixing shed, and its existence will be scored as 1 point if present and 0 points if absent. Additionally, the shed must conform to the standard dimension specifications prescribed by the Forest Department, ensuring sufficient space for uninterrupted mixing, storage, and processing of soil mixtures. Compliance with the prescribed dimensions will qualify for an additional 0.5 points, while deviation will score 0 points. The shed must also be properly maintained, clean, and organized to avoid contamination of soil, organic manure, and other additives, and a well-maintained shed will secure 0.5 points, whereas poor maintenance or neglected infrastructure will result in 0 points. Therefore, the total maximum score for the Soil Mixing Shed criterion is 2 points, based on its presence, dimension compliance, and maintenance standards.

5.1.11 Compost Unit

Accredited nurseries must establish a functional composting unit for the production of vermicompost or organic compost, ensuring the availability of nutrient-rich growing media for seedlings. The presence of a compost unit is a mandatory requirement, and nurseries must ensure that it is fully operational and maintained as per departmental guidelines. The dimension of the compost unit must conform to the prescribed standards, ensuring sufficient production capacity to meet the nursery's annual planting material targets. Additionally, the composting unit must be well-maintained, structurally intact, and free from contamination, ensuring the compost produced is high-quality and pathogen-free. The quantity of compost produced per week must meet the minimum prescribed production standards, ensuring a consistent supply of organic compost for seedling beds and polybag filling. Regular monitoring, record-keeping,

and documentation of compost production are mandatory to ensure the unit's efficiency and contribution to nursery operations. Any deviation in dimension, maintenance, or production capacity will result in a lower score during the accreditation evaluation process.

5.1.12 Inspection Path

Accredited nurseries must ensure the presence of well-defined inspection paths to facilitate smooth movement of staff, visitors, and inspection authorities without causing disturbance to the seedlings. The inspection paths may be constructed of kutcha (unpaved) or concrete material, depending on site conditions, but should be clearly demarcated and accessible. The length and width of the paths must conform to the prescribed departmental guidelines, ensuring adequate space for carrying materials, maintenance equipment, and for conducting seedling health inspections. The pathways should also be properly maintained, free from obstructions, weeds, or water stagnation, allowing for safe and smooth movement. Additionally, visible and well-positioned signages should be installed along the inspection paths to provide clear directional guidance, ensuring visitors and staff can navigate the nursery without confusion. These signages must also display species layout information, helping in easy identification and documentation of planted species. Compliance with these inspection path standards is critical to ensuring efficient management, organized operations, and smooth inspection procedures, ultimately contributing to the orderly functioning of the nursery.

5.1.13 Sapling Sales Counter

Accredited nurseries must establish a dedicated Seedling Sale Corner to facilitate the public distribution and sale of high-quality planting material, promoting afforestation and greenery expansion. The Sale Corner must be present within the nursery premises and conform to the prescribed dimensions to ensure organized seedling display and accessibility for customers. It must be properly maintained, clean, and ventilated to prevent seedling stress and deterioration, ensuring their health and vigour at the point of sale. To promote transparent and efficient seedling distribution, the nursery must maintain a Sale Register, recording all sales transactions, customer details, and seedling quantities supplied, ensuring complete accountability. Additionally, nurseries must strive to achieve a minimum of 10% to 15% seedling sales from their total annual production, reflecting the market demand and outreach. In cases where seedlings are distributed for community plantation drives, government projects, or promotional purposes, proper documentation of distribution must also be maintained. Ensuring these criteria strengthens the nursery's role in public afforestation initiatives while upholding professional accountability, proper inventory management, and transparency in seedling sales. Regular inspections will verify the proper establishment, maintenance, and record-keeping of the Seedling Sale Corner to ensure adherence to accreditation standards.

5.1.14 Entry Gate and Visibility Standards

The accredited nursery must have a well-defined entry gate installed at the main access point, prominently displaying a signboard that includes essential information such as the nursery's name, geographical area (in hectares), latitude/longitude coordinates, and the scheme under which it operates. This signboard should comply with the Department of Forests' prescribed format to ensure uniformity and visibility. The entry gate must be properly constructed as per the approved technical estimate or scheme provisions, ensuring structural durability and

security. Additionally, the visibility of the nursery from the main road is a critical criterion for easy accessibility and public recognition. Nurseries that are clearly visible from the road will score higher in the accreditation process. Adherence to these criteria enhances public visibility, accessibility, and operational legitimacy of the nursery, ensuring smooth governance and transparent functioning.

5.1.15 Display Hoardings

Accredited nurseries must mandatorily install display hoardings at a prominent location within the nursery premises, ensuring visibility to visitors, officials, and stakeholders. The hoarding must comply with the design, dimension, and content guidelines prescribed by the Department of Forests or any relevant afforestation scheme under which the nursery operates. The presence of the hoarding is awarded a maximum score of 1 point, with 0.5 points allocated for quality and durability of the material used, ensuring it withstands environmental exposure. An additional 0.5 points will be awarded if the dimension of the hoarding strictly adheres to the prescribed size standards. Similarly, 0.5 points will be granted if the content of the hoarding, such as labelled lay out map, nursery name, species information, funding scheme, departmental logos, and project objectives, is aligned with the official guidelines. Absence of a hoarding or non-compliance with any of these criteria will result in a score of 0 for the respective parameter, emphasizing the importance of consistent visibility, standardization, and public outreach through appropriate display hoardings.

5.1.16 Signages with Species Information

Accredited nurseries must install species information signages for each planting stock, ensuring clear identification, species-specific information, and public awareness. The presence of signages is mandatory, and nurseries will be awarded a full score (1 point) if signages are clearly displayed for all species. The material quality of the signages will also be evaluated, with durable, weather-resistant materials such as metal, treated wood, or UV-protected polymer boards receiving a full score (1 point). If the material is of average quality, prone to weather damage, or poor durability, the score will be 0.5 points, and if the material is substandard or vulnerable to quick degradation, the score will be zero (0 points).

The dimension of the signages must strictly adhere to the size specifications prescribed by the Department of Forests, ensuring uniformity, visibility, and readability. If the signage dimensions comply with the guidelines, the nursery will be awarded 0.5 points; however, if the signages deviate from the recommended dimensions, the score will be zero (0 points). Additionally, the content of the signages, including botanical name, local name, family, origin, and ecological utility, must comply with departmental guidelines. If the content is complete and accurate, 0.5 points will be awarded, whereas incomplete, incorrect, or missing content will result in zero (0 points). This criterion ensures that nurseries promote species-level awareness, transparency, and scientific information dissemination, aligning with best practices in nursery management and forestry education.

5.1.17 Nursery Tools and Kits

Accredited nurseries are required to possess a complete set of essential tools and kits necessary for efficient nursery management, as prescribed by the Department of Forests. The availability

of standardized tools and equipment such as pruning shears, watering cans, seed trays, potting tools, hoe, spades, root trainers, measuring tapes, and plant protection equipment is critical for ensuring smooth nursery operations. During the inspection process, the presence of these tools and kits will be awarded a full score of 1 point if all required items are available (1 point). If any item is missing or incomplete, the score will be reduced accordingly. Additionally, it is imperative that all tools are in proper working condition to ensure the effectiveness of nursery operations. Nurseries with functional tools and kits will receive an additional 0.5 points, whereas non-functional or damaged tools will receive a score of zero. This criterion emphasizes the importance of operational readiness, resource efficiency, and quality management, ensuring that accredited nurseries maintain a high standard of productivity and operational efficiency. Regular maintenance, repair, and replacement of damaged tools must be practiced for meeting the accreditation benchmarks and avoid operational inefficiencies.

5.1.18 Seedling Protection Measures

Accredited nurseries must implement preventive and curative measures to safeguard seedlings from insect infestations, fungal attacks, and other potential threats that can compromise seedling health and survival. This includes adopting integrated pest management (IPM) practices, regular inspection of seedlings for pest or disease symptoms, application of bio-pesticides, organic fungicides, and microbial agents, and ensuring proper air circulation and moisture control to minimize fungal growth. Nurseries are required to maintain detailed records of pest and disease management measures. During the inspection, if effective seedling protection measures are found to be in place, the nursery shall be awarded a score of 1 (Yes); however, if no such measures exist or are inadequately implemented, the score shall be 0 (No).

5.1.19 Operational Equipment

Accredited nurseries must possess and maintain essential operational equipment and tools to ensure efficient nursery management and seedling transportation. This includes the availability of nursery trolleys, seedling carrier vehicles, first aid boxes, and soil testing kits as standard infrastructure. The presence of nursery trolleys is crucial for the safe and efficient transportation of seedlings within the nursery premises, and they must be maintained in good working condition. Similarly, the availability of seedling carrier vehicles is mandatory for the safe and timely transportation of seedlings to planting sites, ensuring minimal physical damage to the planting stock. Both the nursery trolley and carrier vehicle must be operationally fit, and their condition will be assessed during the accreditation process. Additionally, the presence of a first aid box with essential medical items as per the departmental guidelines is mandatory to ensure prompt medical assistance in case of minor injuries during nursery operations. Inspectors will also verify if the first aid box contains all prescribed items, with partial scores provided for incomplete kits. Furthermore, a soil testing kit must be available and actively used in the nursery to monitor soil pH, fertility levels, and nutrient content, allowing for necessary soil amendments to optimize seedling growth. Mere possession of a soil testing kit is not sufficient; the kit must be in regular use for soil health assessments, ensuring that the soil conditions remain favourable for quality seedling production. Compliance with these equipment standards ensures that accredited nurseries function smoothly, efficiently, and with minimal resource losses, ultimately enhancing the quality and survival rates of seedlings.

5.1.20 Nursery Documentation and Herbarium Maintenance

Accredited nurseries must maintain a comprehensive and up-to-date Nursery Journal to document all essential nursery operations, including seed collection, sowing, germination, growth monitoring, transplantation, and plant survival rates, as per the prescribed departmental guidelines. The presence of a Nursery Journal is mandatory and shall be scored as 1 point if present and 0 if absent. Additionally, the journal must contain all requisite details, such as source of seeds, date of sowing, seedling count, hardening schedule, and nutrient application records, to ensure operational transparency. Properly maintained journals adhering to departmental protocols shall receive 0.5 points, while poorly maintained or incomplete records will receive 0 points.

In parallel, the nursery must also maintain a physical and digital herbarium to document the species diversity raised in the nursery. The physical herbarium must include pressed, dried, and labelled plant specimens representing the variety of species being propagated. Nurseries meeting this criterion shall be awarded 1 point for the presence of a herbarium and 0 points if absent. Additionally, herbarium sheets must contain detailed information as per the standard botanical nomenclature and departmental guidelines, which shall account for 0.5 points if properly mentioned and 0 points if missing. To enhance species knowledge and public outreach, nurseries are also encouraged to develop a Digital Herbarium that displays high-quality images, scientific names, family, ecological significance, and plantation suitability of each species. Nurseries maintaining a functional Digital Herbarium shall receive 0.5 points, while non-compliance will result in 0 points. Further, Digital Herbarium displays through interactive KIOSKs at nursery premises are highly encouraged to facilitate visitor awareness, educational outreach, and species identification, earning an additional 0.5 points if installed. This criterion aims to promote documentation, knowledge dissemination, and traceability of species diversity in accredited nurseries, thereby ensuring scientific and operational excellence. (*Refer guidelines*).

5.1.21 Computer Sets and Camera

Accredited nurseries must be equipped with essential technological infrastructure such as computer sets and cameras to facilitate record-keeping, data management, and photographic documentation of nursery operations. The presence of at least one functional computer set is mandatory, and nurseries must ensure that the purchase of such equipment aligns with departmental procurement guidelines. To ensure effective utilization, the computer must remain in regular operational use for tasks such as maintaining digital records, preparing progress reports, and submitting accreditation data online. Similarly, the availability of a camera is critical for capturing photographic evidence of seedling production, nursery health, and field-level activities. The camera must also be purchased in accordance with departmental procurement norms and remain in active use for visual documentation of nursery operations, plantation sites, and periodic progress reports. During the accreditation assessment, nurseries will be evaluated on both the availability and usage of computer sets and cameras, ensuring that these tools contribute to efficient data management, transparent reporting, and improved monitoring of nursery performance.

5.1.22 Waste Disposal Unit

Each accredited nursery must have a dedicated waste disposal unit to ensure proper management and disposal of organic and inorganic waste generated during nursery operations. This includes discarded polybags, dried leaves, pruned branches, non-viable seedlings, and other biodegradable and non-biodegradable waste materials. The waste disposal unit must follow scientific composting methods, segregation of waste, and safe disposal practices in accordance with environmental regulations to minimize the ecological footprint of nursery activities. Accredited nurseries must also ensure that hazardous waste such as pesticide containers, chemical bottles, or contaminated materials are disposed of responsibly to avoid soil and water contamination. The presence of a functional and well-maintained waste disposal unit is a mandatory criterion for accreditation, with a scoring provision of 1 point for presence and 0 points for absence during the assessment process.

5.1.23 Seed Orchard and Species Diversity

Accredited nurseries should possess a functioning seed orchard to ensure a consistent and genetically superior supply of seeds for propagation. The presence of a dedicated seed orchard within or associated with the nursery is essential for maintaining seed quality, genetic purity, and long-term sustainability. Nurseries with a seed orchard will be awarded 2 points, while those without one will receive 0 points. Additionally, nurseries must demonstrate species diversity as per the prescribed departmental guidelines, ensuring the availability of a wide range of species suitable for afforestation, agroforestry, and ecosystem restoration projects. Compliance with species diversity norms will earn the nursery 1 point, whereas non-compliance will result in 0 points.

5.2 Seed Quality & Genetic Diversity

5.2.1 Use of certified and genetically superior seeds

Accredited nurseries must ensure the use of certified and genetically superior seeds sourced exclusively from designated seed collection areas within forest zones, as certified and approved by the respective Divisional Forest Officers (DFOs). The seeds must possess high genetic purity, superior growth potential, and adaptability to local ecological conditions to ensure the production of high-quality, resilient planting material. Seed collection must follow scientific protocols, ensuring biodiversity conservation, species variability, and maintenance of genetic diversity. Nurseries are also required to maintain proper documentation of seed origin, collection date, and certification issued by the local DFO, ensuring full traceability and regulatory compliance. Regular seed viability and germination tests must be conducted to ensure that only vigorous and healthy seeds are utilized in propagation, thereby enhancing afforestation success rates.

5.2.2 Documentation of Origin and seed bank management

Accredited nurseries must maintain comprehensive documentation of seed origin to ensure genetic purity, traceability, and authenticity of the planting material. This includes recording the source location, species name, collection date, seed lot number, and procurement agency, along with details of the germination percentage, seed treatment, and viability tests. Proper labelling and tagging of seed stocks is mandatory to avoid genetic contamination or misidentification. Nurseries must also establish a systematic seed bank management practice,

ensuring that seeds are stored in temperature-controlled and pest-free environments, with periodic testing of seed viability and health. Inventory management must follow the First-In-First-Out (FIFO) principle, ensuring that older seeds are utilized first while maintaining detailed logs of seed distribution, usage, and remaining stock levels. The seed bank infrastructure must adhere to departmental guidelines, including humidity control, pest protection, and secure storage facilities to prevent seed deterioration. Compliance with these documentation and seed bank management protocols ensures traceable, high-quality planting material, contributing to the genetic diversity and sustainability of forest plantations.

Format for documentation of origin and seed bank management						
Sl No	Species	Reserve Forest	GPS	Tree Measurement	Weight of Seed Collected	Approved by DFO

5.2.3 Implementation of seed viability and germination tests

Accredited nurseries must ensure that all seeds used for propagation are of high genetic quality, true-to-type, and sourced from certified or approved origins to maintain genetic diversity and adaptability. The seeds must exhibit high viability, superior germination potential, and strong growth characteristics to produce vigorous and stress-resilient seedlings. To ensure this, nurseries are required to conduct seed viability and germination tests at regular intervals using scientific methods prescribed by the Department of Forests. These tests should include pre-sowing treatments, germination percentage analysis, and vigour index assessment, ensuring that only healthy and viable seeds are utilized for propagation. Detailed record-keeping of seed test results, including source, collection date, testing method, and germination rates, must be maintained for future audits and verification purposes. This criterion guarantees that nurseries consistently produce genetically robust planting material, enhancing the survival rate, adaptability, and long-term sustainability of plantations.

- **Float test:** The float test for seeds is a simple method to assess seed viability, where seeds are placed in water, and those that sink are considered viable while those that float are likely dead or damaged and should be discarded.

Place the seeds in a container of water and observe them for 15 minutes.

Viable seeds: Healthy, viable seeds will sink to the bottom of the container.

Non-viable seeds: Damaged or dead seeds, which are lighter and less dense, will float on the surface of the water.

Healthy seeds have a higher density and are filled with nutrients and carbohydrates, while dead seeds are hollow and lack these essential components, making them lighter and causing them to float.

Float Test results with 80% and above healthy seeds to be considered as good seed source.

Format for Float test					
Sl.No	Date	Species	Weight of Seeds	Source/division	Seed viability/ Float test result

- **Wet cloth test:** The wet cloth or paper towel test is a simple method to assess seed viability by placing seeds on a damp paper towel, folding it up, and placing it in a warm, humid environment to encourage germination.

- ✓ Dampen a cloth/paper towel thoroughly but not to the point of soaking, ensuring it's moist but not dripping.
- ✓ Place a small sample of seeds (e.g., 10-20) on the damp cloth/paper towel, ensuring they are not overlapping.
- ✓ Fold the cloth/paper towel to enclose the seeds, and place it in a sealed plastic bag or container to maintain humidity.
- ✓ Keep the sealed bag in a warm place (ideally between 70°F and 80°F or 21°C and 27°C) for 7-10 days, depending on the seed type.
- ✓ Regularly check the seeds for signs of germination, such as root or cotyledon emergence.
- ✓ Count the number of germinated seeds and calculate the percentage of seeds that sprouted.

Wet cloth test result with 80% and above germination rate to be considered as good seed source.

Format for wet cloth test					
Sl.No	Date	Species	Weight of Seeds	Source/division	Seed germination / wet cloth test result

5.3 Nursery Management Practices

5.3.1 Seedling propagation techniques and transplantation protocols

5.3.1.1 Mother Beds

Accredited nurseries must mandatorily maintain mother beds for germinating seeds, ensuring their presence and functionality as per the prescribed guidelines. The dimensions of the mother beds should strictly conform to the standardized size specifications recommended by the Department of Forests to ensure uniform and healthy seedling growth. The mother beds must be well-maintained, weed-free, and properly irrigated to provide an optimal environment for seed germination and root establishment. Additionally, the number of mother beds should proportionally match the targeted seedling production capacity and species diversity, ensuring that the nursery

can meet its planting stock targets without overcrowding or underutilization. Nurseries must also ensure that the germination rate from these mother beds meets or exceeds a minimum threshold of 75%, as stipulated in the departmental guidelines. Any germination performance below this benchmark shall be considered substandard, affecting the nursery's eligibility for accreditation. Regular monitoring and record-keeping of germination data, along with periodic inspections, are necessary to validate that the mother beds are functioning optimally and yielding healthy seedlings in line with for afforestation goals.

5.3.1.2 Polypot Bed

Accredited nurseries must ensure that polypot beds are present, adequately maintained, and conform to the dimensional standards prescribed by the Department of Forests. The number of polypot beds should proportionately tally with the number of seedlings/species being raised, as per the guidelines. Each polypot bed must be properly stacked, bound, and maintained, ensuring survivability of seedlings above 80%. Seedlings must be timely transplanted from germination beds to polypots, as recorded in the nursery register, ensuring a seamless growth cycle. The shifting, grading, and spacing of polypots must be conducted periodically following the prescribed standards to promote uniform growth, root development, and efficient resource utilization. The size and quality of polypots used should strictly adhere to departmental specifications, ensuring durability and optimal root space. The soil composition used for filling the polypots must comply with the prescribed ratio of topsoil, organic compost, and sand, ensuring tight soil packing to promote robust root development and prevent root desiccation. Additionally, the stock and distribution register must reflect an accurate tally of the number of saplings produced, distributed, and maintained, ensuring traceability and accountability in the production process. Compliance with these criteria ensures systematic nursery management, high-quality seedling production, and successful plantation establishment, reinforcing the overall objectives of forest conservation and afforestation.

5.3.2 Use of organic fertilizers, composting, and biofertilizers

Accredited nurseries must prioritize the use of organic fertilizers, compost, and biofertilizers to ensure sustainable soil fertility management and healthy seedling growth. The use of chemical fertilizers should be minimized, and preference should be given to farmyard manure (FYM), vermicompost, green manure, decomposed organic matter, and microbial biofertilizers such as *Azospirillum*, *Rhizobium*, and *Mycorrhiza*. Nurseries must establish on-site composting units to recycle organic waste, ensuring a continuous supply of nutrient-rich compost for seedling production. The application of biofertilizers must align with species-specific nutrient requirements, promoting faster root establishment, improved nutrient uptake, and overall plant vigour. Additionally, records of fertilizer application schedules, dosages, and sources must be maintained to ensure traceability and compliance with departmental guidelines. By strictly adhering to these standards, nurseries contribute to environmentally sustainable nursery practices and improve the success rate of plantation programs.

5.3.3 Pest and disease control measures

The nursery must implement scientific and environmentally sustainable pest and disease control measures to safeguard seedlings from potential infestations and infections. The use of integrated pest management (IPM) practices, including biological control agents, organic pesticides, neem-based formulations, and microbial bio-repellents, shall be prioritized to minimize chemical dependency. Preventive measures such as soil sterilization, seed treatment, regular sanitation, and proper spacing of seedlings must be strictly followed to reduce pest and disease incidence. In cases where chemical intervention becomes unavoidable, the nursery must adhere to the permissible pesticide use limits prescribed by the Forest Department, ensuring minimal environmental impact and no residual toxicity in seedlings. Additionally, the nursery must maintain detailed documentation of pest and disease control measures, including treatment dates, chemicals or biological agents used, and effectiveness reports, for future reference and audit purposes. Periodic inspections by the Forest Department will assess the effectiveness of pest and disease control strategies, ensuring that the nursery maintains a high standard of seedling health and quality as per accreditation requirements.

5.3.4 Monitoring of seedling growth and maintenance of digital records

The nursery must establish a systematic and continuous monitoring mechanism to assess seedling growth, health, and development at various stages of propagation. This includes recording key growth parameters such as germination rate, height increment, foliage density, and overall vigour of seedlings. The nursery is required to maintain digital records of all critical data related to seedling production, nutrient application, pest management, hardening practices, and survival rates. The use of digital platforms, mobile applications, and cloud-based databases is encouraged to facilitate real-time data entry, remote monitoring, and analysis. Additionally, the nursery must ensure that the digital records are systematically categorized, retrievable, and auditable for inspection purposes by the Forest Department or third-party assessors. Maintaining accurate and updated digital records enhances operational transparency, accountability, and traceability of nursery operations, ensuring sustained adherence to the quality benchmarks prescribed under the nursery accreditation protocol.

Format for monitoring seedling growth					
Month-.....					
Sl.No	Species	Bed No.	Average height	Deformity (if any)	Pest attack (if any)

** PLEASE REFER GUIDELINES IN ANNEXURE-II

5.4 Workforce & Capacity Building

5.4.1 Employment of skilled nursery managers and field staff

Accredited nurseries must have a sufficiently skilled and adequately staffed workforce capable of executing all nursery operations with scientific precision and operational efficiency. The

workforce should include trained nursery managers as Forest Rangers, field supervisors as Forester-I, other frontline staffs, skilled labourers, specializing in seed treatment, propagation techniques, pest and disease management, irrigation management, and seedling hardening. Periodic evaluation of workforce skills and operational competency will be a key criterion for continued accreditation, ensuring that the workforce remains technically proficient, operationally competent, and aligned with the Department's quality standards.

5.4.2 Periodic training and knowledge enhancement programs

Accredited nurseries must ensure the continuous capacity building of their personnel through periodic training and knowledge enhancement programs focused on nursery management best practices, scientific propagation techniques, pest and disease management, soil and water conservation, and climate-resilient afforestation methods. Training sessions must be conducted at regular intervals, either through in-house experts, external resource persons, or in collaboration with the Forest Department, to keep nursery staff updated on the latest advancements in forestry science, seed technology, and nursery infrastructure management. Additionally, participation in state-level and national-level workshops, exposure visits, and practical demonstrations should be encouraged to enhance their technical competencies and operational efficiency. Proper documentation of training schedules, participant records, and skill development outcomes must be maintained for inspection and accreditation renewal purposes. Additionally, nurseries must maintain a record of staff training sessions, skill certifications, and capacity enhancement programs to ensure continuous professional development.

5.4.3 Collaboration with research institutions for continuous improvement

Accredited nurseries must actively collaborate with recognized forestry research institutions like RFRI, universities like AAU, and scientific organizations to ensure continuous technological and scientific advancements in nursery management practices. Such collaborations should focus on introducing superior seedling propagation techniques, improving soil health management, enhancing pest and disease control measures, and developing climate-resilient planting stock. Nurseries are expected to participate in capacity-building programs, knowledge exchange workshops, and field trials organized by these institutions to remain updated with the latest research findings. Additionally, nurseries must facilitate data-sharing and joint research initiatives to contribute to the development of region-specific species, site-suitability mapping, and performance evaluation of planted stock. Formal MoUs (Memorandums of Understanding) or working partnerships with research bodies will significantly enhance the quality, survival, and adaptability of seedlings, fostering scientific rigor, innovation, and sustainability in nursery operations.

5.5 On-Site Inspection and Monitoring

A rigorous and periodic on-site inspection and monitoring system is a critical component of the nursery accreditation process to ensure that accredited nurseries consistently maintain prescribed quality standards, operational efficiency, and compliance with departmental protocols. The Forest Department, as the legitimate certifying authority, shall conduct scheduled and surprise inspections to assess the overall performance, infrastructure, seed quality, plant health, nursery management practices, resource utilization, and adherence to prescribed standards. The objective of these inspections is to ensure that

nurseries do not deviate from the certification criteria and continue to produce high-quality planting materials suitable for large-scale afforestation, reforestation, and ecological restoration projects.

During on-site inspections, special emphasis will be placed on critical nursery components such as seed sourcing, seed treatment, propagation methods, potting mixture preparation, irrigation efficiency, hardening techniques, pest and disease management, plant growth records, and documentation practices. The inspecting team shall verify whether the nursery has maintained accurate digital and manual records of seed origin, germination success rates, mortality rates, soil testing reports, pest control measures, and plantation success data. Additionally, the team will assess whether the nursery infrastructure, including fencing, polyhouses, shade houses, seed storage facilities, irrigation systems, and drainage systems, complies with the standardized norms prescribed by the department.

The monitoring process will also involve an assessment of seedling health parameters, such as root-shoot ratio, plant vigour, disease resistance, foliage density, and physical deformities, to ensure that the planting material meets prescribed morphological and physiological quality benchmarks. In case of any non-compliance or deviation from standards, the inspection team shall issue a corrective action plan with a stipulated timeline for the nursery to rectify the deficiencies. Failure to comply within the specified timeframe may result in temporary suspension or revocation of accreditation.

Furthermore, post-plantation monitoring will also be undertaken to evaluate the performance of nursery-raised seedlings in the field. This involves tracking survival rates, growth patterns, and establishment success of planted stock to validate whether the seedlings supplied by the nursery meet the intended afforestation goals. Nurseries demonstrating consistent high-quality output, improved survival rates, and compliance with forest department guidelines will receive high-performance ratings, while repeated non-compliance may result in accreditation downgrading or cancellation.

To ensure accountability and transparency, the Forest Department will adopt digital monitoring systems like geo-tagging, mobile-based inspection reports, satellite imagery verification, and GIS mapping for real-time tracking of nursery operations and field-level performance. This comprehensive on-site inspection and monitoring mechanism will not only safeguard the integrity of nursery accreditation standards but also foster a culture of continuous improvement, innovation, and operational excellence in the nursery sector. A designated technical committee conducts field inspections, interviews nursery personnel, and verifies documentation.

5.6 Scoring & Certification

The final stage of the nursery accreditation process involves scoring and certification, wherein nurseries are systematically evaluated based on their compliance with prescribed evaluation criteria as outlined by the Department of Forests. Each nursery's performance is assessed across multiple parameters, including seed source authenticity, genetic purity, soil and water management, infrastructure standards, pest and disease control, record-keeping, resource optimization, and post-plantation survival rates. A detailed scoring matrix is employed to assign quantitative scores for each parameter, ensuring an objective and transparent evaluation process. Nurseries must meet a minimum aggregate score threshold, determined by the Department, to qualify for accreditation.

Nurseries that successfully meet or exceed the prescribed benchmark are granted official accreditation, thereby earning the status of a Certified Nursery. This certification is valid for a period of two years, during which the nursery is expected to maintain its quality standards without deviation. Accredited nurseries are issued a Certificate of Accreditation along with a unique accreditation number, enabling them to supply seedlings for government-funded afforestation projects, public distribution, and private plantation initiatives. The certification also grants preferential access to government schemes, financial assistance, technical training, and capacity-building programs aimed at further enhancing nursery performance.

To ensure continued adherence to quality standards, the certification is subject to periodic re-evaluation by the Department of Forests. During re-evaluation, a team of technical experts, silviculturists, and forestry officers conduct a comprehensive on-site assessment to verify whether the nursery has maintained compliance with accreditation standards. Parameters such as survival percentage of planted stock, genetic conformity of seedlings, infrastructure condition, and operational efficiency are rigorously inspected. If the nursery continues to meet the prescribed standards, the accreditation is renewed for another two-year cycle. However, if any deviation, quality lapse, or non-compliance is observed, the certification may be suspended or revoked, necessitating a re-assessment after corrective measures are implemented.

The scoring and certification process not only incentivizes nurseries to consistently uphold high-quality standards but also establishes accountability, transparency, and traceability in the nursery production system. Accredited nurseries play a critical role in ensuring the availability of high-quality planting stock for afforestation, reforestation, and ecological restoration programs, contributing to the larger goal of forest conservation, climate resilience, and sustainable forestry development. Nurseries are scored based on compliance with evaluation criteria (*Guidelines & Format enclosed*). Those scoring above the required threshold receive accreditation, which is valid for two years, with periodic re-evaluation.

6. BENEFITS OF NURSERY ACCREDITATION

The implementation of a robust nursery accreditation system offers a wide range of ecological, economic, and social benefits, significantly contributing to the success of large-scale afforestation, reforestation, and landscape restoration programs. By ensuring that nurseries adhere to scientifically approved protocols, quality benchmarks, and operational standards, accredited nurseries consistently produce high-quality, genetically pure, and site-suitable planting materials, which directly enhance the survival rate, growth performance, and overall health of forest plantations. This, in turn, supports the restoration of degraded ecosystems, augmentation of forest cover, enhancement of biodiversity, and improvement of ecological services such as carbon sequestration, soil conservation, and water recharge. On the economic front, nursery accreditation facilitates access to government-sponsored afforestation projects, carbon credit mechanisms, and green economy initiatives, thereby fostering new employment opportunities, increased revenue generation, and rural economic development. Additionally, accredited nurseries become eligible for financial incentives, institutional support, and technical training provided by the Department of Forests, enabling them to scale up operations, adopt modern nursery technologies, and improve resource utilization efficiency.

From a social perspective, the certification of nurseries fosters greater community participation, skill development, and livelihood opportunities, especially among rural and forest-dependent communities,

empowering them to actively participate in forestry-related activities. The availability of certified high-quality seedlings further supports the establishment of community forests, agroforestry plantations, commercial tree plantations, and biodiversity parks, enhancing ecosystem resilience and promoting sustainable forest management. The Forest Department, through the accreditation system, establishes a framework for regular monitoring, performance evaluation, and quality assurance, ensuring long-term sustainability of forest plantations. Furthermore, the certification process creates accountability among nurseries, reducing the chances of substandard seedling production, resource mismanagement, and non-compliance with forestry standards. This not only streamlines forest resource management but also contributes to achieving national afforestation targets, carbon neutrality goals, and biodiversity conservation commitments under international conventions like the Paris Agreement, Convention on Biological Diversity (CBD), and Bonn Challenge.

In a broader context, nursery accreditation serves as a powerful instrument to transform forestry operations, promote green business models, and establish a quality-driven nursery network, ultimately contributing to the state's Gross State Domestic Product (GSDP) from forestry, ensuring the sustainability of forest ecosystems, and fostering a resilient socio-economic framework. The structured and regulated nursery certification process also enables the Forest Department to strengthen policy implementation, resource allocation, and stakeholder coordination, ensuring that the highest quality planting material reaches the ground, resulting in healthy, dense, and productive forests that benefit both people and the planet.

6.1 Higher Plantation Success Rate

The success of afforestation and reforestation initiatives heavily depends on the quality of planting stock used during field transplantation. Accredited nurseries, adhering to standardized production protocols, ensure the supply of genetically superior, physiologically robust, and site-suitable seedlings, thereby significantly enhancing the plantation success rate. High-quality seedlings exhibit greater root vigour, shoot height, biomass development, and disease resistance, allowing them to establish quickly in the field and withstand harsh environmental conditions such as drought, temperature extremes, or poor soil quality. Additionally, seedlings with a well-developed root system and high nutrient efficiency experience faster growth rates, minimal transplant shock, and higher survival percentages post-plantation.

By enforcing stringent quality control standards during seed collection, germination, hardening, and grading, accredited nurseries minimize the risk of poor-quality planting stock, ensuring that only healthy, pest-free, and morphologically sound seedlings reach the plantation sites. This reduces mortality rates, minimizes plantation failures, and optimizes resource utilization during afforestation. Furthermore, the use of species-specific nursery management practices aligned with site suitability guidelines ensures that the seedlings can thrive in diverse ecological zones, including degraded forest lands, riverbanks, hilly terrains, and open wastelands.

The economic impact of higher plantation success rates is also substantial, as fewer replanting efforts, reduced mortality, and optimized plantation inputs lead to cost-efficiency in large-scale forestry operations. Moreover, ensuring high-quality planting stock enhances carbon sequestration potential, improved soil stabilization, enhanced biodiversity conservation, and ecosystem restoration, aligning with the broader goals of climate change mitigation, sustainable forest management, and national afforestation policies. Consequently, nursery accreditation plays a pivotal role in delivering quantifiable

afforestation success by consistently supplying superior planting material, ultimately contributing to the long-term sustainability and productivity of forest.

6.2 Better Fund Utilization

The accreditation of nurseries plays a pivotal role in ensuring optimal utilization of funds allocated by the government, private sector, or international funding agencies for afforestation, reforestation, and plantation development programs. By promoting the use of certified planting material, the accreditation system ensures that financial investments yield higher returns in terms of plantation survival, growth, and productivity. When funds are directed toward establishing high-quality, genetically superior, and healthy seedlings from accredited nurseries, the likelihood of plantation failure, low survival rates, and resource wastage is significantly minimized. This, in turn, results in cost-effective afforestation projects, where the same financial outlay yields higher forest cover, increased biomass, and enhanced ecosystem services.

Furthermore, the certification process ensures that nurseries adhere to standardized propagation methods, optimal nutrient management, proper hardening procedures, and sustainable pest control measures, resulting in uniform and robust planting stock. This helps the government and private sectors avoid unnecessary expenditures on replantation, failed restoration, or forest cover recovery, maximizing the impact per rupee spent. Additionally, certified nurseries with robust infrastructure, scientific management, and quality assurance mechanisms significantly reduce mortality rates of transplanted seedlings, allowing for long-term carbon sequestration, ecosystem restoration, and economic value generation from forests.

From the private sector perspective, investing in accredited nurseries guarantees value for money as they receive superior planting stock with higher survival and growth rates, ultimately maximizing the economic return on investment (ROI). The government, on the other hand, benefits from enhanced afforestation outcomes, reduced maintenance costs, and increased carbon sink potential, making public fund utilization more transparent, result-oriented, and productive. Additionally, by ensuring that only accredited nurseries are contracted for large-scale plantation schemes, the government can demonstrate accountability in public fund utilization to various stakeholders, including funding agencies, environmental auditors, and the public. Ultimately, better fund utilization through nursery accreditation strengthens the financial efficiency, environmental sustainability, and social impact of plantation programs, enabling a cost-effective and results-driven forestry sector. Government and private investments yield better returns with certified planting material.

6.3 Transparent Governance:

A standardized evaluation system for nursery accreditation plays a pivotal role in ensuring transparency, accountability, and fairness in nursery management. By establishing uniform assessment criteria, the accreditation process eliminates subjective biases and ensures that all nurseries, whether government or private, are evaluated on the basis of scientific, operational, and environmental parameters. This fosters credibility and trust among stakeholders, including government agencies, private investors, forestry professionals, and local communities. The implementation of digital monitoring tools, third-party audits, and periodic inspections further strengthens oversight mechanisms, ensuring that accredited nurseries continue to meet prescribed standards over time. Additionally, public disclosure of accreditation status, evaluation reports, and compliance records

enables greater transparency, allowing policymakers and investors to make informed decisions. By adhering to clear and well-documented guidelines, the system also enhances accountability, making nurseries responsible for maintaining seedling quality, adhering to sustainable practices, and ensuring long-term plantation success. Through transparent governance, the accreditation framework not only strengthens institutional integrity but also promotes a more efficient, credible, and sustainable nursery management system that aligns with national and global forestry objectives.

6.4 Economic Development:

Accredited nurseries play a vital role in aiding economic growth by gaining preferential market access and securing contracts for large-scale forestry, afforestation, and reforestation programs initiated by both government and private entities. Certification provides nurseries with credibility and competitive advantage, making them eligible suppliers for state-sponsored plantation drives, corporate social responsibility (CSR) projects, compensatory afforestation initiatives, and climate mitigation programs. With an increasing global emphasis on sustainable forestry and carbon sequestration, accredited nurseries can tap into emerging markets such as carbon offset programs, biodiversity conservation projects, and agroforestry ventures, thereby expanding their economic opportunities. Additionally, formal accreditation enhances a nursery's ability to attract financial assistance, subsidies, and soft loans from government agencies, international organizations, and environmental NGOs, further strengthening their economic viability. The certification process also contributes to job creation, generating employment for local communities, skilled horticulturists, and forestry professionals engaged in seed collection, plant propagation, nursery maintenance, and transportation. By ensuring a steady supply of high-quality, disease-free, and genetically superior seedlings, accredited nurseries facilitate sustainable forest-based livelihoods, enhance rural economies, and contribute to the green economy, ultimately supporting national and international afforestation goals.

7. POLICY RECOMMENDATIONS & FUTURE ROADMAP

To institutionalize nursery accreditation as a cornerstone of sustainable forestry, it is imperative to integrate the protocol into state and national forestry policies while ensuring inter-agency collaboration, funding mechanisms, and technological advancements. Establishing a legislative framework mandating certification for all government and private nurseries will standardize quality control, genetic purity, and sustainable nursery practices. Strengthening capacity-building initiatives through regular training, knowledge-sharing platforms, and digital monitoring tools will enhance compliance and efficiency. Future efforts should focus on leveraging technology such as GIS mapping, remote sensing, and AI-driven analytics for real-time nursery monitoring, performance evaluation, and predictive modelling. Encouraging public-private partnerships (PPPs) will attract investment, innovation, and employment opportunities, scopes for a self-sustaining nursery sector. Additionally, integrating climate-resilient species selection, carbon sequestration incentives, and community-based nursery models will align nursery production with global sustainability goals and afforestation commitments. The roadmap ahead would envisage dynamic policy integration, continuous research-driven improvements, and statewide scalability, ensuring that nursery accreditation evolves as a robust system supporting biodiversity conservation, ecological restoration, and climate adaptation strategies.

7.1 Official Notification & Legal Framework:

The integration of nursery accreditation into the State forestry regulatory framework is essential for ensuring institutional recognition, legal compliance, and standardised nursery management across

governmental and private sectors. The Forest Department, as the statutory authority, may issue an official notification mandating that all nurseries supplying planting material for afforestation, reforestation, and commercial forestry projects must obtain accreditation. This directive will align with existing forestry laws, biodiversity conservation acts, environmental protection regulations, and afforestation policies, ensuring that nurseries operate within a scientific, sustainable, and legally sanctioned framework. The accreditation system need to be incorporated into forest governance mechanisms, with provisions for regular inspections, compliance audits, and renewal of accreditation status based on adherence to prescribed norms. Additionally, accredited nurseries will be eligible for government incentives, research collaboration, and institutional support, further strengthening their role in forest ecosystem restoration, climate resilience, and sustainable timber production. Legal provisions may also define penalties for non-compliance, ensuring that nursery operations remain accountable, transparent, and aligned with the broader objectives of forest management and conservation policies.

7.2 Capacity Building & Training Programmes

A well-structured capacity-building and training program is essential for ensuring that nursery personnel, including officers, field staff, and workers, are equipped with the latest knowledge, skills, and best practices in nursery management. SFTIs should facilitate regular training sessions, workshops, and hands-on demonstrations focusing on seed selection, propagation techniques, pest and disease management, soil and water conservation, infrastructure maintenance, and climate-resilient nursery practices. These programs should be conducted in collaboration with forestry research institutes, universities, and technical experts of the department, ensuring alignment with scientific advancements and departmental guidelines. On-the-job training and skill development modules should emphasize organic and sustainable nursery practices, efficient resource utilization, and technological interventions such as GIS mapping, automated irrigation systems, and digital record-keeping. Additionally, nurseries should encourage participation in exposure visits, inter-institutional knowledge exchanges, and certification courses to enhance professional expertise. Periodic evaluation and feedback mechanisms should be in place to assess the impact of training programs and continuously improve their effectiveness.

8 CONCLUSION

Accrediting forest nurseries is a strategic and scientifically driven initiative that strengthens national afforestation programs, enhances climate resilience, and promotes sustainable forest management in alignment with global environmental commitments and national forestry policies. A well-structured nursery accreditation system, backed by scientific principles, regulatory control, and quality assurance protocols, ensures the consistent production of genetically superior, disease-free, and climate-adaptive planting material, which is critical for successful afforestation, ecosystem restoration, and biodiversity conservation. By institutionalizing this certification framework, the Forest Department establishes credibility, transparency, and accountability, ensuring that only nurseries meeting prescribed quality and operational benchmarks contribute to large-scale forestry initiatives. This structured approach not only optimizes resource utilization, fosters private sector participation, and facilitates funding opportunities but also enhances the long-term success of plantations, ensuring higher survival rates and ecological stability. The accreditation process reinforces trust among stakeholders, including policymakers, conservationists, and afforestation agencies, creating a sustainable and scalable nursery management model for present and future generations.

ANNEXURE-I
(FORMAT FOR MARKING)

SL. NO	PARTICULARS	Put a '✓' in the space '[]' provided adjacent to each of the following criteria as applicable.		MAX MARKS ALLOTTED	MARKS OBTAINED
1	NURSERY SITE	PRESENT = 1 []	ABSENT = 0 []	1	
1.1	Site selection (as per guidelines)	YES = 2 []	NO = 0 []	2	
1.2	Area of the nursery (as mentioned)	YES = 0.5 []	NO = 0 []	0.5	
1.3	Geotagging	YES = 0.5 []	NO = 0 []	0.5	
1.4	Proximity to motorable road (5-50m)	YES = 0.5 []	NO = 0 []	0.5	
1.5	Proper Sunlight	YES = 0.5 []	NO = 0 []	0.5	
1.6	Water logging	YES = 0 []	NO = 0.5 []	0.5	
1.7	Slope (5 to 15 degrees)	YES = 0.5 []	NO = 0 []	0.5	
1.8	Adjacent to nearby forest	YES = 0.5 []	NO = 0 []	0.5	
2	FENCING/BOUNDARY WALL	PRESENT = 1 []	ABSENT = 0 []	1	
2.1	Type (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
2.2	Length(as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
2.3	Quality(as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
2.4	Proper Maintenance	YES = 0.5 []	NO = 0 []	0.5	
3	WATER SUPPLY	PRESENT = 2 []	ABSENT = 0 []	2	
3.1	Water source Type (As per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
3.2	Presence of irrigation network	YES = 1 []	NO = 0 []	1	
3.3	Presence of water storage tank	YES = 1 []	NO = 0 []	1	
3.4	Tank capacity (Lts) (As per guidelines)	YES = 0.5 []	NO = 0 []	0.5	

3.5	Provision of rain water harvesting	YES = 0.5 []	NO = 0 []	0.5	
4	POWER SUPPLY	PRESENT = 2 []	ABSENT = 0 []	2	
4.1	Green Energy Source	YES = 0.5 []	NO = 0 []	0.5	
4.2	Power Supply Network	Good = 1 []	Needs attention = 0 []	1	
4.3	Presence of backup energy source	YES = 0.5 []	NO = 0 []	0.5	
5	OFFICE/CAMP HUT	PRESENT = 1 []	ABSENT = 0 []	1	
5.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
5.2	Well Ventilated	YES = 0.5 []	NO = 0 []	0.5	
5.3	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
5.4	Properly located	YES = 0.5 []	NO = 0 []	0.5	
6	SEED STORAGE UNIT	PRESENT = 1 []	ABSENT = 0 []	1	
6.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
6.2	Well Ventilated	YES = 0.5 []	NO = 0 []	0.5	
6.3	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
6.4	Proper stacking of seeds	YES = 0.5 []	NO = 0 []	0.5	
6.5	Quality of stored seeds (as per protocol)	YES = 0.5 []	NO = 0 []	0.5	
6.6	Insect/pest/fungus attack	YES = 0 []	NO = 0.5 []	0.5	
6.7	Species diversity (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
6.8	Display of Seed samples which are grown in the nursery	YES = 0.5 []	NO = 0 []	0.5	
7	STORE HOUSE	PRESENT = 1 []	ABSENT = 0 []	1	
7.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
7.2	Well Ventilated	YES = 0.5 []	NO = 0 []	0.5	
7.3	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	

8	LABOUR SHED	PRESENT = 1 []	ABSENT = 0 []	1	
8.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
8.2	Well Ventilated	YES = 0.5 []	NO = 0 []	0.5	
8.3	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
9	GREEN HOUSE/MIST CHAMBER	PRESENT = 1 []	ABSENT = 0 []	1	
9.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
9.2	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
9.3	Presence of Sprinklers	YES = 0.5 []	NO = 0 []	0.5	
9.4	Sprinklers and all equipment in proper working condition	YES = 0.5 []	NO = 0 []	0.5	
9.5	Facilities meet modern standards (As per Protocol)	YES = 0.5 []	NO = 0 []	0.5	
10	SOIL MIXING SHED	PRESENT = 1 []	ABSENT = 0 []	1	
10.1	Dimension (as per estimate)	YES = 0.5 []	NO = 0 []	0.5	
10.2	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
10.3	Soil composition (as per guidelines)	YES = 1 []	NO = 0 []	1	
10.4	Soil filled polypots	Tightly packed = 1 []	Loose soil = 0 []	1	
11	COMPOST UNIT	PRESENT = 1 []	ABSENT = 0 []	1	
11.1	Dimension (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
11.2	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
11.3	Quantity of compost produced per week from the unit (as per guidelines)	YES = 1 []	NO = 0 []	1	
12	INSPECTION PATHS	PRESENT = 1 []	ABSENT = 0 []	1	
12.1	Length and width (as per guidelines)	YES = 1 []	NO = 0 []	1	
12.2	Properly maintained	YES = 1 []	NO = 0 []	1	

12.3	Presence of signages showing directions and displaying information of species layout	YES = 1 []	NO = 0 []	1	
13	MOTHER BEDS	PRESENT = 1 []	ABSENT = 0 []	1	
13.1	Dimension (as per guidelines)	YES = 1 []	NO = 0 []	1	
13.2	Properly maintained	YES = 1 []	NO = 0 []	1	
13.3	Nos of mother beds are proportional with nos of seedlings/species	YES = 1 []	NO = 0 []	1	
13.4	Germination rate (>=75%)	GOOD = 1 []	BAD = 0 []	1	
14	POLYPOT BEDS	PRESENT = 1 []	ABSENT = 0 []	1	
14.1	Dimension (as per guidelines) norms	YES = 1 []	NO = 0 []	1	
14.2	Properly maintained	YES = 1 []	NO = 0 []	1	
14.3	Nos of polypot beds are proportional with nos of seedlings/ species	YES = 1 []	NO = 0 []	1	
14.4	Survivability (>80%)	GOOD = 1 []	BAD = 0 []	1	
14.5	Polypots stacked & bound properly	YES = 1 []	NO = 0 []	1	
14.6	Timely Transplanted (As per Register)	YES = 1 []	NO = 0 []	1	
14.7	Proper polypot shifting and grading (As per guidelines)	YES = 1 []	NO = 0 []	1	
14.8	Polypot sizes used (as per guidelines)	YES = 1 []	NO = 0 []	1	
14.9	Quality of Polypots used (as per guidelines)	YES = 1 []	NO = 0 []	1	
14.1	Stock & distribution tally of saplings	YES = 1 []	NO = 0 []	1	
15	ENTRY GATE with a signboard mentioning area, lat/long, scheme	PRESENT = 1 []	ABSENT = 0 []	1	
15.1	Visible from road	YES = 0.5 []	NO = 0 []	0.5	
15.2	Measurement & quality (as per estimate/scheme)	YES = 0.5 []	NO = 0 []	0.5	
16	DISPLAY HOARDING	PRESENT = 1 []	ABSENT = 0 []	1	

16.1	Quality of the hoarding (as per guidelines/scheme)	YES = 0.5 []	NO = 0 []	0.5	
16.2	Dimension (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
16.3	Content on the hoarding (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
17	SIGNAGES WITH SPECIES INFORMATION	PRESENT = 1 []	ABSENT = 0 []	1	
17.1	Material of the signages	GOOD = 1 [] AVERAGE = 0.5 []	BAD = 0 []	1	
17.2	Dimension (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
17.3	Content of signage (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
18	NURSERY TOOLS AND KITS	PRESENT = 1 []	ABSENT = 0 []	1	
18.1	No. of items (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
18.2	Items in proper working condition	YES = 0.5 []	NO = 0 []	0.5	
19	SEEDLING PROTECTION MEASURES				
19.1	Measures for countering insect infestation and fungal attack taken up	YES = 1 []	NO = 0 []	1	
20	SEEDLING SALES CORNER	PRESENT = 1 []	ABSENT = 0 []	1	
20.1	Dimension (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
20.2	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
20.3	Properly ventilated	YES = 0.5 []	NO = 0 []	0.5	
20.4	Percentage of seedlings sold (10% to 15%)	YES = 1 []	NO = 0 []	1	
20.5	Sale Register properly maintained	YES = 1 []	NO = 0 []	1	
20.6	Seedlings distributed for other purposes	YES = 1 []	NO = 0 []	1	
21	NURSERY TROLLEYS	PRESENT = 1 []	ABSENT = 0 []	1	
21.1	In good working condition	YES = 0.5 []	NO = 0 []	0.5	
22	SEEDLING CARRIER VEHICLE	PRESENT = 1 []	ABSENT = 0 []	1	
22.1	In good working condition	YES = 0.5 []	NO = 0 []	0.5	

23	FIRST AID BOX	PRESENT = 1 []	ABSENT = 0 []	1	
23.1	Items included (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
24	SOIL TESTING KIT	PRESENT = 1 []	ABSENT = 0 []	1	
24.1	In use	YES = 0.5 []	NO = 0 []	0.5	
25	NURSERY JOURNAL	PRESENT = 1 []	ABSENT = 0 []	1	
25.1	Details mentioned (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
25.2	Properly maintained	YES = 0.5 []	NO = 0 []	0.5	
26	HERBARIUM	PRESENT = 1 []	ABSENT = 0 []	1	
26.1	Species diversity (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
26.2	Details mentioned (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
26.3	Digital herbarium present	YES = 0.5 []	NO = 0 []	0.5	
26.4	Digital herbarium display in KIOSK	YES = 0.5 []	NO = 0 []	0.5	
27	COMPUTER SETS	PRESENT = 1 []	ABSENT = 0 []	1	
27.1	Purchase made (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
27.2	In use	YES = 0.5 []	NO = 0 []	0.5	
28	CAMERA	PRESENT = 1 []	ABSENT = 0 []	1	
28.1	Purchase made (as per guidelines)	YES = 0.5 []	NO = 0 []	0.5	
29	STAFF	PRESENT = 1 []	ABSENT = 0 []	1	
29.1	No. of staffs (as per guidelines)	YES = 1 []	NO = 0 []	1	
30	WASTE DISPOSAL UNIT	PRESENT = 1 []	ABSENT = 0 []	1	
31	NURSERY REGISTER FOR FUND UTILIZATION WITH TIMELINE	PRESENT = 1 []	ABSENT = 0 []	1	
32	SEED ORCHARD	PRESENT = 1 []	ABSENT = 0 []	2	

32.1	Species diversity (as per guidelines)	YES = 1 []	NO = 0 []	1	
TOTAL MARKS				100	

GRADE	SCORE
A	80 and above
B	60-79
C	below 60

****REFER ANNEXURE-II FOR GUIDELINES**

ANNEXURE-II (GUIDELINES FOR NURSERY ACCREDITATION)

1.NURSERY SITE:

Site selection:

- Sufficient land area to accommodate the desired nursery scale (Minimum of 3 Ha) and easily accessible.
- Fertile soil with proper aeration (well drained loamy soil with good organic matter content). Test pH of the soil (pH 5-6 is considered ideal for a forest nursery), nutrient level (moderate to high levels of Nitrogen, moderate levels of Phosphorus, and adequate Potassium with smaller amounts of essential micronutrients like Calcium, Magnesium, Sulphur, Iron, etc) to adjust as needed.
- A reliable water source for irrigation like river, canal, pond, well- (Consider water quality and accessibility).
- Protection from extreme weather condition (avoid low lying areas to prevent damage from flood).
- Proximity to labor access to a reliable workforce for nursery operation like sowing, weeding and transplanting (presence of villages nearby for easy availability of laborers).

Area of the nursery: 3 Ha and above.

Geotagging: The nursery area to be geotagged.

Proximity to motorable road: 5-50 m.

Proper sunlight: The area should have access to adequate sunlight for proper growth of seedlings.

Water logging: The area should have good drainage to prevent waterlogging.

Slope: 5-15 degrees.

Adjacent to nearby forest: Availability of suitable growing stock nearby (for seed collection).

2.WATER SUPPLY:

Water source type:

- A reliable, readily accessible possible water source like pond, river or dug well or a dedicated water supply of a tank is typically considered the best water source for forest nursery as it needs a consistent supply of water for proper seedling growth near nursery site with good drainage to avoid water logging.
- The water source should be easily accessible to the nursery area to minimize water transportation cost and effort.

- The water should be clean and free from contaminants that could harm the seedlings such as excessive salinity or pollutants.

Water testing to be determined through chemical testing methods such as pH, turbidity, total dissolved salts (TDS), etc.

- The source should provide enough water to meet the nursery's irrigation needs throughout the year, especially during the dry season.

Consider one nursery bed of dimension 1m x 10m requires average of 40 litres of water per day during dry season.

A 3 Ha nursery comprises of 400 such nursery beds.

Therefore, per day a 3Ha nursery requires = $40 \times 400 = 16000$ litres of water.

Presence of irrigation network: Efficient irrigation system that minimizes water loss. Provision of sprinklers or drip irrigation to be considered.

Presence of water storage tank: A storage tank with sufficient capacity to meet the irrigation needs of the nursery.

Tank capacity: Total capacity of the water tanks should be 20000 litres for a 3 Ha nursery.

Provision of rain water harvesting: There must be a provision for rain water harvesting in the nursery to maintain sustainable management of water in the nursery.

3. SEED STORAGE UNIT:

Proper stacking of seeds: Seeds to be dried and kept in seed storage unit tightly packed in clear containers to prevent from pest attacks and longevity. Containers containing seeds to be stacked in shelves with the species names alphabetically arranged for easy identification and access.

Quality of seeds stored: Healthy and sound seeds, free from any defects and pest attacks collected from genetically superior mother trees.

Selection of plus trees for seed collection:

- **Plus tree:** A Plus Tree is a selected tree that demonstrates superior phenotypic qualities compared to others in its population. The term is primarily used in forestry, silviculture, and tree breeding to describe trees chosen as candidates for genetic improvement programs or seed production. These trees are carefully identified based on certain desirable characteristics and are often utilized in reforestation or genetic improvement initiatives.

Key Characteristics of a Plus Tree

1. Superior Growth: Faster height and girth growth compared to surrounding trees of the same species. Displays robustness and adaptability to environmental conditions.

- 2. Better Form:** Straight trunk with minimal taper. Absence of forks or multiple leaders. Well-developed canopy, providing balanced shade and reduced competition.
- 3. High Yield:** Higher fruit, nut, or seed production compared to peers. Consistent yields over the years.
- 4. Resistance to Pests and Diseases:** Shows resilience against prevalent diseases and pests in the area.
- 5. Wood Quality:** Desired density, texture, and uniformity for timber production. Minimal defects like knots or cracks.
- 6. Adaptability:** Thrives under local climatic, soil, and environmental conditions.
- 7. Reproductive Traits:** High flower and seed viability. Early reproductive maturity.

Selection Process of Plus Trees

1. Preliminary Survey:
 - Identification of candidate trees in a natural forest, plantation, or orchard.
 - Recording of environmental conditions and tree location.
2. Comparison with Reference Trees:
 - Selected tree is compared with surrounding trees (referred to as check or control trees) of the same age and species.
 - Metrics like height, girth, canopy spread, and wood quality are evaluated.
3. Tagging and Documentation:
 - Chosen trees are marked for identification and further monitoring.
 - Comprehensive data on growth, health, and productivity is recorded.
4. Testing and Validation:
 - Genetic studies may be conducted to ensure the tree's traits are heritable.
 - Performance of offspring (via seeds or clonal propagation) is often evaluated in trials.

Applications of Plus Trees

- 1. Genetic Improvement:** Plus trees serve as the genetic base for breeding programs aimed at enhancing tree quality and productivity.
- 2. Seed Production Areas (SPA):** Identified plus trees are often retained in designated areas for seed collection.
- 3. Clonal Propagation:** Superior clones from plus trees are produced through techniques like grafting, tissue culture, or cuttings.
- 4. Reforestation Projects:** Seeds or saplings from plus trees are used to establish plantations, ensuring better survival, growth, and yield.
- 5. Conservation of Superior Traits:** Helps in preserving genetic diversity and promoting desirable traits in future tree populations.

Species diversity:

- Mixture of timber, medicine, fruit and fodder species.
- Rare endangered species.
- Ecologically important species.
- Economically important species.
- All the species selected to be invariably local.

4.GREEN HOUSE/MIST CHAMBER:

Facilities meet modern standards: Modern forestry greenhouses and mist chambers utilize automated systems for precise environmental control, including temperature, humidity, and light, to optimize plant growth and propagation, while also incorporating features like air circulation and pest control.

Structural Components:

- Materials: Modern greenhouses often use rigid plastic (polycarbonate), plastic film (polyethylene), or glass for walls and roofs.
- Frames: Frames are commonly made of steel, aluminium, plastic, or wood.
- Foundation: Consider materials like concrete or gravel for the foundation.

Temperature Control:

- Heaters: Heaters are used to maintain optimal temperatures during colder periods.
- Fans: Exhaust fans and "pad and fan" systems help regulate temperature and humidity.
- Ventilation: Side and ridge vents can be opened to control temperature and air circulation.

Humidity Control:

- Misting Systems: Misting systems are used to maintain high humidity, crucial for rooting cuttings and hardening tissue-cultured plants.
- Evaporative Cooling: Evaporative cooling pads help maintain humidity and cool the greenhouse.

Lighting:

- Natural Light: Greenhouses maximize natural light, supplemented by artificial lighting when needed.
- Photoperiodic Simulation: Some greenhouses use photoperiodic simulation to control plant growth stages.

Automation:

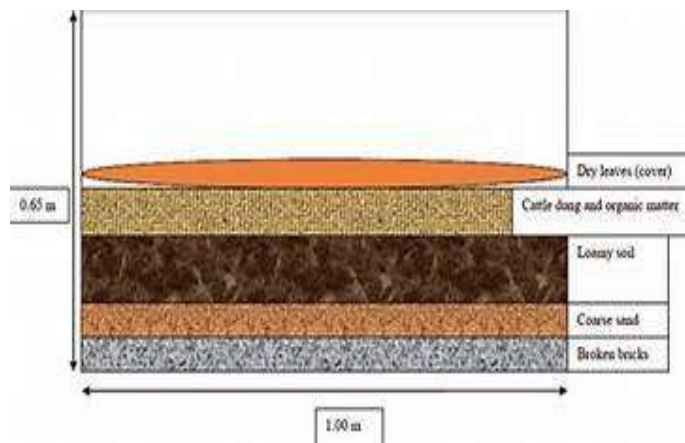
- Computerized Systems: Microprocessors and sensors gather data on temperature, humidity, light intensity, and wind direction to provide precision control.
- Automated Control Systems: Automated systems regulate temperature and humidity in mist chambers.

5.SOIL MIXING SHED:

Soil composition: Inside the beds, a proper growing medium is essential. This typically consists of a mixture of loamy soil, compost, and sand to promote healthy root growth and provide good drainage. Soil to be broken to fine smooth texture for easy development of root system. Soil mixes to be composed of soil:sand:manure in the ratio 2:1:1. (Polypot bags to be filled tightly with soil mixes for better anchorage and growth of the plant).

6.COMPOST UNIT:

Vermicomposting uses worms to break down organic waste into nutrient-rich compost. This process is useful for forest nurseries to improve soil quality and provide natural fertilizer for plant growth.



Considerations for such unit:

Size and Space: The size of the unit depends on the amount of organic waste generated in your forest nursery. It should be located in a cool, shaded area.

Worms: Red worms (*Eisenia fetida*) are the most commonly used for vermicomposting. They help break down the organic material efficiently.

Materials: Organic waste like leaves, grass, and plant residues, along with bedding materials (such as shredded cardboard or coconut coir) for the worms.

Maintenance: Regularly add organic matter, ensure proper moisture, and turn the compost for oxygen flow.

- This system can greatly benefit the nursery by creating a sustainable method of enriching the soil for healthier forest plants.

Dimension: 2m x 4m or above.

Quantity of compost produced per week from the unit: 100 kilograms per unit of 2m x 4m per week.

Number of units: It is recommended to have atleast 10 units of compost per 3 Ha area of nursery.

7.INSPECTION PATH:

- A firm, level surface, like concrete or gravel, is ideal for easier movement.
- Strategically placed throughout the nursery bed to walk all areas easily.
- Should be narrow width enough to comfortably walk through with tools and allow movement of loading carrier vehicles and other vehicles for loading and any transportation of material in seedlings.

Width:

Inspection path = 2m (minimum)

Width of path between beds = 0.8m-1m

8.MOTHER BEDS:

- Nursery beds should be constructed at least 18 cm high from the ground and one-meter width.
- Beds should be oriented to east to west direction.
- There should be sufficient paths between the beds (0.8-1m)
- Seeding beds to be labeled as per species grown.
- Should have good drainage.

Dimension: 1m x 10m

9.POLYPOT BEDS:

Dimension: 1m x 10m

Proper polypot shifting and grading:

Shifting:

Shifting refers to the process of moving seedlings from one polypot bed to another or from smaller to larger pots when necessary. It ensures that seedlings have the space they need to grow without competition for resources like nutrients, water, and light.

Reasons for Shifting:

- **Root Expansion:** As seedlings grow, their root systems need more space. When seedlings outgrow their current polypots or if roots are becoming bound, it is essential to shift them into larger pots or different beds.
- **Healthier Growth:** Overcrowding can hinder seedling development. Shifting seedlings into more appropriate space reduces stress and promotes better growth.
- **Hardening Off:** Gradually exposing seedlings to outdoor conditions (sunlight, wind) is known as "hardening off." This may require shifting seedlings to outdoor beds where they can be gradually acclimatized.

How to Shift?

- **Assessment:** Inspect the seedlings to determine if they are becoming root-bound or overcrowded. If the roots are circling or growing too dense in the pot, they need to be shifted.
- **Preparation:** Prepare a new polypot or planting bed with the right soil mixture. The new container should have appropriate drainage and room for the roots to expand.
- **Careful Removal:** Gently remove seedlings from the old polypot, being careful not to damage the roots. You can use a hand trowel or similar tool to loosen the roots if necessary.
- **Replanting:** Place the seedling in the new polypot or bed, ensuring that it is at the same depth as before and the roots are properly spread out to avoid further binding.
- **Watering and Maintenance:** After shifting, water the seedlings carefully and provide the necessary care to help them adjust to their new environment.

Grading of Seedlings:

Grading involves sorting seedlings based on their quality, size, and health. This step ensures that only the healthiest and most robust seedlings are selected for transplantation into the field or for sale.

Why Grading is Important?

- **Quality Control:** Grading helps to identify seedlings that meet the desired specifications for a planting project. Low-quality seedlings may struggle to survive or grow well in the field.
- **Optimizing Resources:** By selecting the best seedlings for planting, nurseries can maximize the success of their afforestation, reforestation, or restoration projects.
- **Reducing Failures:** It prevents the planting of weak seedlings that might die during transplanting, reducing waste and increasing project efficiency.

How to Grade Seedlings?

- **Height and Size:**
Measure the height and overall size of seedlings. Typically, seedlings that are too tall or too short for their age may be graded as lower quality.
Grade 1: Seedlings with optimal height and robust stem growth.
Grade 2: Seedlings that are slightly underdeveloped but still have potential.

Grade 3: Seedlings that are weak, undersized, or malformed.

Time frame	Optimal Height of seedlings
0-1 month	< or = 6 inch
1-2 months	6 inch-1 ft
2-3 months	1 ft-2 ft
3-6 months	2 ft- 3 ft

➤ **Root Development:**

Inspect the roots to ensure they are healthy and well-developed. Poor root systems (root-bound or damaged) will affect the seedling's ability to survive transplantation.

Grade 1: Seedlings with strong, well-formed root systems.

Grade 2: Seedlings with adequate roots but some minor issues (e.g., slightly circling roots).

Grade 3: Seedlings with weak, stunted, or damaged root systems.

➤ **Stem and Foliage Health:**

Examine the stem and leaves for signs of damage, disease, or pests. Healthy, undamaged foliage is a sign of a well-nourished seedling.

Grade 1: Strong, healthy stems with no pest or disease damage, and vibrant green foliage.

Grade 2: Some minor leaf damage or slight deformities.

Grade 3: Severely damaged stems, yellowing leaves, or visible pest infestations.

➤ **Hardening Off:**

Seedlings should be graded based on their readiness to be transplanted. Those that have been properly hardened off (acclimatized to outdoor conditions) are given a higher grade.

Grade 1: Fully hardened off seedlings that are ready for field transplant.

Grade 2: Seedlings still in the process of hardening off or that may need extra care during transplantation.

Grade 3: Seedlings that have not been hardened off or are not ready for transplantation.

Shifting and Grading Process in Practice:

- **Routine Monitoring:** Periodically (monthly) inspect seedlings for their growth progress, root development, and overall health.
- **Selective Shifting:** When seedlings outgrow their polypots or show signs of poor root development, shift them to larger containers or more spacious nursery beds.
- **Grading at Key Intervals:** At regular intervals, grade seedlings to ensure they are ready for the next stage, whether that's for field planting or further development.
Record Keeping: Maintain detailed records of each seedling's growth, shifting dates, and grading to track their development and ensure successful transplanting.

Polypot sizes: 5" x 8"

Quality of polypot: 300 gauge.

10.DISPLAY HOARDING:

(to be installed inside the nursery near the entry gate).

Quality of the display hoarding:

Material:

- Use durable, weather-resistant materials such as PVC, vinyl, or mesh fabric to withstand outdoor elements.
- Ensure the hoarding is UV-resistant to prevent fading from sunlight.

Finish:

- High-quality printing with vibrant colors to capture attention.
- Use of waterproof ink to avoid damage from rain.
- Smooth and clear finish for legibility from a distance.

Design:

- Bold fonts for headings, easy to read from a distance.
- High-contrast color schemes to enhance visibility.
- Strategic placement of images, such as lush green trees, healthy plants, and a serene nursery environment.
- Clear borders and enough white space to avoid clutter.

Dimension: 10 x 12 ft (3 x 3.7 m) or 6 x 10 ft (1.8 x 3 m)

- When selecting the size, consider the visibility requirements based on the location, such as roadside visibility or placement.

Content on the display hoarding:

Name and address of the Nursery: The name of the nursery, year it was established, location, total area, scheme under which the nursery was developed, type of nursery to be mentioned.

Map of the Nursery Area: A visual layout of the nursery, showing different sections for various types of plants or species. This could include paths, greenhouses, and storage areas. Map should also show the position of the display hoarding for easy understanding of the visitors about the nursery.

Species Information: A list of plant species being cultivated, including common names, scientific names, and sometimes photos of the plants. This helps visitors or workers identify the species being grown.

Number of Seedlings/Plants: The total number of plants in the nursery or the number of plants for each species. This can help track inventory.

Educational Content: Information on the ecological importance of the species being grown, including how they contribute to forest ecosystems, wildlife, and the environment.

11.SIGNAGES WITH SPECIES INFORMATION:

(to be installed in front of each nursery bed).

Material of the signages:

Use durable, weather-resistant materials such as PVC, vinyl that can withstand outdoor conditions.

Dimension:

Standard sign size: 6" x 10" (15 cm x 25cm)

Content of the Signages:

Each signage should contain key information about the species, in an easily readable format.

- Species Name:
 Scientific Name (Latin, italicized): This is important for precise identification.
 Common Name: This makes the plant easily identifiable for a wider audience.
 Local Name: in vernacular language (assamese) for understanding and identification by wider audience.
- Economic importance: Commercial uses of the species to be mentioned in simple language in both English and Assamese.

12.NURSERY TOOLS AND KITS:

A forest nursery is a facility where tree seedlings, shrubs, or other plants are grown for reforestation, afforestation, or other forestry purposes. The tools and kits used in forest nurseries can vary depending on the size and complexity of the operation. Here is a list of common tools and equipment found in a forest nursery:

No. of items: Below mentioned items in sets of 3 (three) to be present per 3Ha area of the nursery.

Propagation Tools:

Seed trays/pots: Used for starting seeds and young seedlings.

Sowing tools: Hand tools for placing seeds in trays or pots.

Seedling trays: Shallow trays with small cells for growing young plants.

Root trainers: Special containers designed to promote healthy root development.

Soil Preparation:

Soil testers: Used for checking pH levels, moisture, and nutrient content.

Composters: Equipment for composting organic material to enrich soil.

Tillers or hoes: Manual or motorized tools for loosening the soil.

Watering Equipment:

Watering cans or hoses: For manual watering of plants.

Irrigation systems: Drip irrigation or sprinkler systems for more extensive watering needs.

Water tanks: Storage for water used for irrigation.

Plant Care and Maintenance:

Pruning shears: For trimming and shaping plants.

Loppers: For cutting thicker branches.

Fertilizer spreaders: For applying nutrients to soil.

Mulching equipment: To apply mulch for moisture retention and weed control.

Pest and Disease Management:

Sprayers: For applying pesticides, fungicides, or herbicides.

Insect traps: To monitor and control pests.

Biological control kits: For introducing natural pest predators.

Transport Equipment:

Wheelbarrows: For moving soil, compost, or plants.

Seedling carrier vehicle: for transporting seedlings.

Nursery Management and Maintenance:

Greenhouse kits: For creating controlled environments for seedlings.

Shade nets: To protect young plants from excessive sunlight.

Shade structures: To provide shelter for sensitive seedlings.

Temperature and humidity monitoring devices: For controlling the nursery environment.

Storage and Organization:

Shelving units: To organize pots, tools, and materials.

Labeling systems: To track plant varieties, growth stages, and other important information.

- These tools and equipment are vital for a successful forest nursery. The number and type of items in a kit can vary depending on the scale and specific goals of the nursery. For example, larger commercial forest nurseries might use more advanced machinery, while small community nurseries may rely more on hand tools.

13. SEEDLING SALE CORNER:**Dimension:**

8ft X 10ft or large as desirable.

Seedlings often require a certain amount of vertical space to grow healthily. A standard nursery shelf or structure should allow for 18-24 inches of height to accommodate seedlings.

14.FIRST AID BOX:

Items included: An antiseptic solution, bandages, gauge roll and pads, cotton, adhesive tape, scissor, alcohol wipes, iodine solution, ointment tubes, sanitizer, gloves.

15.NURSERY JOURNAL:

Details to be mentioned: Represented in the tabular format below-

A) Details about the nursery:

Page-1		
SL NO.	PARTICULARS	DESCRIPTION
1	Name of the nursery	.....
2	Area of the nursery	.....
3	Location	.....
4	Name of the Range	.....
5	Block/Compartment	.....
6	Name of the R.F/P.R.F	.....
7	Year of creation	.....
8	Scheme	.....
9	Amount sanctioned	.....
Page-2		
1	Description of the area	.....
2	Landmarks (EWNS direction)	.....
3	GPS Coordinates of the nursery (at minimum 4 points)	.....
4	No. of mother beds	.....
5	No. of polypot beds	.....
6	Total no. of polypots	.....

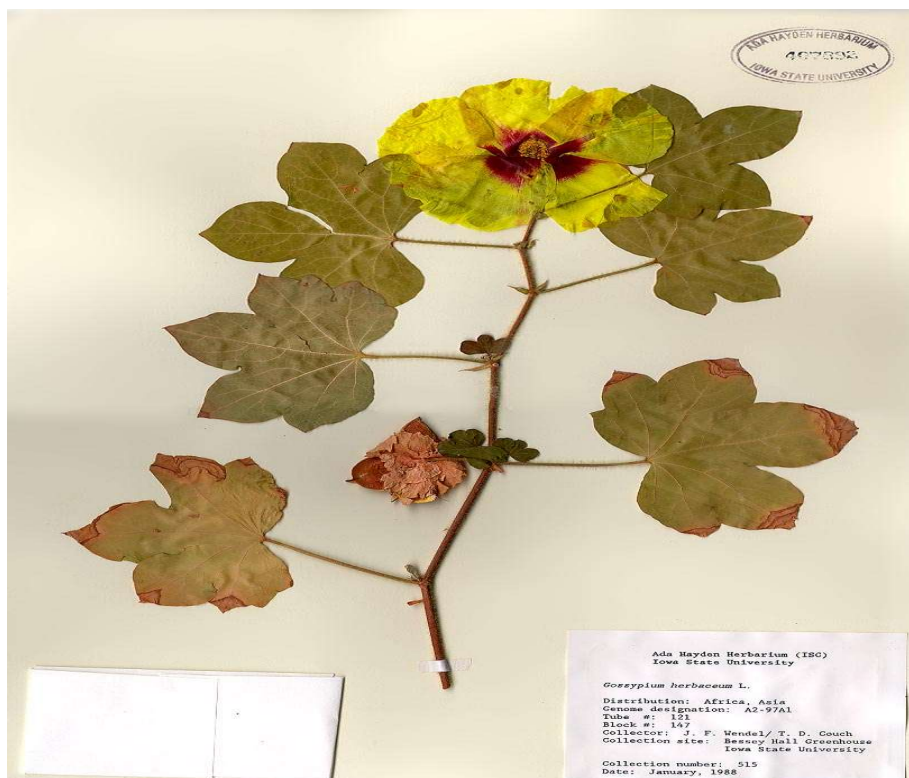
B) Details about the species:

SL NO.	PARTICULARS	DESCRIPTION
1	Name of the species (local name/scientific name)	.....
2	Photograph of the seedling	.....
3	Seed collection time	.....
4	Weight of collected seeds	.....
5	No. of seeds per kilogram	.....
6	Location of mother tree with GPS coordinates	.....
7	Seed treatment	.....

8	Preparation of mother beds	.....
9	Soil composition	.....
10	Date of transfer to mother beds	.....
11	Date of first germination	.....
12	Germination percentage	.....
13	Counting of germinated seedlings by random sampling of size 6"x6"	.....
14	Date of shifting of germinated seedlings to polypot	.....
15	Size of polypot	.....
16	Date of Stacking of polypot in beds	.....
17	Nursery technique for germination of seed	.....
18	Average height of seedling (1month/3 months/6months/1 year)	.....
19	Any sign of disease/insect attack/fungal infestation with date	.....
20	Treatment applied with date	.....

16.HERBARIUM:

An herbarium is a collection of preserved plant specimens used for scientific study and research. These specimens are typically pressed and dried, mounted on sheets, and cataloged with specific details about the species. Herbariums play an important role in documenting plant diversity, helping researchers, botanists, and ecologists understand the distribution, characteristics, and classification of plant species.





Species Diversity in an Herbarium:

The species diversity in an herbarium refers to the wide variety of plant species that are preserved in the collection. The nursery should have herbarium of all the species grown in the nursery.

Details Mentioned in Herbarium Specimens:

When cataloging plant specimens, various details are recorded, such as:

Scientific Name: The botanical name, including genus and species.

Collection Date: The date the plant was collected.

Location: The geographical location where the plant was found (latitude, longitude, altitude).

Habitat: The environment or ecosystem where the plant was growing (e.g., forest, wetland).

Collector's Name: The person who collected the specimen.

Description: Physical features such as leaf shape, flower color, fruit, and stem structure.

Additional Notes: Information about the plant's growth form, reproductive state, and other distinctive features.

Herbarium techniques:

- **Collection of Plant Material:**

- **Selection of Specimens:** Collect specimens from healthy, mature plants in the nursery. Choose different parts of the plant, including leaves, flowers, fruits, seeds, stems, and roots, depending on the plant's growth stage.
- **Timing:** The best time for collection is during flowering or fruiting when the plant's characteristics are most distinct.

- **Pressing the Plant Specimens:**

- **Use of a Plant Press:** A plant press consists of two wooden or metal frames with absorbent paper (like newspaper or blotting paper) sandwiched between them. Place the collected plant material on the paper and press the plant gently to flatten it. Be sure to arrange the plant parts in a way that highlights important features.
- **Orientation:** Place leaves flat, and flowers and fruits should be positioned to show their structure clearly.
- **Drying:** After placing the specimens in the press, keep them in a dry, warm area (around 30°C) for 24–48 hours. Check frequently to ensure they are drying correctly and replace the absorbent paper if necessary.

- **Mounting the Specimens:**

- **Herbarium Sheets:** Once the specimens are fully dried, transfer them to herbarium sheets (usually 11" x 16" sheets of thick, acid-free paper).
- **Gluing or Taping:** Secure the plant material with non-acidic glue or use transparent tape for smaller specimens. Attach the plant to the sheet without covering any essential parts like flowers or fruits.
- **Labeling:**
 - Every specimen should have a label indicating:
 - Plant name (genus and species)
 - Family name
 - Collection date
 - Location of the nursery or forest
 - Collector's name and any additional information such as altitude or habitat.
 - Field Notes: Include field observations about the plant, such as size, habitat, or any unusual features.

- **Storage of Specimens:**

- **Herbarium Cabinets:** Store mounted specimens in well-ventilated cabinets designed to prevent deterioration. Use drawers to separate specimens and avoid crushing them.

- Temperature and Humidity Control: Keep the storage area cool, dry, and free of pests to prevent damage to the specimens.

- **Database Management:**

- Digital Records: Digitize the herbarium specimens by photographing or scanning them. Enter metadata, such as species names and collection details, into a digital database for easy tracking and retrieval.
- Cataloging: Assign unique identification numbers to each specimen for tracking and reference purposes.

Scientific name: *Bombax ceiba*
 Location of collection: Garbhanga RF
 Range Name: South Guwahati
 Division Name: Kamrup East
 UIN (Unique Identification No.) = **KESGGarBcN**
 Where, **KE**= Kamrup East, **SG**= South Guwahati, **Gar**= Garbhanga RF,
Bc = Bombax ceiba, N=1,2,3,...= Serial no. of that species.

- Display: Digital herbariums to be displayed in KIOSK for the benefit of the visitors.

- **Maintenance and Long-Term Care:**

- Regular Inspections: Herbarium specimens should be regularly checked for signs of degradation, pests, or mold. Use archival-quality materials for mounting and storing the specimens to ensure their long-term preservation.
- Pest Control: Implement integrated pest management strategies to protect specimens from insect damage, and ensure that the storage area is secure from moisture.

Benefits of Herbarium Techniques in Forest Nurseries:

- **Taxonomic Studies**: Helps in the identification and classification of tree species.
- **Conservation Efforts**: Preserves plant samples for future conservation research and study.
- **Educational Use**: Provides resources for teaching about biodiversity, plant identification, and forest ecology.
- **Research and Documentation**: Acts as a historical record of plant species within a specific area or nursery.

17.COMPUTER SETS:

Purchase: A minimum of 1(one) computer set to be present in each nursery and purchase to be made as per departmental norms.

18.CAMERA:

Purchase: A minimum of 1(one) camera to be present in each nursery and purchase to be made as per departmental norms.

19.STAFF:

A nursery should consist of a good number of work force having adequate knowledge in the respective field.

No. of staff: For the proper maintenance and functioning of the nursery the staff should consist minimum of: (Recommendations made per 3 Ha of nursery)

Forester = 1 no; Forest Guard = 2 nos; Mali/Fixed pay/MTS = 5 nos

20.DESIGNATED SEED ORCHARD:

A seed orchard is a plantation of genetically superior trees, isolated to reduce pollination from genetically inferior outside sources, and intensively managed to produce frequent, abundant, easily harvested seed crops.

- A designated seed orchard to be present within 500m from the nursery for seed collection in the nursery.
- Species to be planted in various blocks, each block comprising of trees with similar species with spacing of 5m between each tree.
- Each block in the seed orchard will act as blocks of future mother trees of various species planted for the seeds to be grown in the nursery.
- Each block should have atleast 20 trees i.e., 20 trees per species in designated blocks in the seed orchard is required to be planted.

Species diversity:

- Species diversity in a nursery refers to the number of different species of trees grown in the nursery. Nurseries should emphasis on maintaining rich species diversity in the nursery. Species that are local to the area where the nursery is situated, species which are rare endangered, threatened, ecologically important, economically important, medicinal, etc to be grown. All the species grown to be invariably local.

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