



MEMORANDUM

FOR : The Regional Directors
Regions 2, 3, 4A, 5, 6, 9, 12, 13, NCR and NIR

FROM : The Director

SUBJECT : **FMB TECHNICAL BULLETIN NO. 22-D, INTRODUCTION TO
MECHANIZED CONTAINER TREE NURSERY MANAGEMENT
AND CROP PLANNING**

DATE : **AUG 16 2016**

I. This Technical Bulletin

This Technical Bulletin is to introduce the various aspects of a successful container tree nursery management and the importance of crop planning that includes developing propagation protocols and growing schedules from seed collection or procurement through outplanting.

II. Users of the Technical Bulletin

The users of the Technical Bulletin are the Nursery Managers, Growers, Assistant Growers and readers who plan to start and operate a nursery for native plants as well as exotic plants in the tropics.

III. Introduction

Although individual management styles differ with personality types and specific objectives, there are several key aspects of every successful nursery such as solid organization, professional personnel, a system of data collection and analysis, and an established system for solving problems.

Nursery management must establish a clear assignment of responsibilities, together with the authority to carry them out because raising container seedlings is not a simple procedure. Nursery managers and growers must be knowledgeable about day-to-day operations and will be held responsible of directing nursery activities, and making growing schedules.

Likewise, crop planning is an important procedure to help schedule time, labor, materials, equipment and facilities to produce the planting stock. A daily log is a key aspect of a successful nursery operation and management because it records a way to track what happens with each crop and provides a history of crop development. It includes personal experiences and observations based on actual crop performance in the nursery and in the field and continuously revised until more accurate information has been attained. The propagation protocol is used to make a good schedule for the crop and bring them to the three growth phases so they will be healthy and conditioned for outplanting.

IV. Nursery Management

Nursery management covers organization, attributes and professional attitudes of nursery managers and growers, working with people, data collection and discovering ways to improve nursery practices and plant quality.

Nursery Management is a "hand-on" activity. To succeed, the management of a nursery must have a structured organization that ensures that responsibilities are assigned and jobs get done. Regardless of the organizational structure, any successful nursery must have one characteristic: unity of command.

Here are some professional attributes of nursery managers and growers:

1. Technical competence - Nursery managers and growers must have the technical competence to hurdle work constraints which can reduce the quality of the planting stock. They must learn to grow container tree seedlings by observation, data collection and analysis, trial and error as well as studying technical publications.
2. Clear managerial goals - Nursery managers handle production, technical services and administrative affairs. Nursery managers must establish a clear assignment of responsibilities, together with the authority to carry them out. Nursery managers should be knowledgeable about day-to-day operations, direct nursery activities and growing schedules.

The Grower acts as production manager. He must be hands-on in growing the seedlings and not buried by administrative details to ensure that resources are not wasted by poor management and provide leadership and direction to the nursery staff.

3. Relating to the crop - Nursery managers and their staff must learn to "think like a seedling". They should prioritize activities based on the biological requirements of the crop. The goal at the nursery is to grow good seedlings on an economical basis. Every member of the crew should have at least a fundamental knowledge of the effects that their activities will have on the biological well-being of the seedlings.

4. Commitment to the nursery - A container tree nursery cannot be run "by a committee." Instead, one person always has to accept primary responsibility for the crop at all times. The price of quality seedling in container nurseries is knowledge and constant vigilance.
5. Cleanliness - All nursery staff from the Nursery Manager to the laborers should be committed to "cleanliness". The cheapest insurance against pests and diseases or seedling physiological problems in a container nursery is to keep everything clean and in good working order. Cleanliness for sanitation is a good nursery management practice. The emphasis on cleanliness, neatness, and maintenance also affects the nursery workers. As the saying goes, "*We care about this place; it reflects on you as well as us; it is going to be something we can all be proud*". Workers will respond with added pride in their work and feel they belong and have a stake in the nursery.

V. Components of Crop Planning

1. Identify the planting stock (seeds).
2. Understand the three growth phases crops go through (establishment, rapid growth, and hardening) and the requirements for each phase.
3. Develop growing schedules for crop production from seed collection or procurement through outplanting.
4. List space, labor, equipment, and supplies required to support the crop during the three growth stages.
5. Keep written records, including a daily log and crop development record.
6. Develop and record accurate propagation protocols so that success can be replicated and mistakes can be avoided next time.

Recordkeeping is a vital component of effective and successful nursery operation and management. A common weakness to an efficient nursery operation is the lack of records or knowledge about seed treatments, germination requirements, plant development, and special crop needs.

The most important record to keep is a daily log or a detailed computer system that records and stores environmental conditions and seedling growth rates for each species. Eventually, protocols can be developed from these logs and tailored to the unique growing conditions of a specific nursery to allow nursery managers and growers to readily repeat success from year to year.

The collection of data and analysis of information includes the following:

1. Financial and production records such as expense data, production data, and unit-cost data.
2. Cultural records fall into three categories: growing schedules, environmental conditions in the propagation area, and crop development records. Cultural records can be used in determining the cause of errors in the culture of the crop, in deciding what action to be taken on the crop, and in making plans to avoid problems with future crops.

V. The Propagation Protocol

A propagation protocol is a document that shows all the steps necessary to propagate a plant, from the collection of seeds to outplanting.

Seedbank Management

Location of Seed Collection	
Local name	
Coordinates or location	
Altitude	
Slope description	
Stand Analysis (Identification of Plus Tree Candidates)	
Man-made or natural forest	
Average age of the stand	
Type of forest and main species	
Percentage of superior trees in the stand	
Scientific name of species	
Seed lot code	
Site Conditions	
Soil type	
Soil pH	
Soil depth	
Climate type	
Annual precipitation	
Precipitation during propagation	
Precipitation during the summer	
Annual average temperature	
Average temperature (summer)	
Average temperature (rainy)	

Example of Crop Planning and Growing Schedule for the Three Phases of Crop Development for Container Seedlings

Phase	Seed Treatment	Establishment	Rapid Growth	Hardening
Definition	Stratification to overcome seed dormancy	From germination through emergence and formation of true leaves	From emergence of true leaves to when seedling approaches target height; rapid increase in size, particularly in terminal shoot	Energy diverted from shoot to root growth; seedling reaches target height and root-collar diameter; seedling is conditioned to endure stress

Objectives	Increase percent germination	a. Maximize uniform germination b. Fill containers efficiently c. Encourage root growth d. Maximize survival e. Minimize damping off	a. Minimize stress b. Encourage shoot growth c. Maintain environmental factors near optimum levels d. Monitor target height and roots fully occupy container	a. Stop shoot growth b. Encourage root and stem diameter growth c. Acclimate to natural environment d. Condition to endure stress for survival after planting
Duration	One year	About 14-21 days for germination; 4-6 weeks for early growth	Varies widely, typically about 8 to 12 weeks	Varies widely by species, from 4 to 8 weeks
Date	Year-round	Nov to Dec	Jan to Mar	April – May
Media mix	n/a	5:1:1 (coco peat; raw rice hull; soil)		
Min. rate of germination	n/a	90%	n/a	n/a
Germination	n/a	4-7 days	n/a	n/a
Cover	n/a	growing medium	n/a	n/a
Temperature	3-5 °C	20 to 24 °C	16 to 25 °C	5 to 20 °C
Light	not necessary	7,500 – 10,000 lux	20,000 – 25,000 lux	35,000 – 45,000 lux
Moisture	6% seed moisture content	Level 4 (wet) for days 1 – 7; Level 3 for days 8-14.	Alternate between moisture levels 4 (wet) and 2 (moist). Allow to dry.	Alternate between moisture levels 4 (wet) and 2 (moist). Allow to dry
Humidity	n/a	90%	40% or ambient	40% or ambient
Propagation site	Cold room	Germination house	Growth area (shaded)	Growth area (open)
Fertilization	None	5g per liter of potting mix.		
Mycorrhiza	n/a	35 ml/liter or 0.75-1.0 liter per sack of growing media		
Irrigation or Watering	n/a	Water growing media thoroughly each time but let it dry between watering	Water growing media thoroughly each time but let it dry between watering	Gradual reduction but do not allow the plants to wilt.

Target size	n/a	Avoid stretching	15 cm height; 6 mm caliper	20 cm height, 8 mm caliper
Activity	n/a	Weed and pest management	Weed and pest management	Weed and pest management
Special needs	Check seeds for fungal infection	<ul style="list-style-type: none"> a. Protect from weather b. Keep temps optimal c. Irrigate to keep "moist, but not wet" d. No or low fertilizer 	<ul style="list-style-type: none"> a. Protect from stress b. Ambient temperature c. Irrigate regularly d. Fertilize properly 	<ul style="list-style-type: none"> a. Induce moderate moisture stress b. Expose to ambient temps and humidity. c. Reduce fertilization rates and change nutrient ratios
Labor	Apply fungicide if needed	<ul style="list-style-type: none"> a. Scout for pests and diseases b. Monitor germination c. Introduce beneficial microorganism d. Stretching e. Re-sow if necessary 	<ul style="list-style-type: none"> a. Scout for pests and diseases b. Monitor environment c. Modify density of crops d. Adjust culture to avoid excessive height 	<ul style="list-style-type: none"> a. Scout for pests and diseases b. Monitor crops and environment carefully; c. Deliver crops timely

Development of Seedlings in the Nursery

Species	
Percentage of germination	
Percentage of survival rate of seedlings in the nursery	
Growth rate	
Root collar diameter	
Height	
Height of seedlings before outplanting	
Diameter of seedlings before outplanting	
Shoot to root ratio	
Growth form (Bushy; Straight growing)	
General quality (very good; good; average; bad)	

Development at the outplanting site

Survival rate	
Growth development in height	
Growth development in diameter	
Percentage of trees affected by biotic factors	
Percentage of trees affected by abiotic factors	
Name(s) of biotic factor(s)	
Name(s) of abiotic factor(s)	

FOR THE REFERENCE AND GUIDANCE OF ALL CONCERNED.

RICARDO L. CALDERON, CESO III

Job/Position Title: Nursery Manager

Job Description

Nursery Managers are responsible for the day-to-day operations of running a nursery. They plan, organize, direct, control, and coordinate activities of workers including hiring workers, employees' relations, financial matters, growing plants and research. Nursery Managers are capable of great capacity for work, decision- maker, diplomat, problem solver, firm believers that all activities must be for the betterment of the project, people of good judgment, and who are knowledgeable, honest, and forthright, and challenged by the accomplishment of the job They decide which plants to grow and how many of each plant are needed for outplanting.

Duties and Responsibilities

1. Nursery managers recruit, hire, train, oversee, and terminate employees of a nursery.
2. Developing specific goals and plans to prioritize, organize, and accomplish work assignment.
3. The nursery manager delegates job duties and ensures that employees do their jobs properly
4. Providing guidance and direction to subordinates, including setting performance standards and monitoring performance.
5. The nursery manager might also schedule work hours.
6. Nursery managers are responsible for establishing a safe working environment by creating and implementing safety regulations and policies that adhere to legal standards.
7. Determines species and quantity of plants to be grown, based on budget, projected volume, or executive directive.
8. Selects and purchases seed, plant nutrients, and disease control chemicals.
9. Tours work areas to observe work being done, to inspect crops, and to evaluate plant and their conditions.
10. Confers with his superiors in planning facility renovations or additions.
11. Coordinates clerical, record keeping, inventory, requisition, and marketing activities.
12. Analyzing information and evaluating results to choose the best solution and solve problems.
13. Proficient in MS Word & Excel.
14. No criminal history

Essential Work Habits:

1. Demonstrate the ability to maintain a positive and cooperative attitude with all fellow employees. Promote positive morale by working effectively as a team leader.
2. Demonstrate the ability to effectively communicate with all fellow employees. Communicates all relevant job related information as needed. Solve problems of crops without delay.

3. Present a consistent level of professionalism when interacting with employees and peers.
4. Willing to work extra hours as needed. Works weekends and holidays as necessary.
5. Reports to work as scheduled, maintaining a level of absences that results in minimal departmental disruption and minimal unfair burden on other employees.

Education

B.S. in Forestry or Agro-Forestry or Horticulture or Agriculture with at least 3 years work experience in nursery operation or plant propagation and administration.

Job/Position Title: Grower

Job Description

Nursery Grower works under the Nursery Manager. This position requires a motivated and responsible individual with a passion for growing plants. This is a "hands-on" position responsible for assisting with all aspects of seedling production as well as grading and shipping of planting stock.

The Grower correctly performs the cultural requirements needed for each crop in such a way to produce quality plants, on a consistent basis, with minimal losses, and as efficiently as possible. Maintain the growing area to meet sanitary and organizational standards.

Duties and Responsibilities:

1. Ability to establish priorities, work independently, and accomplish objectives with minimal supervision. For example, performs daily walkthroughs to create and then follow daily action plans. Correctly cares for crops as directed by the Nursery Manager and/or higher ups. Correctly records work on documentation sheets. Create, follow through and update crop schedules and data base.
2. Develop and utilize a written schedule of tasks to be completed over 7-14 day period.
3. Inspect all growing areas and identify any plant requirements and possible issues.
4. Monitor and manage plant cultural requirements, watering, fertilization and IPM programs.
5. Monitor EC and PH of water to appropriate levels.
6. Apply chemicals as needed with appropriate protective clothing and equipment.
7. Maintain all records of applications and production programs on a daily basis.
8. Manage the growing crew in all facets of plant production.
9. Assess quality control and coordinate grading and shipping of planting stock
10. Keep the nursery and work areas safe and clean.
11. Set personal goals and standards and shares them with supervisor.
12. Assist in training of Assistant Growers as assigned.
13. Participate in education programs as they are offered and continue to self-educate as needed when new plants, equipment, or techniques are brought into the program.
14. Actively contribute to the continued success of the nursery by expressing new ideas that can result in lower costs, improved plant quality, and improved efficiency.
15. Design and implement experiments that will benefit an individual, the team, or the agency.
16. Properly use, clean and maintain all equipment.
17. Anticipate potential crises for the purpose of avoiding crop loss or lack of availability.

18. Trouble shoot repairs of equipment and report results to Nursery Manager as necessary.
19. Demonstrate the ability to solve crop related problems.
20. Proficient in MS Word & Excel.
21. No criminal history.
22. Any other duties as assigned.

Essential Work Habits:

1. Demonstrate the ability to maintain a positive and cooperative attitude with all fellow employees. Promote positive morale by working effectively as a team member.
2. Demonstrate the ability to effectively communicate with all fellow employees. Communicates all relevant job related information as needed. Report problems of crops without delay.
3. Present a consistent level of professionalism when interacting with employees and peers.
4. Willing to work extra hours as needed. Works weekends and holidays as necessary.
5. Reports to work as scheduled, maintaining a level of absences that results in minimal departmental disruption and minimal unfair burden on other employees.

Qualifications:

Bachelor of Science in Forestry or Agro-Forestry or Agriculture or Botany graduate. No experience necessary (on-the-job training will be provided) but experience in plant propagation or nursery operation is preferred. He/She has the passion for work and enthusiastic to learn.