

# **Basics for Nurseries**



# I. Production Systems

## A. Introduction

This course is not intended to cover all aspects of nursery establishment and management. However, a few nursery problems involve seeds and seed management practices. The type of nursery system, size of the nursery, and location are important for seeds. It was once believed that all seedling production and planting in the Tropics had to be done in containers. This is not true; in general, however, bare-root production systems predominate in the Temperate Zones and container production systems predominate in the Tropics.

## B. Objectives

1. Recognize different nursery systems and the conditions most favorable for each.
2. Learn the relationship of nursery systems to national seed program management.
3. Review basic seed technology for sowing in each system.

## C. Key Points

The following points are essential in understanding seed basics for nurseries:

1. Bare-root systems are more common in Temperate Zones; container systems are more common in the Tropics.
2. Bare-root production is possible in the Tropics with some pines and for stump production of selected species.
3. In container systems, large seeds are usually sown directly in containers, while small seeds are sown in germination beds or trays and transplanted (pricked out).
4. Tray mobility is an advantage in caring for and protecting young seedlings.
5. In small nurseries, seed treatments for germination are usually done by hand.

## D. Core Material

### 1. Type of Nursery

#### a. Bare-root systems

- (1) Are suitable with large-scale planting programs.
- (2) Can produce seedlings or stumps.
- (3) Require same-day planting in tropical environments.
- (4) Used with *Pinus caribaea* in Venezuela and stump plantings of *Gmelina*, *Dalbergia sissoo*, and *Cassia siamea*.

#### b. Container production systems

- (1) Are preferred in most tropical locations because:
  - (a) They can be small, labor-intensive operations.

- (b) Containerized seedlings can stand the transport stress.

### (2) System options include:

- (a) A large centralized nursery with production of 0.5 to 1.0 million seedlings
  - (b) Numerous small nurseries with production of 10,000 to 100,000 seedlings
- (3) This system can be used for "wildings."

## c. Seed program considerations

- (1) In a large, centrally located nursery, seed cleaning and storage should be located nearby.
- (2) In small, dispersed nurseries, cleaning and short-term storage should be in a regional center.
- (3) In small nurseries, much seed collection, extraction, and cleaning are performed locally.
- (4) Localized collection forces the use of local seed sources.
- (5) For tropical recalcitrants, small local nurseries must be used to avoid viability loss in seeds.
- (6) A combination of approaches will probably evolve.

## 2. Bare-Root Production

**a. Small seeds** — For small seeds, use mechanized sowing and culture.

**b. Large seeds** — For large seeds, sow by hand.

### c. Covering

- (1) Small seeds — Press into the soil surface and cover with a light mulch (2 to 3 mm).
- (2) Large seeds — Place on their sides, press into the soil, and cover with 5 mm of soil.

## 3. Container Production

In container production, either sow directly into containers, or sow in seedbeds or seed trays and transplant later (pricking out).

### a. Sowing into containers

- (1) Is good for the root systems.
- (2) Is used for
  - (a) Large seeds that can be handled individually
  - (b) Seedlots with expected high germination
- (3) Sustained sowing rates are shown in table 16.
- (4) Allows pricking out of "doubles."
- (5) Aims for one seedling per container.
- (6) Calculation of seed needs.

**b. Sowing into seedbeds or seed trays**

- (1) Concentrates germination in small areas.
- (2) Is used for
  - (a) Seedlots with expected germination of less than 40 percent
  - (b) Seedlots with slow germination
  - (c) Species that have several seedlings per seed unit
  - (d) Very small seeds
  - (e) Scarce or expensive lots

Table 16.—Suggested sowing rates for seedling production in containers (Napier and Robbins 1989)

Expected germination	Seeds per container
<i>Percent</i>	<i>Number</i>
80	1 or 2*
60-79	2
40-59	3
<40	use seedbeds

\*Sow half the containers with one seed and half the containers with two seeds.

- (3) Provides the advantages of seed tray mobility.
- (4) Follow these steps:
  - (a) Sand:topsoil mix of 1:1.
  - (b) Pure sand for *Pinus*, *Eucalyptus*, and others.
  - (c) Press seeds into medium, barely cover with washed sand, and mulch lightly.
  - (d) Monitor closely to maintain proper moisture level.
- (5) Sowing into seedbeds is most common.
  - (a) Provide well-drained seed beds.
  - (b) Broadcast small seeds, pressing them into soil, and covering lightly.
  - (c) Protect from rodents.
  - (d) Sow very small seeds by mixing seeds and fine sand.
- (6) Calculate sowing rates.

**D. Sources**

For additional information, see Lantz 1985, Liegel and Venator 1987, Napier and Robbins 1989, Willan 1985.