



Buffer Zone Copperblock Nursery : Infrastructure

INTRODUCTION

A bare-root nursery and a container nursery have many of the same infrastructure needs and can be operated as a combined system to produce loblolly seedlings for a wide planting window.

In the case of a Buffer Zone Nursery most of the 'heavy lifting' has been done by the bare-root nursery. Critical aspects such as water quality and quantity; accessible land; buildings and services are in place (and silvicultural expertise). Developing a Copperblock container nursery in the buffer zone of a bare-root nursery should be safer and faster than opening a new site.

Problem:
The buffer zone may not be accessible for a short period in the Fall if fumigation is happening. Therefore the Buffer Zone Nursery must have a dedicated water supply line controlled from **outside the buffer zone.**

This Technical Bulletin, first in a series, discusses the infrastructure needs of a container nursery that uses the Copperblock™ tray system.

Recognizing that new practices in new locations should be approached cautiously, this and future Bulletins address the "Start-Up" and the "End-Up" stages separately.

WATER

The water supply of a bare-root nursery will be perfectly suited to growing in containers.

A Copperblock nursery raising loblolly pine seedlings will need about 50,000 gallons/week per million trees in summer – a bare-root nursery generally applies 1" per irrigation 2 – 3 times per week = 50 - 75,000 gals/acre/week. As the Copperblock

nursery has ~1.5 million trees per acre, the supply line should be adequate for a buffer zone nursery.

Water quality is as critical for a container nursery as it is for bare-root. Greater control over fertility can be exercised in a container nursery so knowing the water analysis is essential.

Additional thoughts:
Assured supply – Copperblock seedlings will require more frequent irrigation as each seedling has less soil volume available (~ 6 in³ per plant vs ~ 35 in³ per plant in a bed at 25/ft²) – backup systems are essential.
Filtration – common impact sprinklers are suitable, but if a microjet system is selected, filtration of particles may be needed.

EC:
1 millimho/cm (mmho/cm)
= 1,000 micromhos/cm (µmho/cm)
= 1,000 microsiemens/cm (µS/cm)
0.05 mmho is very pure water
1290 µmho is very high, but can be used

Electrical conductivity is critical: **2,000 µmho** is the max for loblolly. The more pure the water, the more easily the pH can be changed.

pH Target range pH 5 to pH 6.5
• Copperblock target pH5.5

The nutrient content of the water may be important and will be addressed in the Fertigation bulletin.

Water borne pests are controlled in the same way for a buffer zone nursery. As total water usage is about one-half, additional treatment may be economical.

STARTUP Install a (covered) reservoir to serve the startup nursery – this should hold sufficient water for at least one day.

Waste water collection, treatment or reuse can be introduced in a modern container nursery with some early planning.

POWER

A bare-root nursery usually has all the electrical supplies needed for a buffer zone Copperblock nursery. The most critical service is that supplying water extraction and irrigation pressure. A backup service must be available (this may be an alternative power source).

Additional thoughts:
These days all irrigation and fertigation can be monitored and controlled remotely (even from off site) during a buffer zone exclusion period. This should be part of the planning process.

The electrical service should be extended to the buffer zone where the container nursery is to be located – to power nutrient injectors and monitoring equipment.

STARTUP Use a flow-powered ratio injector at startup. Locate the startup nursery near the power supply.

BUILDINGS

A buffer zone Copperblock nursery needs no more buildings than are normally present at a bare-root nursery. Growing medium can be stored outside, fertilizers and chemicals should be protected and contained as usual. Copperblock trays are stored outside.

A sheltered work area is needed for the seeding and harvesting operations – this can be the existing packhouse.

A large-scale container nursery will have a sizeable soil mixing, filling and seeding line occupying as much as 2,000 sq.ft. for a loblolly production of 30 million This will need 3-phase electrical service, water and compressed air.

And a harvest area of 4,000 sq.ft will be needed for this nursery if Copperblock loblolly seedlings are shipped over a 4 month window.



WASTE MANAGEMENT

A Copperblock nursery will generate waste from familiar sources:

- rainfall runoff
- hazardous materials and fuel spillage – and their containers
- non-hazardous containers (polyethylene bags)
- seedling culls
- fossil fuel emissions

INFORMATION TECHNOLOGY

This infrastructure element is already in place in a bare-root operation. Crop record systems, from seed acquisition to seedling shipping are essentially identical for a Copperblock nursery. Some additional records will be suggested but the current system can be adapted.

The communications system of a bare-root nursery will serve the needs of the Buffer Zone Copperblock nursery. With more advanced automation a more advanced communication and control system may be developed.

SITE

A Copperblock nursery has less demanding needs for quality of site than does a bare-root nursery. Therefore a Buffer Zone nursery site is more than adequate.

For any bare-root nursery:

- **Aspect** has been proven suitable
- **Slope** has been shown to be sufficient
- **Clearing** has been completed
- **Flatness** has been provided
- **Soil** has been selected for mechanized equipment

ROADS

Copperblock containers have to be transported from the covered work area, after filling with growing medium and seeding, to the nursery area. For seedling harvest the Copperblocks have to be moved back to the covered work area.

Fortunately the roads serving the buffer zones are normally adequate for the vehicles serving a Copperblock nursery, both in smoothness and strength. Regular maintenance is important.

New roads may be required within the Buffer Zone Nursery to serve Copperblock layout, machine spraying, and Copperblock removal for seedling harvest. The impact would be similar to equipment entering the bare-root fields.

STRUCTURES

A Copperblock loblolly Buffer Zone Nursery in the Southeast USA can be an “open-compound” and greenhouse structures are not necessary.

An open-compound Copperblock nursery may be exposed to heavy rainfall causing nutrient leaching (see the Bulletin on Fertigation). Storm damage to seedlings would be similar to that experienced in bare-root beds.

unfamiliar sources:

- damaged, discarded and retired Copperblock trays (see the Bulletin on Containers)
- leachate – from irrigation and fertigation (see the Bulletin on Fertigation): leachate can be collected and recycled, or treated, in the container nursery if an impermeable layer is installed.
- growing medium from non-germinant cavities (see the Bulletin on Growing Medium).

A bare-root operation has systems in place to manage the familiar forms of waste while the unfamiliar forms are not hazardous and easily managed.

TRANSPORTATION

The infrastructure of transportation ensures supplies reach the nursery and product is delivered to clients. There is no difference between the transportation system required for a bare-root nursery and that required for a Copperblock nursery:

- materials are delivered by suppliers, usually by commercial trucking companies.
- seedlings are shipped in cartons, usually in refrigerated transport.

Transportation timing may be different if Copperblock loblolly seedlings are “hot lifted” and shipped over a wider planting window. (See the Bulletin on Harvest).

Transportation load size will be different, depending on Copperblock stocktype an average full reefer load will be:

PCT 410 : 240,000 per load

PCT 415 : 210,000 per load

(adequate space for cold air circulation must be provided inside the packed trailer).

SECURITY

The Copperblock Nursery will be located within the security system of the bare-root nursery. As it will be located in a buffer zone it will have to be marked as an exclusion zone during fumigation of the bare-root beds.

A Copperblock nursery is less prone to damage from wildlife or livestock as the containers are usually raised above the ground.

Bird damage can be prevented with bird netting – with protected seed/seedlings often at 50/ft² in Copperblock trays vs 25/ft² in bare-root.

Vandalism and theft of equipment may be a consideration in a Buffer Zone Nursery if the buffer zone is remote from the center of operations or near the property boundary.