



North Carolina
Forest Service

FORESTRY Leaflets

Focus Series on Bottomland Swamp Forests

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#BF-3

Planting Cypress and Tupelo Seedlings for Reforestation in Deep Swamps

Prompt and effective reforestation after timber is harvested in deep, bottomland swamps is vital to sustain the forest resources and minimize overall landscape effects. Reforestation can be challenging in these types of swamps due to their unique characteristics including very soft, mucky soil and the presence of standing water for much of the year. This leaflet focuses on establishing seedlings to regenerate these primary tree species of focus:

- Bald cypress, *Taxodium distichum*
- Pond cypress, *Taxodium ascendens*
- Water tupelo, *Nyssa aquatica*
- Swamp tupelo, *Nyssa biflora*

When considering an overall reforestation plan, you should consider incorporating techniques and tactics that promote natural regeneration coupled with targeted planting of seedlings (also known as 'artificial' regeneration). Successful reforestation in deep, muck swamps may take several seasons to occur. It is in the owner's best interest to be proactive and accelerate this process where feasible to meet the desired management objectives. Forestry Leaflet #BF-2 outlines an approach for deploying natural reforestation techniques for these species.



Site Factors

There are two main site factors to consider when assessing reforestation options in swamps: **soil** and **hydrology**.

Soil

- In many of the so-called 'deep' swamps where cypress and tupelo often grow, the soils are mucky and often saturated at, or near, the ground surface.
- It is difficult to create an opening in the soil that stays open long enough to set a seedling, and it can be difficult to pack the soil around the seedling's roots.
- While soil and site preparation practices are often used for dry, upland sites to manage competition or aerate the soil, these types of practices are not appropriate for deep, muck, bottomland swamp forests.

Hydrology

- When water is standing for prolonged periods, reforestation is more difficult. Seedlings will not grow if totally submerged underwater. However, cypress and tupelo seedlings have shown to be able to handle inundation, if the needles or leaves remain exposed above the water surface.
- Planting seedlings into standing water is difficult because it is hard to tell if all the seedling roots are properly buried into the soil. However, in a swamp that retains water for the entire year, artificial regeneration by planting seedlings may be the best choice to assure future forest establishment.
- If planting in standing water, you may need to use seedlings that are larger/taller than normal, to make sure the top remains exposed above floodwaters. Work with your preferred forest tree nursery so they can plan 1 to 2-years in advance and grow seedlings that meet your desired specifications.

More information about the effects of hydrology is available in Forestry Leaflet #BF-2 and should be reviewed when planning any type of reforestation in bottomland swamps.



Two photos showing cypress seedlings approximately 1 to 2 years after planting in a seasonally-inundated, riverine bottomland swamp in southeastern North Carolina.

Seedling and Planting Considerations

Seedlings of cypress and tupelo species are available at many forest nurseries, including from the N.C. Forest Service, although pond cypress may be somewhat less available due to overall reduced demand. Forestry studies, experience and observation have shown that the planting of cypress seedlings, especially bald cypress, is usually more successful than the planting of tupelo seedlings. It is important to match the newly-regenerated species to the site, based on what was present before a harvest.

Most of the more successful cypress plantings observed in eastern North Carolina used bare-root seedlings that were 1-year old and planted with a shovel or tree planting bar (generally known as a dibble bar). The handling, storage and planting of seedlings is detailed in two pocket guides produced by the N.C. Forest Service:

- *Riparian & Wetland Tree Planting Pocket Guide for North Carolina*
- *North Carolina Forest Service Tree Planting Pocket Guide*

General specifications for seedlings of either cypress or tupelo include:

- ✓ Approximately 2-feet in height.
- ✓ Minimum root collar diameter ranging from 1/4 to 3/8-inch thickness.
- ✓ Minimum of two to four first-order lateral roots.

Use a planting tool that is large enough to make a suitable hole to contain the seedling's roots without binding or deforming them.

Take advantage of raised mounds ('hummocks') or elevated micro-sites in the swamp as spots to plant a seedling, even if this means deviating slightly from the planting row or seedling spacing.

The installation of protective tree tubes can prevent herbivory damage of the new seedling by animals, although tubes generally only are effective if installed and secured upon relatively dry ground.



Tree tubes can be installed to protect seedlings from damage by rodents and other animals. Once the seedling grows up and out from the tube, removal can be considered. However, continue to monitor the area for damage by animals or alterations to the hydrology (such as beaver dams) to assure long-term survival of newly established seedlings.

Stick Planting

If normal planting methods will not work due to mucky soils or having to plant in standing water, then the 'stick planting' method may be appropriate. This method has shown to work best with cypress and is similar to the live-stake technique often used on wetland or stream restoration projects. Key steps for stick planting include:

- ✓ Use seedlings that have a larger root collar diameter.
- ✓ If needed, clip the taproot to be no more than about 9 inches long.
- ✓ Cleanly clip off lateral roots. It is acceptable to leave a short stub ($\frac{1}{4}$ -inch or less) of lateral root.
- ✓ Insert the main taproot of the seedling straight into the soil, up to the root collar. Ideally, insert the seedling in spots next to standing water or where water level is expected to be at, or slightly below, the root collar of the seedling. For example, do not necessarily insert the seedling in the center of a water-filled depression. Instead, plant the seedling near the water's edge, but in a place that is likely to remain saturated for much of the year.

Review the *Riparian & Wetland Tree Planting Pocket Guide for North Carolina* for more advice on stick planting.

Technical References

While this Leaflet is intended for woodland owners, below are a few publicly available technical references about artificial reforestation in bottomland swamps:

[The Effects of Tree Shelters on Seedling Survival and Growth of Two Bottomland Hardwood Species: Third-Year Results](#). 2010. H.C. Stuhlinger, J.A. Earl, and R.A. Montgomery. *Proceedings of the 14th Biennial Southern Silvicultural Research Conference*. USDA-Forest Service, General Technical Report SRS-121.

[A Guide to Bottomland Hardwood Restoration](#). 2001. USDA-Forest Service and U.S. Geological Survey. General Technical Report SRS-40.

[Planting Cypress](#). Susan Vince and Mary Duryea. 2011. University of Florida, Institute of Food and Agricultural Sciences, Extension Circular #1458.

[Restoration Methods for Deepwater Swamps](#). W.H. Conner, K.W. McLeod, and E. Colodney. 2002. *Proceedings of a Conference on Sustainability of Wetlands and Water Resources: How well can Riverine Wetlands Continue to Support Society into the 21st Century?* USDA-Forest Service, General Technical Report SRS-50.

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