
PLANTING HARDWOOD SEEDLINGS

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**U.S.D.A. Forest Service, Northeastern Area,
State and Private Forestry
Northeast Area State Foresters
Department of Forestry and
Natural Resources
Purdue University**

The world around us is ever changing, and people are beginning to understand the importance of trees and their impact on the environment. Trees benefit humanity in many ways. They provide wildlife habitat and wood for housing and furniture. They clean the air, stabilize the soil, and help maintain water quality. A healthy tree plantation is a natural dynamic ecosystem that in its own way provides a better life for each person. If you venture into the process of tree planting, you will become one of the thousands of individuals who are stewards of the land.

The decision to plant trees is a noble one, but one that must be planned and carefully executed for the planting to be successful and flourish. Successful hardwood plantations require planning and a commitment of your time and resources. This commitment will most likely be intensive for the first four years. Failure to complete the necessary tasks most often leads to plantation failure. This brochure discusses the most important topics to consider in establishing a plantation of healthy fast-growing hardwoods. Remember, planning ahead will help guarantee a successful plantation.

TREE SPACING

Tree spacing varies, depending on the objectives of the planting and the species planted. Open field plantings for timber production should have a spacing between 6 and 10 feet both between rows and within rows. Current thinking for hardwood plantations is to plant a denser stand, a minimum of 8 x 8 feet. This spacing will result in a higher probability of a fully stocked plantation, reduced maintenance, and better formed trees. Windbreak plantings will vary from 8 to 16 feet between rows

and 6 to 16 feet within rows. Wildlife plantings should be spaced between 4 to 8 feet apart. A spacing wider than 10 by 10 feet is not recommended for hardwood plantations.

TREES PER ACRE

Spacing (feet)	Trees per acre
6 x 6	1210
8 x 6	907
8 x 7	778
8 x 8	680
10 x 6	726
10 x 7	622
10 x 8	544
10 x 10	430

SITE PREPARATION

To grow and survive, tree seedlings must compete for limited soil nutrients, moisture, and sunlight. The amount of site preparation needed depends on the amount of weed competition present. Remove all perennial weed competition the summer or fall before planting. This can be accomplished either mechanically or chemically. A band treatment is recommended on sloping or highly erodible land. Research has demonstrated that discing, or plowing and discing, eliminates perennial weed competition, loosens the soil, and releases nutrients stored in the organic matter. The nutrients and increased soil moisture enhances seedling survival and growth during the first growing season. First year weed control, either mechanical or chemical, will be much easier after perennial competition has been removed.

PLANTING SEASON

Planting hardwood seedlings at the proper time of the year will help guarantee a successful plantation. It is best to plant tree seedlings in late winter or early spring when the seedlings are dormant. This period lies between March 1 and May 15. Soil moisture and temperature at this time of the year are ideal for high survival and vigorous tree growth. Depending upon the weather, tree planting can be extended later in the spring if adequate soil moisture is present. Poorly drained fields should be planted later in the spring.

Although fall planting is not recommended, plantations have been successfully established at this time of the year. Plantation failure at this time of the year can occur as a result of excessive freezing and thawing of the soil, seedling desiccation, increased disease problems, and planting problems caused by a short planting season.

Avoid planting areas that are excessively wet or dry. Plant these sites when the soil conditions are more favorable for seedling development. Wet sites drown seedling roots. Excessively dry sites put the seedling into a water stress condition. Either condition may result in poor survival or growth.

Planting as early in the spring as possible helps ensure the establishment of the seedling root system before the dry season arrives.

SEEDLING CARE

The seedlings you receive have been given the best care possible in the nursery. This includes excellent fertility, water, and weed control in order to provide you with a vigorous plant. How you handle the seedlings when you receive them can have a major impact on survival and growth. Always:

- * Transport seedlings in a cool covered vehicle.
- * Inspect seedlings for adequate moisture at the time of pick-up.
- * Store seedlings in a cool area out of direct sunlight or in a cooler; protect them from freezing.
- * Plant the seedlings as soon as possible, but no later than one week after arrival.
- * Repair or replace damaged seedling containers to ensure adequate moisture.
- * Avoid exposing the root system to direct sunlight or wind for even a few seconds during the planting operation.
- * Carry seedlings in a bucket with water, or in a tree planting bag with moist peat moss.
- * Prune excessively long lateral roots (>8"). This will not injure the seedling and will aid in the proper planting of the seedling.
- * Never take seedling packages to the field and leave them exposed to the sunlight.
- * Pruning the tops of seedlings is generally not necessary.
- * Handle seedlings carefully to avoid damaging the buds or the stem.

PLANTING AND PLANTING TOOLS

There are a number of appropriate tools to consider for planting hardwood seedlings. The two most commonly used hand tools are a shovel or post hole auger. Each can produce an adequate hole to spread out the root system, but the number of seedlings planted per hour may be less than with other methods. These tools work well for a few hundred to several thousand seedlings. To increase production, purchase a planting bar. The increased production and ease of planting will offset the additional expense. For plantings in the thousands of seedlings, a machine planter is recommended. This machine can plant many thousands of seedlings per day. Consulting foresters or experienced tree planting contractors are available to plant and apply weed control on large field plantings.

As with any task, there is a right and a wrong way to plant trees. Follow these simple instructions to ensure proper tree planting.

- * Plant all roots pointed down. Forcing the seedling root system into the hole may result in bent ("J" rooted) or broken roots.
- * Do not twist the seedling and the root system into the hole. New root development will be greatly impaired.

- * Make a large enough hole to accommodate the whole root system.
- * Plant the seedling two inches deeper than it was planted in the nursery.
- * Always make sure that the whole root system, and especially the tap root, is in contact with the soil. Remove all air pockets in the soil by properly packing the soil around the root system.
- * Plant as much of the root system as possible.

POST-PLANTING CARE

Research has demonstrated that weed control for the first four growing seasons will greatly increase seedling survival and growth. Weed control after planting is the most important cultural treatment that you need to consider. With good weed control, you can expect a 50 percent increase in survival and a 100 percent increase in growth after four growing seasons. The minimum weed-free area around a seedling should be a four foot diameter square or circle. On small plantings, this can be accomplished with mechanical tilling equipment, mulches, synthetic weed barriers, or small hand-held sprayers.

On large plantings, either a tractor mounted cultivator or disc will be needed. To apply herbicides on a large planting, a power sprayer will make the process much easier. Always use some type of weed control for the first four growing seasons. If you use a herbicide, make sure the product or mix controls both present weeds as well as weed seed in the soil.

Mowing is not considered to be adequate weed control. Mowing increases sunlight to the seedling, but does nothing to remove competition for moisture and nutrients below the ground. In the early years, removing this below ground competition can make the difference between success and failure.

A REFORESTATION CHECKLIST FOR LANDOWNERS

- o The months of March to April are usually the best time to plant.
- o Select the best species and seed source for your site.
- o Determine the number of trees per acre.
- o Order your seedlings as early as possible.
- o Read about seedling quality and nursery conditioning.
- o Decide how, when, and where you will pick up the seedlings.
- o Do you have a suitable vehicle? (You should be able to keep the seedlings cool and protected from physical damage and/or chemicals, diesel fuel, herbicides, etc.)

For Additional Information or Assistance

For additional information or help, contact your local forester, consulting forester, district forester, Extension Office or Soil Conservation Service Office (see your local telephone directory for addresses and phone numbers).

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