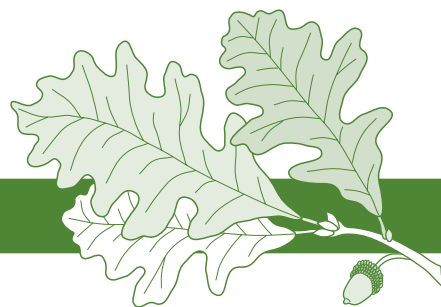


Tree Planting: Planning



Millions of trees are planted on both private and public lands in Iowa. Purposes for planting trees include timber production, fiber production, erosion control, wildlife habitat improvement, riparian buffer creation, improvement of stocking or composition in open woodlands, Christmas tree production, shelterbelt establishment, fuelwood production, watershed protection, energy conservation, and beautification.

Successful tree planting involves a series of steps, each one dependent upon the others. This publication and *Tree Planting: Establishment and Care*, Pm-1677, discuss the steps for successful tree planting, including (1) planning, (2) site preparation, (3) selecting and ordering planting stock, (4) caring for the nursery stock, (5) planting methods, and (6) plantation maintenance.



Planning

A little time spent planning your tree planting project may mean the difference between a successful and an unsuccessful planting. Ideally, the planning process should begin the summer before a spring planting.

Purpose

Consider why you want to plant trees. Do you want to grow high value hardwoods or provide wildlife habitat or both? Make your objectives as specific as possible.

Consider both short- and long-term goals and uses of the land. Keep in mind what and how much time and resources you can devote to the project.

Soils

Whenever possible, match tree species to optimum site characteristics. Many trees survive and grow in a wide range of soil and environmental conditions, but best growth is attained within a rather narrow range. Trees planted on inappropriate soils or sites grow poorly, are susceptible to more insect and disease damage, and suffer high mortality.

For help in evaluating soil characteristics, your county Natural Resource Conservation Service or county extension office can provide soil survey books. These contain a wealth of information about soils, including texture, pH, and drainage characteristics.

Table 2 gives some information about species commonly planted in Iowa. As a general rule, hardwoods are better suited to loamy or clay soils with higher moisture content and higher fertility. Conifers do well on well-drained, coarser soils with lower fertility.

Species

Consider both your purposes for tree planting and site characteristics when selecting species combinations. Which species match your objectives and grow well on the selected site?

Generally it is best to plant as many different species as possible. Pure plantings or monocultures may result in plantation failures, while mixed plantings provide a wider range of potential benefits. For example, black walnut does better when planted with other species that provide natural pruning and form a dense canopy for shading of competition. Also, a greater diversity of wildlife typically use mixed plantings. Natural woodlands in Iowa always are composed of many diverse species.

Layout

Keep in mind both short- and long-term goals when determining specific layout. For Christmas trees, consider access lanes (fire breaks) across the plantation. For timber production, leave an access way around at



least a portion, or around one end, of the plantation for thinning, pruning, and harvesting. Successful wildlife management requires both open land and wooded areas. Choose food and shelter species that desired wildlife prefer. For erosion control, plant buffer strips along waterways, plant trees along contours, and avoid soil-disturbing site preparation. For aesthetic purposes, vary layout and species, use non-row plantings and sculpted edges, leave openings, and consider how to create or retain views.

Recommended tree spacing varies, partially depending on the future purposes of the plantation. With wider spacing, it takes longer for trees to occupy the site. The trees also develop more open-grown characteristics. Narrower spacing results in more competition, better growth form, and earlier natural pruning.



For high-quality, high-value sawlog production, close spacing is ideal because it helps convert the field from a grass to a woodland relatively rapidly. However, close spacing requires early thinning. To meet other objectives, including wildlife habitat creation and food production, wide spacing may be more appropriate.

If you plan to mow between rows, leave a space two to four feet wider than your mower.

Table 1. Common tree spacings

| | Spacing (feet) | Number of trees (per acre) |
|--|---------------------------|---------------------------------------|
| | 5 x 5 | 1,742 |
| | 5 x 10 | 871 |
| | 6 x 6 | 1,210 |
| | 6 x 10 | 726 |
| | 7 x 7 | 889 |
| | 7 x 10 | 622 |
| | 8 x 8 | 681 |
| | 8 x 10 | 545 |

Costs

Tree planting costs include the cost of site preparation, seedlings or seed, cost of planting, and weed control for three to five years after planting.

Many combinations of these activities can produce successful tree plantings. For example, planting a greater number of seedlings (seed) per acre results in fewer years of maintenance before trees establish themselves.

Several types of cost share assistance exist for tree planting projects in Iowa. Contact an Iowa Department of Natural Resources (DNR) District Forester early to apply.

Site Preparation

Competition from grass and weeds is the primary reason for failure of tree plantings in Iowa. Proper site preparation beginning the summer or fall before spring planting is the first important step to reducing this competition.



Soil characteristics and existing vegetation determine appropriate site preparation. Sandy soils often require less site preparation than heavy soils because weeds are less competitive on sand.

If only annual weeds grow on a site, simply knocking them down may be all that is necessary.

Strip site preparation works well on non-competitive perennial grasses, such as blue grass or timothy. Eliminate vegetation in strips at least four feet wide. This can be done mechanically with tillage equipment or chemically with a non-selective, non-persistent herbicide, such as Roundup.

For more competitive grasses, (brome, fescue, orchard grass, Reeds canary grass), consider broadcast application of chemicals or tillage to eliminate competition. Broadcast control is not recommended on erosive slopes, however.

Table 2. Guide for species selection for tree planting in Iowa

| Species | Life span | Growth rate | Shade tolerance | Soil drainage* | pH** | Location in state*** |
|----------------------|-----------|-------------|-----------------|----------------|------|----------------------|
| alder, black | short | fast | intolerant | mp, mw, well | hm | smn-ew |
| ash, black | short | fast | intolerant | poor, mp | ml | smn-e |
| ash, green | long | fast | intolerant | mp, mw, well | h | smn-ew |
| ash, white | long | medium | intermediate | mp, mw, well | m | smn-ew |
| aspen, bigtooth | short | fast | very intolerant | mp, mw | hm | smn-ew |
| aspen, quaking | short | fast | intolerant | mp, mw, well | hm | smn-ew |
| basswood, American | long | medium | tolerant | mw, well | hm | smn-ew |
| boxelder | short | fast | very intolerant | poor-well | hml | smn-ew |
| cedar white | long | medium | tolerant | poor-well | hm | smn-e |
| cherry, black | long | medium | intermediate | mw, well | hm | smn-e |
| coffeetree, Kentucky | long | medium | intermediate | mp, mw | h | sm-ew |
| cottonwood | short | fast | intermediate | poor-well | hml | smn-ew |
| hackberry | long | medium | intolerant | mp, mw, well | h | smn-ew |
| hickory, shagbark | long | slow | intermediate | mp, mw, well | m | smn-ew |
| hickory, shellbark | long | slow | tolerant | mp, mw, well | m | sm-e |
| larch, European | long | medium | intermediate | mp, mw, well | ml | smn-ew |
| locust, black | short | fast | very tolerant | mw, well | hml | sm-ew |
| maple, red | long | medium | intermediate | poor-well | hml | smn-e |
| maple, silver | short | fast | intermediate | poor-well | m | smn-ew |
| maple, sugar | long | slow | intolerant | mw, well | hm | smn-ew |
| mulberry, red | short | fast | intolerant | poor, mp, mw | hm | smn-ew |
| oak, black | long | medium | intolerant | mw, well | m | smn-e |
| oak, bur | long | slow | intermediate | mp, mw, well | hml | smn-ew |
| oak, English white | long | medium | intermediate | mp, mw, well | ml | sm-e |
| oak, pin | long | medium | intermediate | poor, mp, mw | ml | sm-e |
| oak, red | long | medium | intermediate | mw, well | ml | smn-ew |
| oak, shingle | long | slow | intolerant | mp, mw, well | l | s-e |
| oak, swamp white | long | fast | very intolerant | poor, mp, mw | hm | sm-ew |
| oak, white | long | slow | intermediate | mw, well | hm | smn-e |
| osage-orange | long | fast | intolerant | mp, mw, well | hm | s-ew |
| pine, jack | short | medium | very intolerant | poor, mp, mw | ml | smn-ew |
| pine, red | long | medium | intermediate | mw, well | ml | smn-e |
| pine, Scotch | long | medium | intolerant | mp, mw, well | ml | smn-ew |
| pine, white | long | medium | intolerant | well | l | smn-ew |
| poplar, hybrid | short | fast | very intolerant | well | hml | smn-ew |
| poplar, white | short | fast | intolerant | mw, well | hml | smn-ew |
| redcedar, eastern | long | slow | very tolerant | mp, mw, well | hm | smn-ew |
| spruce, blue | long | slow | intermediate | poor-well | ml | smn-ew |
| spruce, Norway | long | medium | tolerant | poor-well | ml | smn-ew |
| spruce, white | long | slow | tolerant | mp, mw, well | hml | smn-ew |
| sycamore | long | fast | intermediate | poor-well | hml | sm-e |
| walnut, black | long | fast | intolerant | mw, well | h | smn-ew |
| willow, Austree | short | fast | very intolerant | poor-well | hml | smn-ew |
| willow, black | short | fast | very intolerant | poor, mp | hml | smn-ew |

* poor, moderately poor (mp), moderately well (mw) and well

** h-high (7.2 to 7.8), m-medium (6.6 to 7.1), l-low (<6.6)

*** southern (s), middle (m), and northern (n); eastern (e) and western (w)





For more information on site preparation, ask the Iowa DNR, forestry extension at Iowa State University, or your district forester for the Iowa DNR publication *Weed Control for Tree and Shrub Seedlings*.

If grass establishment is desired, plant less competitive species, such as blue grass, timothy, or perennial rye; avoid alfalfa or red clover.

Selecting and Ordering Stock

Planting stock is available in a variety of sizes and ages. Sources are both state-run and private. Iowa's DNR Forest Nursery offers planting stock for forestry, erosion control, and wildlife practices. It cannot be used in farmstead windbreaks or for ornamental purposes. Private nurseries in Iowa also offer a variety of plant types and species for all uses. Order seedlings early to ensure availability of desired stock. Consider ordering extra trees (5 to 10 percent) and culling stock without sufficient root systems.

Suppliers often label bare root plants with a double number system, such as 1-0 or 2-2. The first number is the number of years the material was grown in a seedbed, and the second number refers to the number of years of growth in a transplant bed. For example, a 2-0 plant is a two year old seedling, and a 3-2 plant is a five year old transplant that spent three years in a seedling bed and two years in a transplant bed.

Transplanted stock is more expensive than seedlings, but survival and growth rates may improve because of better-developed root systems. Look for a well developed root system when selecting plants. For hardwoods, a good seedling has at least five to six lateral roots; avoid plants with a single large taproot.



Container-grown seedlings are becoming more common, especially conifers. Container-grown plants are grown in greenhouses to reduce the time necessary to produce stock of sufficient size for planting. These plants are often ready for planting in less than a year, and are equivalent to traditional two- to four-year-old seedlings. Container seedlings come in various sizes, depending on species and size of plant. Container-grown seedlings suffer less transplant shock because

they do not suffer root loss like traditional seedlings or transplants. These greenhouse-grown seedlings can then be transferred to transplant beds to produce plug seedlings. A plug-1 seedling was in the nursery bed one year, while a plug-2 seedling was there two years.



Recently there has been renewed interest in seed use to establish forest plantations. If you choose to use seed, pay particular attention to viable seed selection, seed collection and/or storage, proper planting techniques, and the control of seed loss by animals. Once established, trees grown from seed require the same care as trees established with seedlings or transplants. For more information on seed use, see Iowa State University, Forestry Extension Note F-323, *Walnut and Oak Establishment with Seed*.

A few species, including willows and cottonwoods, can be established using unrooted hardwood cuttings. Take cuttings during the dormant season (January or February) from last year's growth and store in sealed bags in the freezer until planting season. During planting season, soak them in water for 24 hours, and plant with only one or two buds above ground.

Prepared by Paul H. Wray, extension forester.

File: Forestry 2

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