

# Tree Planting in Indiana

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## Early Indiana Forestry

In the past 100 years, Indiana has been brought back from the brink of complete deforestation through tree planting supported by the State's nursery program. Indiana's nursery program began at the turn of the 20th century and has enjoyed a productive and successful history.

By 1900, Indiana had become the country's number one producer of hardwood lumber and forest products (Himebaugh 2001). Indiana's favorable climate and productive soils made the State's land ideal for agricultural use. Loss of forest cover to timber harvest and landclearing for agriculture and settlement led to serious soil erosion, siltation of streams and lakes, and a shortage of timber. Forest cover in the State had plummeted from 87 percent at presettlement to less than 10 percent in 1900. In 1901, Governor Winfield Durbin established the Division of Forestry within the State's Department of Natural Resources and, in 1903, purchased 2,000 acres of degraded, cutover land for establishing the Clark Forest Reservation, located outside of Henryville (O'Connor 2003). Early Indiana foresters, who "hit the ground running," used the Clark Forest Reservation to conduct tree-planting research and established a 15-acre seedling nursery for their own use. By 1907, tree seedlings were available for public distribution (Himebaugh 2001).

Native deciduous species, such as black walnut (*Juglans nigra* L.), hickories (*Carya* spp. Nutt.), and oaks (*Quercus* spp. L.), were planted in these early years (Guthrie and Gladden 1916). Many were not well suited, however, for establishment on the heavily eroded sites that were in need of reforestation. Emphasis gradually shifted to species that could fix nitrogen levels, such as black locust (*Robinia pseudoacacia* L.) and white pine (*Pinus strobus* L.), and species that were well adapted to poor soils, such as red pine (*P. resinosa* Soland.) (Jackson 2001). The idea was to return the soil to a productive condition that would support a deciduous forest (Anonymous 1941). As anticipated, the native deciduous species naturally seeded into the pine and locust mix of these early plantings and gradually returned the species composition to one of mixed hardwoods. As more productive sites became available for planting, emphasis returned to planting native deciduous

species, starting with white ash (*Fraxinus americana* L.), sycamore (*Platanus occidentalis* L.), and yellow-poplar (*Liriodendron tulipifera* L.).

Each time new parcels throughout the State were brought under State management, the Division of Forestry established a temporary nursery. These nurseries supplied seedlings for planting on the parcel and on the land of local landowners. More than 1 billion seedlings have been planted for public and private conservation projects in Indiana since the advent of the State's nursery program.

## Current Forestry in Indiana

Today, about 4.7 million acres of forested land in Indiana (figure 1) amount to a fairly stable 20 percent of the State's land base (Bratkovich and others 2004). About 3.9 million acres, or 83 percent of the State's forested land, are privately owned by about 190,000 landowners. The remaining forested land is under public control in the jurisdiction of various Federal, State, and local agencies (table 1).



Figure 1. Forest land in Indiana (Source: Indiana Division of Forestry).

**Table 1.** Forest land in Indiana under public ownership.

Agency	Forested acres	Managed for timber
DNR Fish and Wildlife	83,100	No
DNR Forestry	148,607	Yes
DNR Nature Preserves	16,034	No
DNR Outdoor Recreation	3,779	No
DNR Historic Sites	723	No
DNR Parks and Reservoirs	57,199	No
DNR Other	66	No
IDOC (Corrections)	1,989	Yes
Federal Lands (Forest Service)	412,248	Yes

DNR = Department of Natural Resources. IDOC = Indiana Department of Corrections.

Since most of the State's forest land was planted or regenerated after 1900, most of it has reached the same seral stage. The oak-hickory forest type is predominant in Indiana and is the forester's preferred species mix. High-value black walnut (*Juglans nigra* L.) and black cherry (*Prunus serotina* Ehrh.) are in high demand for fine furniture, but the oak family (*Quercus* spp. L.) is the workhorse of the State's hardwoods group and supports Indiana's furniture industry. Hickory (*Carya* spp. Nutt.), too, is seeing unprecedented growth in use for cabinetry and flooring, although it remains an important wildlife habitat and food species of the standing forest. Unfortunately, these shade-intolerant species are not effectively regenerating under the shade of the mature forest. The understory primarily consists of shade-tolerant species such as sugar maple (*Acer saccharum* Marsh) and beech (*Fagus grandifolia* Ehrh.). Studies, such as the multiagency Hardwood Ecosystem Experiment (HEE), are under way to find ways to encourage natural regeneration of the preferred species. This study covers long-term, forest-level interactions of various management regimes and is expected to run for 100 years. At this point, however, the only reliable regeneration method is replanting after harvest.

## Seedling Production

Currently, the Indiana Division of Forestry operates two tree seedling nurseries. The Jasper-Pulaski State Nursery is located approximately 100 miles (160 km) northwest of Indianapolis and operates as a seedling distribution and seed-buying center for the northern half of Indiana. The Vallonia State Nursery (figure 2) is located about 80 miles (130 km) south of Indianapolis and handles all seedling production and seed-buying and distribution for the southern half of the State.

During the 1980s, three factors combined to necessitate an expansion of the nurseries' production capacity. First, increased funding for USDA Conservation Reserve Program planting was included in the Federal farm legislation. This increased funding for planting led to a large increase in demand for

seedlings. Second, the heaviest demand shifted from conifers to hardwoods. This shift was driven by an increase in the value of hardwood timber and a shift to planting in areas with more productive soils that could support the growth of hardwoods. Third, customers demanded larger seedlings that could out-compete weeds on the more fertile planting sites and survive herbivore predation. Not only were the nurseries challenged to grow many different species, but they also faced the challenge of producing significantly larger seedlings at a reasonable cost. These seedlings had to be able to withstand competition from deer browsing, floods, droughts, and competing vegetation (figure 3).

In the early 1970s, average seedbed densities were in the range of 25 seedlings per square foot. Today, seedbed density averages about 5 seedlings per square foot in the State nurseries, where quality is equal in importance to the total number produced. Currently, the nurseries produce 52 species of bare-root conifer and hardwood seedlings annually. The primary stock type produced is 1-0, although 2-0 and 3-0 components also are produced. Total production at both nurseries peaked at 7 million seedlings in 1991 but fell back to between 4 and 5 million seedlings annually during the mid-1990s (table 2). Present annual production is approximately 3.5 million seedlings.



**Figure 2.** Seedlings growing in beds at Vallonia State Nursery.



**Figure 3.** Mowing between planting rows (left) actually encourages denser weed growth. Herbicide use within the planting rows (right) is best for planting success.

**Table 2.** Seedlings sold and acres planted in Indiana for the past decade.

Year	Total seedlings sold	Acres planted*
2000–2001	5,792,044	9,653
2001–2002	5,334,513	8,890
2002–2003	4,744,445	7,907
2003–2004	5,855,558	9,759
2004–2005	5,193,997	8,656
2005–2006	4,665,627	7,776
2006–2007	4,816,107	8,026
2007–2008	3,675,983	6,126
2008–2009	3,532,005	5,886
2009–2010	3,229,842	5,383

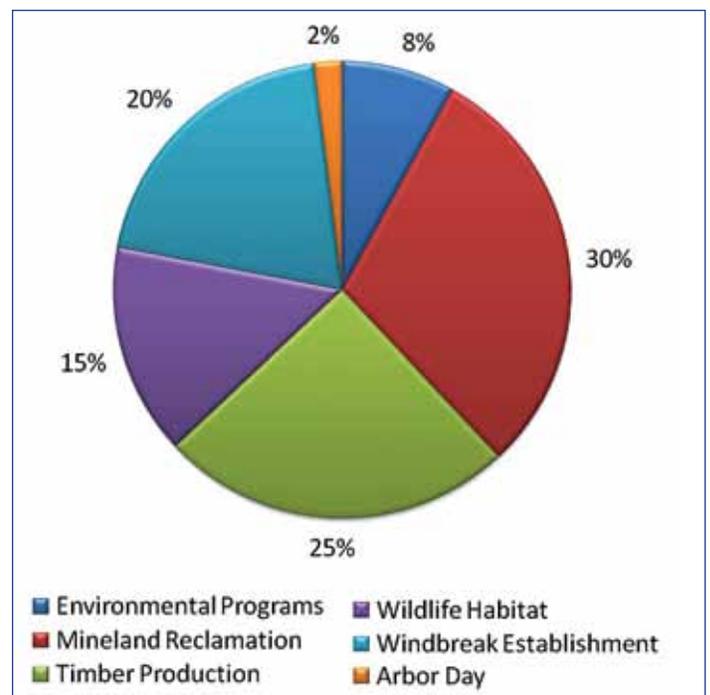
\*Assume 600 stems per acre.

The nursery program’s goal is to produce high-quality seedlings that will ensure good outplanting survival. Therefore, the nurseries emphasize the various cultural practices known to lead to the highest quality seedlings. Thorough seed testing, seedbed planting density, scheduled fertilization, and proper pest control are all integral components of raising high-quality seedlings. Most of the seeds planted in the nursery are collected from native stands within the State. This ensures that the seedlings will be acclimated to Indiana’s growing conditions. Seed collection is geared toward the demand seen today and predictions for what the future might hold. Predicting future demand for tree species is difficult at best. Looking at historical trends and current demands gives the best indication of future needs.

Nursery customers generally fall into one of six broad categories (figure 4) as described in the following sections.

## Timber Production

Indiana’s current productive timber land came about as the result of tree planting in the early days of the Division of Forestry. According to our annual customer surveys, about 25



**Figure 4.** Who we serve—customer base for the Indiana State nurseries.

percent of current planting is specifically intended for timber production. Much of the rest, although planted with other goals in mind, will also provide productive timber land for future generations.

## Mineland Reclamation

Indiana's Division of Reclamation originated as part of the Division of Forestry; therefore, it is familiar with the long-term benefits of tree planting. Mining companies are required to return the postmining land to its approximate original contour and to its premining land use. Reclamation of surface coal mines (figures 5 and 6) is a significant use for Indiana's nursery seedlings. Many of the species the State nurseries offer for sale are adapted to grow in the poor soils often found in reclamation sites.

During the past 10 years, 28,572 acres of active mine lands were reclaimed as forest land or wildlife habitat through the planting of nursery seedlings. Another 2,900 acres of previously abandoned surface mines were also reclaimed in that period.

## Wildlife Habitat

About 15 percent of current planting is specifically intended to benefit wildlife. Many landowners keep wildlife in mind when designing their plantings. From birds to deer, landowners love to attract animals to their property for viewing. The nurseries assemble mixed species seedling packets each year,

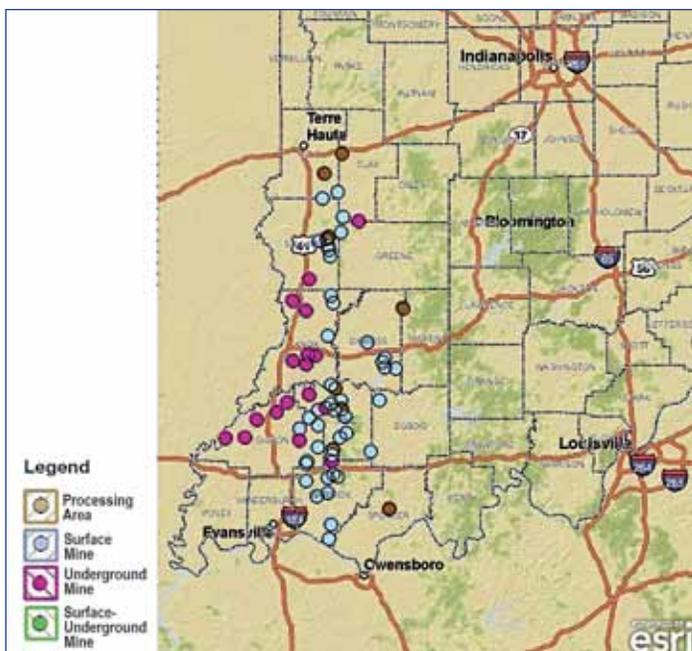


Figure 5. Surface mine locations in Indiana (Source: Indiana Division of Reclamation).

which are designed to provide food and cover for an array of wildlife species. In recent years, offerings have included “songbird,” “wildlife,” “quail,” and “nut” packets.

## Environmental Programs

Environmental programs administered by the U.S. Department of Agriculture, such as the Conservation Reserve Program, the Wildlife Habitat Incentive Program, the Wetland Reserve Program, and the Conservation Reserve Enhancement Program, are also heavy users of the nurseries' seedlings and accounted for 1,442 acres planted just during 2010. These environmental programs can fluctuate with changing administrations, which has a significant effect on the number of acres planted each year.

## Windbreak Establishment

High winds in northern Indiana can contribute to wind erosion and convective cooling. The terrain in that part of the State is very flat and subject to such high wind that several large, new wind energy farms have been established. Therefore, windbreak establishment, primarily in the northern part of the State, is an important use of our nurseries' conifers.

Landowners typically plant 100 to 1,000 seedlings for a windbreak or small wildlife planting and usually do their own hand planting. Larger plantings are normally contracted with a local consulting forester (figure 7), although some Resource Conservation and Development programs have tree planters available to loan for short-term use.



Figure 6. Heavy-duty equipment is used to plant seedlings on mine reclamation sites.



Figure 7. Established reclamation planting.

## Arbor Day

Every year since 1990, the nursery program has offered a free seedling to all third grade students across the State in celebration of Arbor Day. Promoting tree planting to children at a young age is a way to demonstrate the importance of planting trees and the associated benefits provided to the environment. Various other organizations that celebrate Arbor Day also receive free seedlings from the nurseries for their Arbor Day programs. This effort, which reaches a wide variety of constituents, promotes the benefits of tree planting.

## Future Outlook for Tree Planting in Indiana

The Indiana nursery program anticipates steady seedling demand as long as cost-share programs remain at current levels. Tree planting in the State has always been closely tied to Government cost-share programs, although trees often seem to have a lower priority than other components of the Federal farm bill. Previous years' loss of cost-share monies led to an almost 50-percent reduction in seedling sales.

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