

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**TREE/SHRUB ESTABLISHMENT**

(Acre)

Code 612

**DEFINITION**

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

**PURPOSE**

Establish woody plants for:

- forest products such as timber, pulpwood, etc.
- wildlife habitat
- long-term erosion control and improvement of water quality
- treating waste
- storing carbon in biomass
- reduce energy use
- develop renewable energy systems
- improving or restoring natural diversity
- enhancing aesthetics

**CONDITIONS WHERE PRACTICE APPLIES**

Tree/shrub establishment can be applied on any appropriately prepared site where woody plants can be grown.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Use of this standard requires compliance with all applicable federal, state, and local laws and regulations.

The species, type of plant material, location, layout and density of the planting will accomplish the intended purposes.

Planting dates, and care in handling and planting of the seed, cuttings or seedlings will

ensure that planted materials have an acceptable rate of survival.

Only viable, high-quality and adapted planting stock or seed will be used.

Species will be adapted to the soils, climate and site conditions. Adapted species can be found at the NRCS Soil Data Mart or Web Soil Survey by generating the Forestland Productivity or Windbreak and Environmental Plantings reports.

Adequate seed sources or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

Selection of planting technique and timing will be appropriate for the site and soil conditions.

Native plant species will be used whenever possible. Known non-native invasive species will not be used.

Woody plants will be established without compromising the integrity of:

1. Property Lines
2. Fences
3. Utilities
4. Roads
5. Legal Drains
6. Other Easement Areas or Right of Ways

Where a right-of-way easement exists, written permission from the appropriate entity will be needed.

Trees or shrubs will be planted a minimum of 8 feet from the property line or the distance of the mature tree drip line, whichever is

**Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the electronic Field Office Technical Guide for your state.**

greater. Trees will not be planted closer than stated unless all involved landowners agree, in writing.

Where subsurface drains (tile lines) cross through a tree/shrub planting, and where these drains will remain functional, sealed conduit will be installed through the planting and extend a minimum of 50 feet on either side of the planting, or trees/shrubs will not be planted within 50 feet on either side of the tile line.

All plantings will follow applicable criteria found in Indiana (IN) Field Office Technical Guide (FOTG) Forestry Technical Note: Tree & Shrub Establishment.

**Additional Criteria for Forest Products**

**Supplemental planting (species enrichment):** Supplemental planting is completed to improve the stocking and composition of an existing stand in an area that is already stocked with trees. The existing stand is managed for the protection and early development of planted trees.

- Trees will not be planted in locations where they will be overtopped by other trees left in the stand. Overstory trees will be killed or removed within 2-5 years after plant establishment. Species suitable for supplemental planting:

Scientific Name	Common Name
<i>Juglans nigra</i>	Black Walnut
<i>Liquidambar styraciflua</i>	Sweetgum
<i>Liriodendron tulipifera</i>	Yellow Poplar or Tulip Tree
<i>Prunus serotina</i>	Black Cherry
<i>Quercus alba</i>	White Oak
<i>Quercus rubra</i>	Red Oak

**Fine Hardwood Products:** Minimum planting spacing will be 8 x 8 feet or equivalent. Fine hardwoods are tree species that can be used for furniture, veneer products, etc. In Indiana fine hardwood species include:

Scientific Name	Common Name
<i>Acer saccharum</i>	Sugar Maple
<i>Carya illinoensis</i>	Pecan
<i>Juglans nigra</i>	Black Walnut
<i>Liriodendron tulipifera</i>	Yellow Poplar or Tulip Tree
<i>Prunus serotina</i>	Black Cherry
<i>Quercus spp.</i>	Some Oak Species

**Christmas trees:** Use a 6' spacing in the rows and a row width to accommodate maintenance equipment. Allow for adequate service roads in the plantation.

**Additional Criteria to Reduce Soil Erosion and Improve Water Quality**

To control sheet and rill erosion on critical slopes: Plant trees and shrubs on the contour.

Apply mulches as needed per IN FOTG Standard (484) Mulching, and/or seed a cover crop of wildrye (*Elymus species*) wheat, rye, or spring oats between the planted rows per IN FOTG Standard (340) Cover Crop. For riparian area, use species adapted to local flooding and soil wetness.

**Additional Criteria for Wildlife Habitat**

Vegetation established for this purpose will be managed for the targeted wildlife habitat requirements and will encourage plant diversity. See IN FOTG (645) Upland Wildlife Habitat Management, or IN Biology Technical Note Upland Wildlife Habitat for more information.

When disturbance management is necessary to maintain the health of the plant community or habitat needs, see IN FOTG Standard (647) Early Successional Habitat Development/ Management. Management practices and activities will take into consideration the life cycle needs of target and non-target species to minimize negative impacts, such as nest disturbance or reduction in winter cover.

**Planting rates:**

Type	Stems/Acre Minimum
Sites with minimal or no flooding limitations	436
Sites with flooding limitations <sup>1</sup>	544

<sup>1</sup>Sites that are lower in elevation than the 7 day flood profile or that are frequently flooded for long or very long duration. Flood profiles are available for segments of the Ohio, Patoka, Wabash, and White Rivers in southern Indiana.

**Flooding Parameter Table.** Flooding parameter data are found in the IN FOTG, Section II, Water Features Table. An on-site investigation is recommended to verify flooding or ponding parameters.

<b>Flooding Frequency</b>	<b>Chance of Flooding Each Year</b>
Frequently	>50%
Occasional	>5 to 50%
Rare	0 to 5%
<b>Flooding Duration</b>	<b>Days of Flooding</b>
Very long	≥30
Long	7 to <30
Brief	2 to 7
Very Brief	<2

**Rare and Declining Habitat:** When the purpose is to restore forested rare and declining habitat such as savanna, open oak woodlands, etc., refer to IN FOTG Standard (643) Restoration and Management of Rare and Declining Habitats.

**Additional Criteria to Treat Waste**

Use species that have fast growth characteristics, extensive root systems, high nutrient uptake capabilities, and potential for wood/fiber products in short rotations.

**Additional Criteria for Carbon Storage**

For optimal carbon storage (carbon sequestration) select species that are adapted to the site to assure strong health and vigor. Plant the full stocking rate for the site. Species with the highest projected site index will have the highest rates of sequestration in biomass and soils. Site index data can be found at the NRCS Soil Data Mart or Web Soil Survey by generating the Forestland Productivity report.

**Additional Criteria for Developing Renewable Energy Systems**

Select plants that can provide adequate kinds and amounts of plant biomass to supply identified bioenergy needs.

Intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the system.

The harvesting of energy biomass will be accomplished in a manner that will not compromise the other intended purpose(s) and functions.

**Additional Criteria to Reduce Energy Use**

Orient trees to shade a building to reduce summer energy usage. The first priority is placement on the building’s west side where the greatest daily heat gain occurs. The second priority is the east side.

Select plants with a height potential that will be taller than the structure or facility being protected.

Use proper plant densities to optimize the shade produced and meet energy reduction needs.

Trees planted within 30 to 50 ft of the building generally provide effective shade to windows and walls depending on tree height potential.

Keep trees at least 10 ft or further from the structure depending on mature crown spread to avoid damage to foundations or restrict maintenance access to windows and walls.

**Additional Criteria to Enhance Aesthetics**

Trees or shrubs will not be planted within 10 feet of fire hydrants, water meters, or utility structures.

Trees and shrubs will be planted so that the crowns will not infringe on adjoining property unless permission is obtained from the landowner.

**Plant Spacing:** Large trees (mature height greater than 60 feet) will be planted no closer than 40 feet apart.

Medium trees (mature height 30-60 feet) will be planted no closer than 35 feet apart.

Small trees (mature height less than 30 feet) will be planted no closer than 25 feet apart.

Shrubs will be planted no closer than 3 feet apart.

Use evergreen and/or deciduous species, species with showy flowers, brilliant fall foliage, persistent colorful fruits, and noteworthy growth forms and shapes. Use a mixture of small and/or large trees, and shrubs.

Use curvilinear designs and/or small group plantings to increase visual sight diversity.

## CONSIDERATIONS

General: Consider landowner objectives for tree/shrub establishment so that the planned objective for the planting is achievable.

Bare root seedlings should be considered as the standard method to establish trees and shrubs. Planting bare root seedlings has proven to be the most economical and successful method to establish trees and shrubs. However, other methods to establish trees and shrubs may be applicable in some circumstances.

The use of bioassays can be used to assist in determining site suitability with regards to residual herbicide.

Seed sources for direct seeding and woody planting stock should be locally adapted and come from no more than 200 miles north or south of the planting site.

Monocultures and off site species are discouraged in hardwood reforestation projects.

Consider planting 2-3 rows of conifers along all open plantation edges and planting periodic rows of conifers within large plantings to serve as a woodland border and/or wind barrier.

Consider using a support stake when planting container trees and balled and burlapped stock.

Consider planting a mixture of species (5-10 species) adapted to the site (including conifers, hardwoods, and shrubs) to improve plant diversity.

Seek technical assistance from a professional forester for reforestation or other conservation tree planting projects.

Weed Control: To improve plant growth, consider 2 additional years of chemical weed control after plants are established. Weed control should be performed using narrow bands (2'-3' wide) on each side of a plant row unless the entire site is treated.

Erosion: To control sheet and rill erosion, consider establishing permanent cover between tree rows. To treat gully erosion consider closer tree spacing and establishing permanent cover. See IN FOTG Standard (327) Conservation Cover for additional information.

Forest Products: Fine hardwood species can be mixed with other trees (hardwood and softwood) and shrubs to promote diversity, facilitate thinning operations and encourage straight boles.

Direct Seeding: For direct seedings, if there is not a source of light seeded species within 500 feet of any portion of the site, consider seeding an additional 1000 seeds/acre of heavy or light seeded species.

Consider using tillage equipment to prepare a seedbed to enhance natural regeneration.

When using direct seeding consider that spring seeding can reduce rodent and insect damage. Fall seeding can eliminate the need for seed storage.

Natural Regeneration: Natural regeneration may be successful if the site is adjacent to a forested seed wall. A forested seed wall is a site dominated by woody vegetation adjacent to the site. A distance of 150 feet for natural regeneration may be used in these instances.

Sites that are frequently flooded or ponded for long or very long duration may be difficult and unpractical for tree/shrub establishment. Consider using natural regeneration on these sites to establish woody plants and allow the site to revegetate to herbaceous and/or woody plant cover.

Consider that natural regeneration is often likely to occur, but not guaranteed on sites that have a seed source from a forested floodplain system where seeds are deposited in sufficient quantity to establish woody vegetation. On these sites, natural regeneration of light seeded species (e.g. green ash, silver maple, cottonwood, etc.) may establish large numbers of tree seedlings.

Wildlife: Select species from IN FOTG Standards (645) Upland Wildlife Habitat Management, (644) Wildlife Wetland Habitat Management, or (657) Wetland Restoration.

Select species which best meet wildlife and ecosystem needs. Consider planting shrubs in blocks, clumps, or strips with spacing designed to meet the habitat requirement of the desired wildlife species.

Shrub species may be direct seeded to provide wildlife habitat. Refer to IN FOTG

Technical Note No. 16: Direct Seeding of Shrubs.

**Soil Fertility:** Consider soil testing to determine pH, Phosphorus (P), and Potassium (K) levels before establishment of woody vegetation. Species planted should be adapted to soil pH levels at the site.

### PLANS AND SPECIFICATIONS

Plans and specifications for tree/shrub establishment will be prepared for each site in accordance with the criteria for this practice.

#### The plan will include:

- planting dates
- planned stocking rate after mortality
- site preparation and weed control methods
- designed plant spacing, species, type of stock used and planting and storage guidelines

### OPERATION AND MAINTENANCE

Check survivability of planted species after 3 years to insure that the desired stocking rate for the site is present, usually 70% survival of the planted rate. Additional planting will be completed if it is determined that additional natural regeneration will not be sufficient to colonize the site within an acceptable time frame (usually 5 years).

Control weed competition during establishment (3 years). Competing weeds, brush, and vines can adversely affect survival, form and rate of tree growth. Additional years of weed control may be needed in some instances e.g. to control johnsongrass, quackgrass, or other hard to control weed species.

Use the following or combination of methods as needed to control weed competition:

- shallow cultivation
- spraying approved herbicides
- cutting woody plants and applying approved pesticides
- mowing can damage trees and result in increased grass vigor, and is therefore not an acceptable method for weed control to improve tree growth, but may be suitable for controlling un-wanted weeds within the planting.

Shear and shape Christmas trees and correlatively prune hardwood species, as

needed, depending on species and growth form desired. Refer to IN FOTG Standard (660) Tree Shrub Pruning.

Protect the planting from fire. Plan access roads and fire lanes prior to planting, see Indiana IN FOTG Standards (560) Access Road and/or (394) Firebreak.

Fence if necessary to protect the planting from excessive livestock browsing and trampling damage, refer to Indiana NRCS FOTG Standards, (472) Access Control and/or (382) Fence.

Protect from disease, rodents, deer, and insects using approved pesticides, hunting, fencing, or other appropriate methods. Refer to the "Illinois Direct Seeding Handbook", Wildlife Damage Management, for additional information.

### REFERENCES

- Forestry Handbook*, Society of American Foresters, 2<sup>nd</sup> Edition, 1984
- Silvics of North America, Volume 1, Conifers*. USDA, Forest Service, Agriculture Handbook 654, December 1990.
- Silvics of North America, Volume 2, Hardwoods*. USDA, Forest Service, Agriculture Handbook 654, December 1990.
- NRCS – *Forestry Technical Note No. 16, Direct Seeding of Shrubs*,. Indiana NRCS Web Site.
- Seeds of Woody Plants in the United States*, USDA, Forest Service, Agriculture Handbook 450, December 1990.
- Illinois Direct Seeding Handbook*, Illinois USDA, NRCS, October 2000, (see Illinois, NRCS web site)
- Seed Biology and Technology of Quercus*, USDA, Forest Service, 1987.
- A Guide to Bottomland Hardwood Restoration*, Information and Technology Report, USGS/BRD/ITR-2000-0011, General Technical Report SRS-40, 2002.
- NRCS – *Forestry Technical Note MO-18, Seed Collection Guide*, Missouri NRCS
- IDNR – *Division of Forestry, Woody Plants Seed Count*, Indiana Seed

*IN-NRCS Forestry Technical Note Tree  
Planting in Floodplains,*  
[http://www.in.nrcs.usda.gov/intranet/TechnicalNotes/Tree\\_Planting\\_in\\_Flood\\_Plains\\_TechNote.pdf](http://www.in.nrcs.usda.gov/intranet/TechnicalNotes/Tree_Planting_in_Flood_Plains_TechNote.pdf)

*IN-NRCS Forestry Technical Note Tree &  
Shrub Establishment*