

Tree/Shrub Establishment (Acre) 612

CRITERIA

General Criteria Applicable to All Purposes

Select species that are adapted to site conditions and suitable for the planned purpose(s). Refer to the Conservation Tree/Shrub Suitability Groups (CTSG) tool in the MI-NRCS electronic Field Office Technical Guide (eFOTG), Section II.

Do not use any plants on the Federal or state noxious weeds list. Refer to the Invasive Plant Species List in eFOTG, Section II.

Use only viable, high-quality and adapted planting stock or seed. *Refer to the Tree/Shrub Establishment (612) job sheet for minimum planting stock size requirements.*

If existing vegetative cover is anticipated prior to establishment of trees or shrubs, prepare the site using the Tree/Shrub Site Preparation (490) conservation practice standard.

Maintain a 36" diameter weed-free area around planted seedlings or cuttings until average tree/shrubs height is taller than the surrounding weeds. Use the Mulching (484) conservation practice standard for organic or inorganic mulch, including fabric weed barriers. Use the Herbaceous Weed Control (315) conservation practice standard for chemical or mechanical (tillage) weed control.

If tillage is used for weed control, care must be taken not to damage plant stems. Keep tillage depths shallow to avoid root damage.

Note: Mowing or cutting of weeds or grass is not an acceptable means of weed control around woody plantings, but may be used to improve access to plantings.

Ensure that adequate seed sources or advance reproduction will be present or provided for when using natural regeneration to establish a stand.

Use species, age and diameter to determine the acceptability and timing of coppice regeneration.

DEFINITION

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

PURPOSES

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
- *reducing energy use*
- *developing renewable energy systems*
- enhancing aesthetics

CONDITIONS WHERE PRACTICE APPLIES

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

Utilize other conservation practice standards for specialized tree/shrub establishment situations, e.g., Riparian Forest Buffer (391); Alley Cropping (311); Windbreak/Shelterbelt Establishment (380); Critical Area Planting (342); Hedgerow Planting (422).

Protect the planting from plant and animal pests and fire. Refer to the Integrated Pest Management (595) conservation practice standard to assist with site-specific strategies for pest prevention, pest avoidance, pest monitoring, and pest suppression. If damage from deer, rabbits or other herbivores is anticipated, use tree shelters or repellants to protect seedlings.

Evaluate each site to determine if mulching, supplemental water or other cultural treatments will be needed to assure adequate survival and growth. Refer to the Mulching (484), Cover Crop (340) or other applicable conservation practice standards, as needed.

Avoid planting trees or shrubs where they will interfere with structures or any above or below ground utilities. Establish woody plants without compromising the integrity of property lines, fences, utilities, roads, legal drains, easements or public rights-of-way.

Plan the minimum setback distance from the outside tree or shrub row to adjacent property line or contrasting land use areas to be *equal to the 20-year height of the tree or shrub, unless the 20-year height is > than 20' in which case use a minimum setback of 20 feet.* Refer to the CTSG Tool in eFOTG, Section II.

Where subsurface drains (tile lines) cross through a tree/shrub planting, and where these drains are to remain functional, install a sealed conduit through the planting and extending a minimum of 100 feet beyond large trees and 75 feet beyond small to medium sized trees and shrubs.

Planting Dates

Select planting dates, and handling and planting techniques to help ensure that planted materials have an acceptable rate of survival.

Plant bare-root stock, seedling plugs, live cuttings, containerized stock or balled and burlapped stock during the dormant season in the Spring after the ground thaws until June 1 as soil moisture and local weather conditions permit or in the Fall, after October 1 until the ground freezes when soil moisture is adequate.

Do not plant seedlings (bare-root or plugs) in the Fall on soils subject to frost-heave action (clays, clay loam, silty clay loams, silts, silt loams, and loams).

Complete direct seeding from October 1 through April 30 as local soil moisture and weather conditions permit.

Spacing Requirements

Ensure planting or seeding rates will be adequate to accomplish the planned purpose for the site.

For bareroot or plug seedlings or transplants, or for cuttings, plant 302 to 1200 trees per acre. Additional criteria for certain applications are listed below.

Plant air root pruned, other potted trees/shrubs, and balled and burlaped trees/shrubs at a minimum of 28 trees per acre if natural regeneration is expected. Otherwise plant 50 trees/shrubs per acre. See the Tree/Shrub Establishment (612) Job Sheet for a description of air root pruned potted stock.

For other applications or approval of planting densities outside these listed ranges, contact the Michigan NRCS State Forester or State Biologist.

Additional Criteria for Supplemental Underplanting

Use supplemental underplanting to improve the stocking and composition of an existing forest stand where natural regeneration is not adequate.

Manage the existing stand for the protection and early development of the underplanted trees.

Plant 200-300 trees and/or shrubs per acre evenly distributed over the area needing treatment.

Ensure that there is adequate sunlight available for the species to be planted. Refer to the Tree/Shrub Establishment (612) Job Sheet for additional guidance on clearing size and shade tolerance.

Additional Criteria for Establishment of Trees for Forest Products

Christmas trees

Use a 6' spacing in the rows and a row width to accommodate maintenance equipment, for a total of 726 to 1200 trees per acre. Allow for adequate service roads in the plantation. Refer to North Central Regional Extension Publication No. 479 –

Recommended Species for Christmas Tree Plantings,

and Michigan State University Bulletin E-1172 - Growing Christmas Trees In Michigan for further guidance.

Hardwoods

Plant bare root and plug hardwood seedlings and live cuttings at a rate of 545 to 900 trees per acre.

Conifers

Plant conifers at a rate of 600–1000 trees per acre for timber production.

Additional Criteria for Establishing Woody Plantings for Erosion Control

Plant 1000-1200 trees *and/or shrubs* per acre. *Do not use direct seeding for this purpose.*

If revegetating sandblow areas, protect conifer seedlings from mechanical damage caused by blowing sand by planting within brush cuttings, planting within a cover of dune grass, etc. Refer to the Critical Area Planting (342) conservation practice standard for further guidelines.

Use equipment and plant on the contour or across the slope.

On areas subject to wind or water erosion a cover crop may be needed. Refer to the Cover Crop (340) conservation practice standard for more information.

On streambanks in areas where beaver are present, select shrubs/tree seedlings or cuttings that may not be favored by beaver, e.g., pines, elderberry, and hemlock.

Additional Criteria to Establish Wildlife Habitat and/or Improve or Restore Natural Diversity

Use a *minimum of four* native species. *Select shrub species for 25 to 50% of the planting stock.*

Plant at rate that best meets wildlife needs, *best approximates natural conditions, or creates a successional stage or state that can progress to the potential natural plant community. Refer to the Tree/Shrub Establishment (612) Job Sheet and the CTSG tool for additional spacing and species information.*

Additional Criteria for Treating Waste

Select plants that have fast growth characteristics, extensive root systems, high nutrient uptake capacity and tolerance of the planned effluent.

Additional Criteria for Storing Carbon in Biomass

Select plants that have higher rates of growth and potential for carbon sequestration in biomass and are adapted to the site. Plant species at the appropriate stocking rate for the site and species.

Additional Criteria for Developing Renewable Energy Systems

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

Manage the intensity and frequency of energy biomass removals to prevent long-term negative impacts on the system.

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

Additional Criteria to Reduce Energy Use

Orient and locate trees to shade a building to reduce summer energy usage.

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.

Select plants with a potential height growth 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.

Additional Criteria for Establishment with Direct Seeding

If possible, purchase or collect locally adapted seeds (within 200 miles north-south or from the same USDA Hardiness Zone as the planting site). If purchased, schedule shipping of seed to coincide with planting, if possible.

If possible, seed should be planted immediately after collection. If it can't be planted immediately, except as noted below, store all seed in a cool dry place in porous bags (onion or burlap) at temperatures between 35 and 40 degrees F. but no more than 50° F. Oak, hickory, and walnut should be re-hydrated by soaking in cold water for 4-24 hours as soon as possible after collection or delivery and stored at a moisture content of greater than 25% at a temperature of between 28 degrees and 40°F until planting.

Some seeds require a stratification period to break dormancy. Refer to The Woody Plant Seed Manual, (USFS Ag. Handbook #727) for requirements of all species. This reference is also available at: <http://www.nsl.fs.fed.us/wpsm/index.html>

If hand or machine planting is used, plant a minimum rate of 3,000 viable seeds per acre of heavy-seeded species, e.g., oaks, walnut, and hickory, and a minimum rate of 4,500 viable seeds per acre for light-seeded species, e.g., maples, basswood, pines, black cherry and spruces.

If broadcast seeding is used, plant a minimum of 10,000 viable seeds per acre for heavy-seeded species and 30,000 viable seeds per acre for light-seeded species.

Plant heavy-seeded species at a depth of approximately 2 times the seed diameter, or plant all heavy-seeded species at 2 inches if seed predation and/or low soil moisture are anticipated. Drill or sow light-seeded species directly on the surface of the soil and covered to the prescribed depth recommended in the Woody Plant Seed Manual (USFS Ag. Handbook #727).

For additional information on direct seeding techniques, refer to "Illinois Direct Seeding Handbook: A Reforestation Guide" at <http://www.il.nrcs.usda.gov/technical/forestry/dshndbk.html>.

CONSIDERATIONS

Priority should be given to plant materials that have been selected and tested in tree/shrub improvement programs.

Plans for landscape and beautification plantings should consider foliage color, season and color of flowering, and mature plant height.

Consider using diverse species combinations which best meet locally native wildlife and pollinator needs.

Consider the invasive potential when selecting plant species.

Tree/shrub arrangement and spacing should allow for and anticipate the need for future management activities and access needs.

Residual chemical carryover should be evaluated prior to planting; alter species selection and/or timing of planting/seeding, if needed.

When underplanting, trees should be planted sufficiently in advance of overstory removal to ensure full establishment.

Sites that are frequently flooded or ponded for long durations may be difficult and unpractical for tree/shrub establishment. In such cases, consider using natural regeneration to establish trees or allow the site to revegetate to herbaceous and/or woody shrub cover.

Natural regeneration on sites within 200 feet and on the leeward side (based on predominant winds) of a mature stand of light-seeded tree species is likely. Consider adjusting species composition, spacing, and management requirements to either encourage, or discourage this natural seeding, depending on objectives. In most cases, heavy-seeded species will not spread significantly enough to impact planting.

Consider planting 2 to 3 rows of conifers along all open deciduous plantation edges to serve as woodland borders and wind barriers.

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

Prescribed burning may be required for natural regeneration of serotinous cone species and for site preparation for other species. Refer to the Prescribed Burning (338) conservation practice standard.

Consider species being planted for possible attack by disease or insects, e.g., beech bark disease, emerald ash borer, hemlock wooly adelgid, etc.

Supplemental watering, during droughts may be necessary to ensure adequate survival.

Where deer or other herbivore populations are high consider the use of deer herd reduction, tree shelters, repellants or fencing. Note: tube tree shelters on sandy and/or droughty sites may result in seedling desiccation and death.

Additional Considerations for Direct Seeding

Direct seeding may be less likely to establish woody plants than planting seedlings because seed germination and survival is less predictable and seed loss from rodents, insects and other predators can be high.

Spring seeding of some heavy-seeded species may reduce rodent and insect damage.

Fall seeding may eliminate the need for seed stratification and seed storage but may increase loss to rodents and other pests.

Acorns of most species in the white oak group have little or no dormancy and should be planted as soon as possible after collection in the fall.

Application of an approved rodenticide to protect germinating seed from pests may be necessary if rodent populations are high.

If direct seeding hardwoods, mixtures of at least 5 species are recommended to increase species diversity.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using a job sheet (see NRCS-MI Tree/Shrub Establishment (612) Job Sheet), narrative statements in the conservation plan, or other acceptable documentation.

Specifications will include, but are not limited to:

- *Purpose of planting*
- Tree/shrub species to be planted

- *Planting dates*
- Spacing
- Planting and seeding rates
- *Planting methods*
- *Site Preparation requirements*
- *Post-planting weed control requirements*
- Operation and maintenance requirements

OPERATION AND MAINTENANCE

Competing vegetation will be controlled for a minimum of 3 growing seasons after planting or until the woody plants are at least equal in height to competing vegetation. Refer to the Mulching (484), or Herbaceous Weed Control (315) conservation practice standards.

Re-planting will be required when *survival drops below 80% of the minimum allowed stocking level, or if the intended purpose is no longer achievable.*

Trees and shrubs will be protected from fire, insects, disease, and animals until established. Refer to the Firebreak (398) conservation practice standard or other applicable standards as needed.

Pruning may be required to remove damaged, diseased or unwanted limbs to improve health and quality. Refer to the Tree/Shrub Pruning (660) conservation practice standard.

REFERENCES

Bonner, F.T., Technical Coordinator. 2008. Woody Plant Seed Manual, USDA-Forest Service, Agriculture Handbook No. 727. Washington, D.C.
<http://www.nsl.fs.fed.us/wpsm/index.html>

Cathey, H.M. 1990. USDA Hardiness Zone Map. United States National Arboretum. USDA Miscellaneous Publication No. 1475.
<http://www.usna.usda.gov/Hardzone/hrdzon2.html>

Herman, R., D. Schmoker, B. Sloan, and T. Ward. 2002. Illinois Direct Seeding Handbook: A Reforestation Guide. Assoc. of IL SWCDs, USDA-NRCS, IL Dept. of Natural Resources, & IL Environmental Protection Agency.

TECHNICAL GUIDE
SECTION IV
State-Wide
Tree/Shrub Establishment 612-6

<http://www.il.nrcs.usda.gov/technical/forestry/dshndbk.html>

Higman, P. and Susal Campbell. 2009. Meeting the Challenge of Invasive Plants: A Framework for Action. Michigan Department of Natural Resources. Lansing, MI. http://michigan.gov/documents/dnr/Invasives_strategy_final_289799_7.pdf

Koelling, M.R. and L.J. Dornbush. 1992. Growing Christmas Trees in Michigan, Michigan State University Extension Bulletin E-1172. East Lansing, MI. <http://forestry.msu.edu/extension/ExtDocs/xmastree.htm>

Koelling, M.R. and R.B. Heiligmann. 1993. Recommended Species for Christmas Tree Plantings in the North Central United States, North Central Regional Extension Bulletin No. 479. Michigan State University, East Lansing, MI. <http://web2.msue.msu.edu/bulletins/Bulletin/PDF/NCR479.pdf>

Lantagne, D.O. and M.R. Koelling. 1997. Tree Planting in Michigan. 1997. Michigan State University Extension Bulletin, E-771. East Lansing, MI. <http://forestry.msu.edu/extension/ExtDocs/treepInt.htm>

Neumann, D. 2001. Herbicides for Year-of-Planting Weed Control in Hard and Conifer Plantations. MSU Extension Bulletin E2752. East Lansing, MI. <http://forestry.msu.edu/extension/ExtDocs/E2752.pdf>

Neumann, D. 2001. Controlling Broadleaf Weeds and Grasses for Plantation Site Preparation. MSU Extension Bulletin E2754. East Lansing, MI. <http://forestry.msu.edu/extension/extdocs/E2754.pdf>

Pijut, P.M. 2003. Planting Hardwood Seedlings in the Central Hardwood Region. USDA-FS, Hardwood Tree Improvement and Regen. Center. FNR-210. <http://www.ces.purdue.edu/extmedia/FNR/FNR-210.pdf>

Sargent, M.S. and K.S. Carter, ed. 1999. Managing Michigan's Wildlife: A Landowners Guide. Michigan United Conservation Clubs, East Lansing, Michigan.

http://www.michigandnr.com/publications/pdfs/hunting_wildlifehabitat/Landowners_Guide/index.htm

Wenger, K.F., ed. 1984. Forestry Handbook, Second Edition. Society of American Foresters publication Number SAF 84-11. John Wiley and Sons, Inc. New York, NY.

Wisconsin Department of Natural Resources. 2009. Herbicides for Forest Management. Madison, WI. <http://dnr.wi.gov/forestry/Fh/weeds/herbicides.htm>