

Tree/Shrub Establishment (Acre) 612

GENERAL CRITERIA APPLICABLE TO ALL PURPOSES

DEFINITION

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

PURPOSES

Establish woody plants for:

- forest products *such as timber, pulpwood, and energy biomass*
- wildlife habitat
- *long-term erosion control and improvement of water quality*
- *treating waste*
- *storing carbon in biomass*
- energy conservation
- *enhancing aesthetics*

CONDITIONS WHERE PRACTICE APPLIES

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

Utilize other 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).

- Planting plans will be developed for one or more species adapted to soil/site conditions using *Conservation Tree/Shrub Suitability Groups (CTSG) found in the MI-NRCS electronic Field Office Technical Guide (eFOTG), Section II, I. Forestry Information.*
- Species will be suitable for the planned purpose.
- Known invasive species shall not be used. *See eFOTG, Section II., G. Invasive Plant Species List.*
- Planting or seeding rates will be adequate to accomplish the planned purpose.
- Plans and application of tree/shrub establishment will comply with all applicable federal, state, and local laws and regulations.
- The planting design shall consider the cultural and management practices likely to occur in the future e.g. harvesting equipment, thinnings, etc.
- Planting dates, and care in handling and planting of the seed 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.
- Site preparation shall be sufficient for establishment and growth of selected species. *See practice standard Tree/Shrub Site Preparation (490).*
- Adequate seed or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.
- Timing and use of equipment will be appropriate for the site and soil conditions. *See practice standard Forest Harvest Trails and Landing (655).*

- The acceptability and timing of coppice regeneration shall be based on species, age, and diameter.
- All Tree/Shrub plantings will be protected from pests, livestock, and wildfire. Refer to practice standard Firebreak (394).
- Woody plants shall 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
- The minimum setback distance from the outside tree or shrub row to adjacent property line or contrasting land use areas will be 20 feet.
- Where subsurface drains (tile lines) cross through a tree/shrub planting, and where these drains will remain functional, sealed conduit shall be installed through the planting and extend a minimum of 100 feet from rows of large spreading trees and 75 feet from small to medium sized trees and shrubs. Conifers (with the exception of northern white cedar) normally do not interfere with subsurface drains but invading tree species can interfere.

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. 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 guidelines.

Underplanting to improve the stocking and composition of an existing stand. The existing stand is managed for the protection and early development of the underplanted trees.

Plant 200-300 trees and/or shrubs per acre (15 feet x 15 feet = 194 per acre; 12 feet x 12 feet = 303 per acre) evenly distributed over the site. Use Conservation Tree/Shrub Suitability Groups (see eFOTG Section II.

I., Forestry Information) to determine the shade tolerance of the species to be underplanted. Tree/shrub species with no shade tolerance (N) require full sun and require openings 1/2 to 2/3 acre in size (diameter of opening: 160-200 feet, measured at tree crown level). Species with intermediate shade tolerance (I) require canopy closure of 30-50%, which is about equivalent to conditions after a shelterwood timber harvest (See eFOTG Section I G., Forestry Technical Note #25, Forest Stand Improvement, Appendix 2). Intermediate shade tolerance species can also be planted in openings 1/4 to 1/2 acre in size (diameter of opening: 120-160 feet, measured at tree crown level). Shade tolerant species (T) can grow in full shade, although 60-80% canopy closure will accelerate the growth and development of underplanted trees/shrubs when compared to 100% canopy closure. Small openings of 1/10 acre or less (diameter of 80 feet or less, measured at tree crown level) will favor regeneration of shade tolerant species. All underplanted seedlings will benefit from additional cutting or killing of overstory trees 2 or more years after establishment to maintain or increase the amount of light reaching the ground.

Underplanted seedlings are particularly susceptible to browse damage by deer and rabbits, since herbivores have plenty of cover and can escape predators. If herbivores are suspected to be abundant newly planted seedlings must be protected with fences, tree shelters or repellents.

Fine Hardwoods - These hardwood tree species are suitable for furniture, veneer products, moldings, etc. See the following table listing some fine hardwood species native to Michigan.

Fine Hardwood Species

Scientific Name	Common Name
<i>Prunus serotina</i>	Black Cherry
<i>Juglans nigra</i>	Black Walnut
<i>Quercus alba</i>	White Oak
<i>Quercus rubra</i>	Red Oak
<i>Betula allegheniensis</i>	Yellow Birch
<i>Liriodendron tulipifera</i>	Tuliptree
<i>Acer saccharum</i>	Sugar Maple

Plant bare root and plug hardwood seedlings at a rate of 545 to 900 trees per acre (approximately 8 feet X 10 feet to 5 feet X 10 feet). The planting rate for air root pruned container seedlings will be a minimum of 28 trees per acre (40 feet X 40 feet) if natural regeneration is expected, otherwise 50 per acre (30 feet x 30 feet). See **Minimum Planting Stock Size, Containerized Stock** for a description of air root pruned potted stock.

Conifer Species - The following species of conifers may be planted to produce lumber, veneer or pulp crops:

Conifer Species

Scientific Name	Common Name
<i>Abies balsamea</i>	Balsam Fir
<i>Pinus resinosa</i>	Red Pine
<i>Pinus strobus</i>	Eastern White Pine
<i>Pinus banksiana</i>	Jack Pine
<i>Picea glauca</i>	White Spruce
<i>Larix laricina</i>	Eastern Larch
<i>Thuja occidentalis</i>	Northern White Cedar
<i>Picea abies</i>	Norway Spruce
<i>Tsuga canadensis</i>	Eastern Hemlock

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

Additional Criteria for Establishing Woody Plantings for Erosion Control

- Plant at a rate of 1000-1200 trees per acre.
- If revegetating sandblow areas, protect conifer seedlings from mechanical damage caused by blowing sand by planting within brush cuttings placed there for protection of seedlings. Trees may also be planted within a cover of dune grass. Refer to practice standard Critical Area Planting (342) for further guidelines.
- Equipment and planting will be done on the contour or across the slope.
- Non-competitive temporary or permanent cover crops of *cereal grains* or native grasses may be needed when planting windbreaks or reforesting open areas subject to wind or water *erosion*. Care must be taken to control competition within *2 feet of the tree/shrub stem*.
- On streambanks, select shrubs/tree seedlings or cuttings that may not be favored by beaver. Examples: pines, elderberry, and hemlock.

Additional Criteria to Establish Wildlife Habitat

- Use several native species and plant at rate that best meets wildlife needs. See Table 1 – Some Native Tree/Shrub Species that Provide Wildlife Food/Habitat. Also refer to the following: practice standards Hedgerow Planting (422) and Upland Wildlife Habitat Management (645); Michigan conservation sheet Tree/Shrub Establishment for Reforestation, Windbreaks and Wildlife (612A); and MDNR/MSU Publication - Managing for Michigan’s Wildlife-A Landowner’s Guide for additional species and information.

Additional Criteria for Water Quality and Waste Treatment

- Select species that have rapid growth characteristics and extensive root systems.
- Use species that produce wood/fiber in short rotations to obtain maximum biomass removal.
- Plant flood-resistant species when establishing riparian forest buffers. Refer to Conservation Tree/Shrub Suitability Groups in FOTG Section II, and practice standard Riparian Forest Buffer (391) for criteria.

Additional Criteria for Storing Carbon in Biomass

- Plant species at optimum rates that have rapid growth.
- When using trees/shrubs for greenhouse gas reductions, prediction of carbon sequestration rates shall be made using current, approved carbon sequestration modeling technology.

CONSIDERATIONS

- It is very important to consider the landowner’s objectives for tree/shrub establishment so that the planned objective for the planting is achievable.
- Sites that are frequently flooded or ponded for long or very long duration 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.

- Consider planting 2-3 rows of conifers along all open deciduous plantation edges to serve as woodland borders and wind barriers. Place periodic rows of conifers within large plantings of hardwoods to increase species diversity and improve wildlife habitat.
- Consider using a support stake when planting large containerized trees and balled and burlapped stock.
- When underplanting, trees should be planted sufficiently in advance of overstory removal to ensure full establishment.
- Prescribed burning may be required for natural regeneration of serotinous cone species and for site preparation for other species. See practice standard Prescribed Burning (338).
- *The seed source of all plant materials should be within 200 miles north or south of the planting site. For species that reach the northern limit of their range in Michigan seed source should be the same USDA Hardiness Zone as the planting site.*
- Priority should be given to native plant materials that have been selected and tested in tree improvement programs.
- Plans for landscape and beautification plantings should consider foliage color, color and season of flowering, and mature plant height.
- Where multiple species are available to accomplish the establishment objective, consideration should be given to selecting those native species which best meet wildlife needs.
- Tree arrangement and spacing should allow for access depending on purpose. Refer to practice standards for: Access Road (560), Recreation Trail and Walkway (568), and Firebreak (394).
- Residual chemical carryover from adjacent farming operations should be considered prior to planting woody stock.

- Consider species being planted for possible attack by disease or insects: (beech bark disease, emerald ash borer, *hemlock wooly adelgid*, etc.)
- *Supplemental watering may be desirable to ensure adequate survival.*
- *Where deer or other herbivore populations are high consider the use of deer herd reduction, tree shelters, repellants or fencing. Tube tree shelters on sandy and/or droughty sites may result in seedling desiccation and death.*

GENERAL SPECIFICATIONS APPLICABLE TO ALL PURPOSES

Site Preparation/Weed Control for Establishment

- *Provide a weed-free area at least 2 feet in all directions from planted seedlings or cuttings. Eliminate all competing vegetation in all seedbed areas to be direct seeded prior to planting. Refer to practice standard Forest Site Preparation (490), and Michigan Conservation Sheet Weed Control for Tree/Shrub Establishment (612).*
- If fabric weed barriers are used, the following shall apply:
 - 1) Barrier must be a minimum of 4 feet X 4 feet square or 4 foot wide rolled fabric.
 - 2) Barrier must be permeable to water and be guaranteed by manufacturer to last a minimum of 3 years when exposed to sunlight.
 - 3) Barrier must be capable of inhibiting all underlying plant growth.
 - 4) Barrier must be pinned and otherwise installed according to manufacturer's specifications.
- If tillage is used for weed control, care must be taken not to damage plant stems. Keep tillage depths shallow to avoid root damage.
- 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.

Planting Dates

- Bare-rooted stock shall be planted during the dormant season in the spring after the ground thaws until June 1 as soil moisture and local weather conditions permit. Fall planting may be done after October 1 until the ground freezes when soil moisture is adequate. Fall planting of bare-rooted stock will not be done on soils subject to frost-heave action (clays, clay loam, silty clay loams, silts, silt loams, and loams).
- Balled and burlapped or container-grown stock shall be planted October 1 to June 1 as local soil moisture and weather conditions permit.
- Direct seeding shall be completed from October 1 through April 30 as local soil moisture and weather conditions permit. 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.

Minimum Planting Stock Size

Bare-rooted seedlings: *choose seedlings that have vigorous, well-developed, fibrous root systems.*

- **Conifers:** *Minimum height 9 inches with a minimum root length of 8 inches OR minimum caliper¹ 3/16 inch.*
- **Hardwoods:** *Minimum height of 12 inches with a minimum root length of 8 inches OR minimum caliper¹ of 1/4 inch. Exceptions: shagbark and shellbark hickory may have a minimum height of 6 inches and root length of 8 inches OR 1/4 inch caliper.*

Balled and Burlapped Stock:

Conifers:

Tree Height	Minimum Diameter Ball
18-24 in.	10 in.
2-3 ft.	12 in.
3-5 ft.	14 in.
5-6 ft.	20 in.

Hardwoods:

Tree Height	Minimum Diameter Ball	Caliper ¹
5-6 ft.	12 in.	1/2 in.
6-8 ft.	14 in.	3/4 in.
8-10 ft.	16 in.	1 in.

Containerized stock (all species):

One year old plug container seedlings must have root volumes of at least 7 cubic inches. Minimums for air root pruned potted stock: height 3 feet, container size 1 gallon, caliper¹ 3/8 inch.

¹ Caliper (diameter at ground level) shall be measured at the root collar.

Cuttings (Hybrid Aspen, Willow, Cottonwood):

Minimum 10 in. in length with 3/8 in. caliper.

Storage, Care and Handling of Woody Planting Stock

- Planting stock will be protected from desiccation during temporary storage and handling prior to and during planting. Stock will be kept in a cool environment out of direct sunlight and wind. Refer to Michigan conservation sheet Tree/Shrub Planting for: Reforestation, Windbreaks and Wildlife (612A), and MSU Bulletin E-771 - [Tree Planting in Michigan](#) for additional guidelines on handling and storage of planting stock.
- If planting of bare-rooted seedling stock is delayed for more than 5 days, keep seedlings in shipping container and place in cold storage at 33 degrees to 40 degrees F. If cold storage is not feasible, heel planting stock in for a period not to exceed 2 weeks. Refer to Michigan conservation sheet Tree/Shrub Planting for Reforestation, Windbreaks and Wildlife (612A) for details on heeling-in.
- Roots of bare-rooted stock shall be kept moist and protected from freezing during planting operations by placing in a water-soil (mud) slurry, peat moss, sphagnum moss, super-absorbent (e.g., polyacrylamide) slurry or other equivalent material. Do not wash soil from roots and do not submerge in water.

- Rooting medium of containerized and balled and burlapped stock shall be protected from excessive heat and freezing and kept moist at all times by periodic watering.

Planting Requirements for Woody Planting Stock

- Stock shall not be planted when the soil is frozen or dry. Rooted stock will be planted in a vertical position with the root collars approximately level with or up to 1 inch below the existing ground line.
- **Seedlings:** The planting trench or hole must be deep and wide enough to permit roots to spread out and down without J-rooting or L-rooting. If the roots are too long for the planting equipment, minimal pruning of small end roots may be needed. Do not prune back into the main root system or more than 25% of the total root length (excluding long individual fibrous roots). Pack soil around each plant firmly to eliminate air pockets after planting. Refer to Michigan Conservation sheet Tree/Shrub Establishment for Reforestation, Windbreaks and Wildlife (612A) for planting details.
- **Cuttings:** Plant cuttings within 2 days of collection or shipping arrival in the spring before June 1. Plant in firm ground with 1” of cutting exposed above ground.
- **Containerized trees:** Dig a hole slightly larger than the container diameter. Gently remove plants from containers before placing in the ground and firmly pack soil around roots to eliminate air pockets. Before planting, loosen any spiraling or compacted roots. Water should be applied generously.
- **Balled and burlapped trees:** When handling stock, never lift a tree at the stem or trunk. Handle stock at the root ball. Dig a hole 1 1/2 times as wide as the root ball and about the same depth as the root ball. Remove any rope, wire, or plastic twine from the tree. Pull back burlap around trunk and fold down once in the hole. Carefully place the tree in the hole and firmly pack soil around roots to eliminate air pockets. Water should be applied generously.

Direct Seeding Guidelines

General Guidelines for Seed Selection, Storage and Testing

- Direct seeding may be used as an alternative to cuttings or rooted woody plants. 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.
- Seed may be obtained from commercial seed sources or collected from wild plants. If purchased seed is to be used, acquire locally adapted seeds (*within 200 miles north-south or the same USDA Hardiness Zone as the planting site*) and plan shipping of seed to coincide with planting.
- Inspect seed by randomly selecting at least 10 seeds per bushel. Crack or cut seeds open to be sure seed is filled, moist, normal colored, and not damaged by insects or mold. If seed appears to be non-viable, increase the seeding rate by the percentage of non-viable seed from the tested seed. Floating in water for 16-24 hours can separate black walnut and oak (acorn) seed that has not filled or has been damaged by insects. Discard all ‘floaters’.
- 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.
- If possible, seed should be planted immediately after collection. Spring seeding (before April 30) will be less susceptible to rodent damage than fall seedings (after October 1) but may need stratification, depending on species.
- 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 degrees F.
- All species seed except oak, hickory, and walnut should be kept dry. 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 degrees F. until planting.

- Some seeds require a stratification period to break dormancy. Refer to The Woody Plant Seed Manual, USFS Misc. Publication #654 for requirements of all species. This reference is also available on-line at the following web address: <http://www.nsl.fs.fed.us/wpsm/index.html>

Site Preparation

- For direct seeding to be successful, heavy weed growth and sod must be controlled. Refer to practice standard Tree/Shrub Site Preparation (490) for guidelines on preparing seedbeds for direct seeding.
- Elimination of perennial vegetation (especially sod forming grasses) is critical to seeding establishment. Reed canarygrass, brome, fescue, orchard grass and all warm season grasses must be killed and/or destroyed by tillage. If broadcast seeding, the entire site must be treated; if row seeding, at least a 2-foot radius circle or 4-foot wide band must be treated, with the planted seed centered in the grass-free area.*
- Application of an approved rodenticide to protect germinating seed from pests may be necessary if rodent populations are high. Application of all pesticides will conform to the label and will be applied in accordance with Federal, State and local laws and ordinances.

Seeding Rates and Planting Requirements

- Hand plant or drill in rows at 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). Broadcast plantings should be done at a minimum rate of 10,000 viable seeds per acre for heavy-seeded species and 30,000 viable seeds per acre for light-seeded species. If direct seeding hardwoods, mixtures of at least 5 species are recommended to increase species diversity. Refer to Table 2- Hardwood Seeding Rates.
- Depth of planting for heavy-seeded species will be approximately 2 times the seed diameter. Plant all heavy-seeded species at 2 inches if seed predation and/or low soil moisture are anticipated. Light-seeded species may be drilled or sown directly on the surface of the soil and covered to the prescribed

depth recommended in the Woody Plant Seed Manual (USFS Misc. Publ. #654).

- Seed that is broadcast will be disked in and cultipacked or rolled to create a firm seedbed.
- The following chart shows row spacing and seed spacing combinations that will result in about 3,000 seeds per acre when drilled or hand planted in rows:

Row/Seed Spacing for 3,000 seeds/acre

Row Spacing (feet)	Seed Spacing (feet)
6	2.4
7	2.0
8	1.8
9	1.6
10	1.5
11	1.3
12	1.2
13	1.1
14	1.0
15	1.0
16	0.9
17	0.9
18	0.8

Survival Guidelines for Tree/Shrub Plantings:

Practice	Percent Survival
11- Alley Cropping 380-Windbreaks/Shelterbelts Visual Screens Sound Barriers Snow Protection Living Snow Fence	90% of all plants living and no two plants missing together within a row
391-Riparian Forest Buffer 422-Hedgerow Planting 562-Recreation Area Improvement 580-Streambank/Shrln. Protection 612- Tree/Shrub Establishment 644-Wetland Wildlife Habitat Mgt. 645-Upland Wildlife Habitat Mgt.	80% of all plants living and evenly distributed over the entire planted area.

TECHNICAL GUIDE
SECTION IV
State-Wide
Tree/Shrub Establishment 612-8

Table 1 - Some Native Tree / Shrub Species That Produce Wildlife Food/Habitat

Species: Tree (T) Shrub (S)	Shade Tolerance: Tolerant (T) Intermediate(I) Not Tolerant (N)	Used By: Birds (B) Mammals (M)	Site: Wet (W) Moderate (M) Dry (D) All (A)
Alder, Speckled (T)	I	B	A
Arrowwood (T/S)	I	B	D
Aspen, Quaking (T)	N	B,M	M,D
Beech (T)	T	B,M	M,D
Buttonbush (S)	T	B	W
Black Cherry (T)	N	B,M	M,D
Blackhaw (S)	I	B,M	W,M
Black Walnut (T)	N	M	W,M
Buffaloberry (S)	N	B,M	A
Bur Oak (T)	I	B,M	A
Butternut (T)	N	M	M,D
Chokeberry (S)	I	B,M	W,M
Common Elderberry(S)	I	B,M	A
Coralberry (S)	I	B,M	M,D
Cranberry, Highbush (S)	I	B,M	W,M
Dogwood, Alternate-leafed (T)	T	B,M	W,M
Dogwood, Gray (S)	I	B,M	A
Dogwood, Redosier (S)	N	B,M	A
Dogwood, Silky (S)	I	B,M	W,M
Elderberry, Common (S)	T	B,M	W,M
Hackberry (T)	I	B,M	M
Hawthorn (T)	I	B,M	W,M
Hazelnut, American and Beaked (S)	N	B,M	M,D
Hemlock, Eastern (T)	T	B,M	A
Hickory, Pignut (T)	I	M	M,D
Hickory, Shagbark (T)	I	M	M,D
Mapleleaf Viburnum (S)	T	B,M	M,D
Mountain Ash, American (T)	I	B,M	A
Nannyberry (S)	T	B,M	W,M
Pin Oak, Northern (T)	N	B,M	M,D
Red Cedar, Eastern (T)	N	B,M	M,D
Red Oak (T)	N	B,M	M,D
Sand Cherry (S)	N	B,M	D
Serviceberry (T/S)	T	B,M	M,D
Sumac, Staghorn (S)	N	B,M	M,D
Swamp White Oak (T)	I	B,M	W,M
Tamarack (T)	N	B	W,M
White Cedar (T)	T	B,M	W,M
White Oak (T)	I	B,M	M,D
White Pine (T)	T	B,M	A
White Spruce (T)	T	B,M	A
Wild Crabapple (T)	N	B,M	M,D
Wild Grape (Vine)	I	B,M	M,D
Wild Plum (T)	N	B,M	M,D
Winterberry (S)	I	B,M	W,M

Table 2 - Hardwood Species Seeding Rates (Note: walnut and all hickory species are husked. See Woody Plant Seed Manual for seeding rates of additional species)

Common Name	Scientific Name	Range of Seeds/Lb.	Avg. Seeds/Lb.	Lbs/Ac. For 3000 Seeds/Ac	Lbs/Ac. For 4500 Seeds/Ac
American Beech	<i>Fagus grandifolia</i>	1,300-2,300	1,600	1.9	2.9
Bitternut Hickory	<i>Carya cordiformis</i>	125-185	156	20	30
Black Oak	<i>Quercus velutina</i>	125-400	245	13	20
Black Walnut	<i>Juglans nigra</i>	11-100	40	75	112
Bur Oak	<i>Quercus macrocarpa</i>	40-145	75	40	60
Black Cherry	<i>Prunus serotina</i>	2800-13,800	5370	0.6	0.8
Mockernut Hickory	<i>Carya tomentosa</i>	34-113	90	34	51
Northern Red Oak	<i>Quercus rubra</i>	75-256	125	24	36
Pin Oak	<i>Quercus palustris</i>	320-540	410	8	12
Shagbark Hickory	<i>Carya ovata</i>	80-150	100	30	45
Shellbark Hickory	<i>Carya laciniosa</i>	25-35	30	100	150
Sugar Maple	<i>Acer saccharum</i>	3,200-9,100	6,100	0.5	0.75
White Oak	<i>Quercus alba</i>	70-210	120	25	37.5

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation. Michigan conservation sheets Tree/Shrub Planting for Reforestation, Windbreaks and Wildlife (612A) and Weed Control for Tree/Shrub Establishment (612) may be used to develop planting plans.

Adapted tree/shrub species to be planted, spacing, planting methods, planting and seeding rates, cultural practices and maintenance requirements will be

documented in the specifications. Variations in planting methods and species selection when seeding, interplanting, underplanting, and planting in open areas will be documented. Separate specifications may be prepared for each of these planting methods.

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.

- Re-planting will be required when “Survival Guidelines” listed under General Criteria are not achieved.
- Trees and shrubs will be protected from fire, insects, disease, and animals until established.
- *Damaging pests will be monitored and controlled.*
- *Pruning may be required to remove damaged, diseased or unwanted limbs to improve health and quality. Refer to practice standard Tree/Shrub Pruning (660) for further details.*

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