

USDA
NATURAL RESOURCES
CONSERVATION SERVICE
MARYLAND CONSERVATION
PRACTICE STANDARD
TREE/SHRUB ESTABLISHMENT
CODE 612
(Reported by Acre)

DEFINITION

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

PURPOSE

This practice may be applied to establish woody plants for one or more of the following purposes:

1. To produce forest products, such as timber, pulpwood, and biomass for energy;
2. To provide wildlife habitat;
3. To provide long-term erosion control and improvement of water quality;
4. To treat waste (nutrients in effluent);
5. To store carbon in biomass and soils (carbon sequestration);
6. To conserve energy;
7. To improve or restore natural diversity;
8. To enhance aesthetics.

**CONDITIONS WHERE PRACTICE
APPLIES**

This practice may be applied on all suitable lands where establishment of woody plants is desired. It is most often applicable in Maryland to establishing trees for forest production.

This practice does not apply to tree or shrub plantings that will be established primarily for erosion control, water quality benefits, wildlife habitat, or purposes for which other Maryland conservation practice standards are more applicable. (Refer to the conservation practice standards for Conservation Cover, Code 327; Critical Area Planting, Code 342; Field Border, Code 386; Hedgerow Planting, Code 422; Riparian Forest Buffer, Code 391; and Windbreak/Shelterbelt Establishment, Code 380.)

After trees and/or shrubs are established, refer to the Maryland conservation practice standard for Forest Stand Improvement, Code 666, for subsequent management.

CONSIDERATIONS

Assess site conditions including surrounding land uses, soils, residual herbicides (to the extent known), available moisture during the growing season, and existing vegetation on the site and in adjacent areas, including any noxious weeds which may be present.

For landscape and beautification plantings, consider foliage and flower color, season of flowering, and mature plant height and width.

Where multiple species are available to accomplish the establishment purpose, consider selecting species that will provide food and cover for wildlife.

Consider site preparation methods that are cost-effective and will protect wildlife habitat and water quality.

Tree/shrub arrangement and spacing should allow for and anticipate the need for future access lanes for purposes of stand management.

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

Identify and evaluate any constraints such as management options, economic feasibility, state and federal regulations, or cost-share program requirements.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the [Natural Resources Conservation Service - Maryland](#) or visit the [electronic Field Office Technical Guide \(eFOTG\)](#).

CRITERIA

General Criteria Applicable to All Purposes

Select tree and/or shrub species based on their adaptability to the environmental conditions present and to the planned purpose.

Select plant species that are native to Maryland, or are introduced and are non-invasive (i.e., not likely to spread beyond the planted area and displace native species).

Site preparation and planting shall be done at a time and manner to insure survival and growth of selected species. Competing vegetation shall be controlled by using appropriate mechanical and/or chemical methods. Supplemental moisture shall be applied if and when necessary to assure early survival and establishment of selected species.

Only viable, high quality seed and planting stock shall be used. Planting stock shall meet the minimum standards established by the American Nursery and Landscape Association, Forest Service or state-approved nursery.

The method of planting shall include hand or machine planting techniques, suited to achieving proper depths and placement for the selected plant species. Timing and use of planting equipment shall be appropriate for the site and soil conditions.

Planting or seeding rates shall be adequate to accomplish the planned purpose. Tree arrangement and spacing shall allow for access lanes if needed for future stand management and harvesting.

When using natural regeneration to establish a stand, adequate seed or advanced reproduction shall be present or provided. The acceptability and timing of coppice regeneration shall be based on tree species, age, and diameter.

Livestock shall be controlled or excluded as necessary to establish and maintain the planting to meet its intended purpose.

Plant and animal pest species shall be controlled as necessary to achieve and maintain the intended purpose of the planting.

Noxious weeds shall be controlled as required by state law.

Additional Criteria for Providing Wildlife Habitat

Where wildlife habitat is identified as a purpose, select trees and/or shrubs that will also provide food, nesting cover, and/or protective cover for the individual wildlife species or groups of desired species. Plantings shall consist of four or more species to provide greater vegetative diversity. Use locally native plant species when feasible.

For additional information concerning the wildlife value of various native tree and shrub species, refer to the Maryland conservation practice standard for Conservation Cover, Code 327.

Additional Criteria for Treating Waste

Species used to treat waste shall have fast growth characteristics, extensive root systems, high capacity for nutrient uptake, and tolerance of the planned effluent. All federal, state and local regulations related to waste application must be followed.

Additional Criteria for Storing Carbon in Biomass and Soils

Carbon sequestration (storage) is the process through which carbon dioxide (CO₂) from the atmosphere is absorbed by plants and converted during photosynthesis into plant material. Carbon is stored in biomass (tree trunks, branches, foliage and roots) and in soils (as leaf litter and other plant debris). Carbon sequestration rates vary by plant species and age, soil type, and climatic conditions. The rate of carbon sequestration is enhanced as trees and/or shrubs mature and soil organic matter increases.

Select appropriate tree and/or shrub species and stocking rates for site conditions. Use faster-growing species if rapid rates of carbon sequestration are desired. Prediction of carbon sequestration rates shall be made using current, approved carbon sequestration modeling technology.

Additional Criteria for Restoring Natural Diversity

Composition of species selected for planting, or those favored for natural regeneration, shall be native to the site, and create a successional stage that will progress over a period of time to the natural plant community.

Additional Criteria to Enhance Aesthetics

To enhance aesthetics, select species with features such as showy flowers, brilliant fall foliage, or persistent colorful fruits.

Note: Specific cost-sharing programs or other funding sources may dictate criteria in addition to, or more restrictive than, those specified in this standard.

PLANS AND SPECIFICATIONS

Plans and specifications for Tree/Shrub Establishment shall be prepared for each site or management unit according to the Considerations, Criteria, and Operation and Maintenance described in this standard. They shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

Plans and specifications shall include the following: adapted tree and/or shrub species for the intended purpose, spacing, quantities, site preparation, planting methods, planting dates, cultural practices, and maintenance requirements, as applicable. Follow the establishment recommendations in the Maryland job sheet for Trees and Shrub Establishment.

Selection of Species and Time of Planting

Refer to the Maryland Conservation Practice Standard for Conservation Cover, Code 327, for recommended planting dates (Table 1) and a selected list of native tree and shrub species that may be used (Tables 3 and 4). Other trees and shrubs that are native to Maryland, or are introduced and are non-invasive (i.e., not likely

to spread beyond the planted area and displace native species), may also be suitable.

Planting Rates and Spacing

Planting rates and the spacing of trees and shrubs shall be based on the species, type of planting site, and the purpose of the planting. Calculate the number of trees needed by multiplying row width by spacing in the row (all measurements in feet), and then dividing the result into 43,560. A standard tree spacing/planting rate table may also be used.

Existing Woodland - Interplanting and underplanting are generally used to introduce desirable tree species into a stand of inferior species, or for filling voids in a stand. Spacing shall be as follows:

1. **Interplanting** - Plant between other species, but no closer than 8 feet from existing trees;
2. **Underplanting** - Plant no closer than four feet by four feet (4' x 4') under existing trees.

Open Areas - Open areas include agricultural fields, cut-over areas, and other non-wooded land. Spacing shall be as follows, or as specified by a licensed forester, licensed landscape architect, or other qualified resource management professional:

1. **Wood crops** -
 - a. Conifers - 8' x 8' to 10' x 10';
 - b. Hardwoods - 6' x 7' to 10' x 10'.
2. **Christmas trees** - 5' x 5' to 6' x 6'. Spacing may be as close as 4' x 4' for small trees;
3. **Landscaping, site beautification, shade, and other environmental purposes** - Varied spacing, according to a landscape plan.

Protecting Plantings

The planting shall be protected from unacceptable impacts from pests, wildlife, livestock or fire. Livestock shall be excluded as needed to establish the planting. Fencing, if used, shall be in accordance with the Maryland

conservation practice standard for Fence, Code 382.

Vegetation surrounding the tree or shrub planting shall be sprayed with herbicide or mowed in the fall as needed to reduce rodent damage. Follow recommendations from Maryland Cooperative Extension when using repellents or poisons to protect the planting from mice and voles.

Tree shelters may be used to protect plantings from competition from weeds and from deer damage. Use shelters from an approved manufacturer. Use 2-foot tubes next to streams if flooding is likely, otherwise use 4-foot tubes. (Five-foot tubes tend to result in problems with weak wispy stems, especially in oaks.) Generally, lighter colored tubes transmit more light.

Each shelter shall be staked with a wooden stake (minimum 1-inch thickness), or a plastic or fiberglass post, that is at least the same height as the tree shelter being used. Do not use metal or bamboo stakes. Bird exclusion netting shall be used on the tops of tree shelters until the plantings extend out of the tubes.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for each tree or shrub planting. Appropriate Job Sheet(s) may be used to serve as the management plan as well as supporting documentation, and shall be provided to the land user. At a minimum, the following components shall be addressed in the O&M plan, as applicable:

1. Inspect the trees and shrubs annually after the first and second years. If survival is less than expected, replant as needed to achieve the intended purpose of the practice;
2. If tree shelters are used, inspect after flooding or high winds and straighten shelters, tighten ties and replace broken or rotted stakes. Shelters should be removed before they impede the growth of the trunk. Removal should not occur until the seedling has adequate girth to support itself (usually 3 to 5 years after planting);

3. Check for insects and diseases, and if an incidence threatens stand survival, take corrective action to keep the pest under control;
4. Control undesirable plants by pulling, mowing, or spraying with a selective herbicide. Control noxious weeds as required by state law;
5. Protect trees and shrubs from fire and damage from livestock and wildlife, to the extent feasible;
6. Apply nutrients periodically if needed to maintain plant vigor. Use a soil test analysis to determine the appropriate nutrient application rates.

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Field location and extent of planting in acres. Also note the location of the planting on the conservation plan map;
2. Assistance notes documenting the purpose of the practice, dates of site visits, discussions with the client, decisions made, and by whom;
3. Completed copy of the appropriate Job Sheet(s) or other specifications, and management plans. The following items shall be addressed, as appropriate:
 - a. Method of site preparation;
 - b. Species and rates to be seeded/planted;
 - c. Seeding/planting dates;
 - d. Rate and type of soil amendments to be applied;
 - e. Method(s) used to protect plantings from animal damage (e.g., fencing, repellents, tree shelters, etc.).

REFERENCES

1. American Nursery and Landscape Association. *American Standard for Nursery Stock*.
2. Maryland Cooperative Extension. *Wildlife Damage Control, Resistance of Woody Ornamentals to Deer Damage, Fact Sheet No. 655*. University of Maryland, College Park.
3. Maryland Department of Natural Resources, Forest Service. *Riparian Forest Buffer Design and Maintenance*. DNR Publication No. 02-5312005-31.
4. USDA, Natural Resources Conservation Service. *Conservation Practice Standards*. Maryland Field Office Technical Guide, Section IV.