



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
TREE/SHRUB ESTABLISHMENT

Code 612

(Ac)

DEFINITION

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

PURPOSE

Establish woody plants to—

- Maintain or improve desirable plant diversity, productivity, and health by establishing woody plants.
- Create or improve habitat for desired wildlife species compatible with ecological characteristics of the site.
- Control erosion.
- Improve water quality. Reduce excess nutrients and other pollutants in runoff and groundwater.
- Sequester and store carbon.
- Restore or maintain native plant communities.
- Develop renewable energy systems.
- Conserve energy.
- Provide for beneficial organisms and pollinators.

CONDITIONS WHERE PRACTICE APPLIES

Tree/shrub establishment can be applied on any appropriately prepared site capable of growing woody plants.

Utilize other Virginia Conservation Practice Standards for specialized tree/shrub establishment situations, e.g., Riparian Forest Buffer (Code 391), Alley Cropping (Code 311), Windbreak/Shelterbelt Establishment, (Code 380); Critical Area Planting (Code 342), Hedgerow Planting (Code 422) and Management of Rare and Declining Habitats (Code 643).

CRITERIA

General Criteria Applicable to All Purposes

Composition of species will be adapted to site conditions and suitable for the planned purpose(s) and should be selected from the Virginia Plant Establishment Guide.

Determine desired stocking levels for trees and/or shrubs based on ecological characteristics of the site and species, and landowner objectives. Plant, seed, and/or naturally regenerate at densities/rates that reflect

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State office](#) or visit the [Field Office Technical Guide](#).
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anticipated seedling mortality, to achieve desired stocking levels in the established stand. 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.

Use the Virginia Technical Note Forestry #3, Tree and Shrub Establishment Guidelines and the Virginia Plant Establishment Guide located on the Virginia Field Office Technical Guide (FOTG) at <http://efotg.sc.egov.usda.gov/treemenuFS.aspx>, for all recommendations for planting rates, species selection, planting methods and techniques and establishment dates.

Use Virginia Conservation Practice Standards *Tree/Shrub Site Preparation (Code 490)* to prepare sites for planting, seeding, or natural regeneration, if conditions are not suitable for establishing the desired plants.

When utilizing natural regeneration to establish trees and/or shrubs, ensure that a source of seed and/or vegetative propagules is or will be present, or that advanced reproduction exists, sufficient to achieve objectives. Where natural regeneration relies on seed sources, apply any needed stand treatments and/or site preparation at appropriate times to facilitate germination and establishment of seeds from desired species. Plant 25 trees per acre as recommended for sites with natural regeneration is to favor hard-mast producing trees for diversity since areas adjacent to tree lines or woodland will favor wind-blown soft-mast species. The 25 planted trees should be of larger stock trees or tree whips to allow for a more rapid growth of the tree (3'-4' tall with a 3/8" or larger root collar diameter. Modify forest stand conditions as needed, using Virginia Conservation Practice Standards *Forest Stand Improvement (Code 666)*, to create favorable stand structure for initiating natural regeneration. Use Virginia Conservation Practice Standards *Prescribed Burning (Code 338)*, *Brush Management (Code 314)*, and/or *Herbaceous Weed Control (Code 315)*, as needed, to obtain the desired species composition, density, and arrangement of trees/shrubs in naturally regenerated areas. Implement coppice regeneration (originating from root shoots or stump sprouts) based on suitability of tree species, age, diameter, and site conditions. Determine the correct timing for coppice regeneration based on species characteristics.

Use tree/shrub planting to accomplish or supplement forest stand regeneration in locations where natural regeneration of desired species is not possible, or will not meet objectives.

For plantings and seeding, only viable, high-quality and adapted plant materials will be used. Use tree and shrub species which are native and non-invasive. All tree seedlings for hardwood tree planting must be 18 inches tall or have a diameter of 1/4inch. If using tree whips, these species must have a root collar diameter of 3/8 inch and be approximately 3 feet in height.

Species on the Federal or State noxious weeds list, or those know to be invasive to the planting area shall not be planted.

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.

Alter species selection and/or timing of planting/seeding to minimize potential effects of residual chemical carryover, as needed.

No single species will make up more than 50% of the total number of species planted.

Favor tree and shrub species that have multiple values such as those suited for timber, nuts, fruit, florals, browse, nesting, and aesthetics.

Evaluate the site to determine if mulching, supplemental water or other cultural treatments (e.g., tree protection devices, shade cards, brush mats, etc.) are needed to assure adequate survival and establishment. Minimize the need for supplemental water and/or nutrients by choosing site-adapted plant materials, planting methods, and planting seasons. Where supplemental moisture is needed to achieve

tree/shrub establishment use Virginia Conservation Practice Standards Irrigation System, Microirrigation (Code 441).

Protect tree and shrub plantings, seeded areas, and naturally regenerated areas, from unacceptable adverse impacts of pests, wildlife, livestock, and/or fire. Protect from pests, as necessary, by applying integrated pest management techniques for pest prevention, avoidance, monitoring, and suppression.

Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance. Tree removal should follow the Forestry Best Management Practices for Water Quality.

Harmful plant and animal pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. If pesticides are used, refer to Virginia Conservation Standard *Pest Management (Code 595)*. Specific pesticide recommendations will be obtained from personnel who are licensed by the Virginia Department of Agricultural and Consumer Services in one of the forest pest management categories in accordance with Virginia's Pesticide Laws and Regulations. If chemical herbicides or pesticides are used, follow all instructions for the particular chemical on the product label and as outlined in the Virginia Pest Management Guide (2016 edition and subsequent revisions) as maintained by the Virginia Cooperative Extension Service. The specific pesticide container label addressing instructions and safety precautions shall be strictly followed as it applies to handling, applying in proximity to water resources, and storage.

Each site will be evaluated to determine if mulching, supplemental water or other cultural treatments (e.g., tree protection devices, shade cards, brush mats) will be needed to assure adequate survival and growth. (Refer to the Virginia Plant Establishment Guide for specifications.) Minimize the need for supplemental water and/or nutrients by choosing site-adapted plant materials, planting methods, and planting seasons.

Livestock shall be controlled or excluded as necessary to achieve the intended purpose. Refer to the Virginia Conservation Practice Standards *Prescribed Grazing (Code 528)*, *Fence Code (382)*, and/or *Access Control (Code 472)* as applicable.

Additional Criteria for Reducing Nutrients and Pollutants

When plantings are used to remove excess nutrients from runoff or groundwater, select species that have fast-growth characteristics, extensive root systems, and a high-nutrient uptake capacity. Trees and shrubs used to reduce pollutants must be tolerant of the types of pollutants contained in effluent or soils at the site.

Additional Criteria for Restoring or Maintaining Native Plant Communities

Species selected for planting, or those favored in natural regeneration, will be native to the site and will create a successional state that progresses toward the identified target plant community.

Additional Criteria for Sequestering and Storing Carbon

For shorter term, rapid carbon sequestration, select species that have high-growth rates, recognizing that they are typically short-lived. For longer term storage of carbon, select plants with a long life span, the ability to reach a large size, high-wood density, and potential for use in long-lived products. Establish and maintain a fully stocked stand.

Additional Criteria for Developing Renewable Energy Systems

Select plants that can provide adequate types 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 to the site.

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

Additional Criteria to Conserve Energy

Increase energy efficiency by planting trees to provide shade for buildings.

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.

Design tree and shrub plantings to avoid damage to structures, and to allow adequate space for maintenance access to walls and windows. Plant at a distance that is greater than mature crown spread, and select species that develop deep root systems.

To protect structures from heat loss due to wind, use Virginia Conservation Practice Standards *Windbreak Establishment (Code 380)*.

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

Keep trees at least 10 feet 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 for Habitat for Beneficial Organisms

Plant trees and shrubs that provide habitat and food sources for beneficial organisms, such as pollinators, predatory and parasitic insects, spiders, insectivorous birds and bats, raptors, and terrestrial rodent predators. Select plant species that meet dietary, nesting, and cover requirements for the intended beneficial organisms during the critical period for control of target pests and, if possible, for the entire year.

Protect beneficial organisms from harmful pesticides.

CONSIDERATIONS

Consider utilizing plant materials that have been selected and tested in the Plant Materials Program or in similar tree/shrub improvement programs.

Consider using diverse tree and shrub species combinations which best meet the needs of desired wildlife and pollinator species.

When selecting plant materials, consider whether the species, variety, or cultivar possesses aggressive traits, and whether it poses a potential threat to the existing or desired plant community.

Consider the potential impacts of extreme weather events (e.g., drought, flooding, wind, late spring frosts) when selecting plant species and sites for planting.

When using trees and shrubs for carbon sequestration and storage, consider using modeling tools to predict carbon sequestration rates and amounts of stored carbon.

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

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

Consider establishing species with growth rates and at densities that make them competitive with weeds and undesirable plants.

Consider using species that provide subsistence and cultural values, (e.g., as used by Tribes).

Consider designing plantings to enhance visual quality in farmsteads, recreation areas, and along public rights-of-way, by applying foliage color, season and color of flowering, mature plant height, edge-feathering, and other landscaping techniques.

Considerations for Organic Systems during Vegetation Establishment

Natural mulches, such as wood products or hay, can be used to support tree/shrub establishment by controlling competing vegetation, as a viable alternative to using herbicides. Certified weed-free mulches are preferred. NRCS Use CPS Mulching (Code 484).

Pests may be managed through augmentation or introduction of predators or parasites and development of habitat for natural enemies of pests; non-synthetic controls such as lures, traps, and repellents may be used.

Invasive plant species may be controlled through mulching with fully biodegradable materials; mowing; livestock grazing with protection for plantings; hand weeding and mechanical cultivation; pre-irrigation; flame, heat, or electrical means. Use NRCS CPS Prescribed Burning (Code 338), as needed.

Considerations for Reducing Energy Use

When trees are planted to reduce summer energy use in buildings, consider prioritizing their placement on the west side of the building, where the greatest daily solar heat gain occurs. The second priority is the east side. Trees or shrubs planted within 30 to 50 feet of a building generally provide effective shade to windows and walls, depending on tree height potential.

Deciduous tree or shrub species planted adjacent to the south side of buildings in cool climates can provide shade in the summer yet allow sun to reach the building in winter.

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe requirements for applying the practice to achieve its intended purpose, and obtain any required permits.

Use job sheets or other acceptable documentation. At a minimum, provide—

- Objective(s) for establishment.
- Sketches, drawings, and detail drawings.
- Map showing the location of plantings and/or natural regeneration areas.
- Soils map, and description of soils and Ecological Sites (if available).
- Establishment method by species or vegetation type.
- Number of trees/shrubs per acre to be planted, by species.
- Timing of planting and/or natural regeneration relative to considerations for seasonal factors, plant physiology, disease, insects, and wildlife impacts.
- Mitigation measures, if needed, to reduce wildfire hazard or the potential for disease and insect pests.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for this site. As a minimum, include the following activities:

- Burn or mow the area periodically, if needed to maintain the health of the plant community. Do not conduct maintenance practices and activities during the primary reproductive period of wildlife. Exceptions can be considered to maintain the health of the vegetative community if such exceptions

- do not conflict with agency requirements.
- Control access by vehicles and/or equipment during or after tree/shrub establishment to protect new plants and minimize erosion, compaction and other site impacts.
 - Inspect the site at an appropriate time following planting, seeding, and/or natural regeneration to determine whether the survival rate for tree and shrubs meets practice and client objectives. Replant or provide supplemental planting when survival is not adequate.
 - Inspect the trees and shrubs periodically, and protect them from adverse impacts of insects, diseases, competing vegetation, fire, livestock, wildlife, non-functioning tree shelters and/or weed barriers, etc.
 - If needed, control competing vegetation until the desired trees/shrubs are established. Control plant species on the Federal or State invasive species and noxious weed lists. Control competing vegetation for at least 2 feet in all directions from the planted trees and/or shrubs for at least the first 2 full growing seasons following planting.
 - Consider replanting if seedling survival is poor (<70%). Surviving plants should be evenly distributed over the planting area. Desirable natural regeneration may be substituted for planted material when equivalent to desired species and planned purpose.
 - Inspect the site at an appropriate time following planting, seeding, and/or natural regeneration to determine whether the survival rate for tree and shrubs meets practice and client objectives. Replant or provide supplemental planting when survival is not adequate.
 - Natural regeneration sites will be re-evaluated if recruitment and survival after 3 growing seasons is less than 250 evenly distributed seedlings per acre. Once reevaluated, and found with less than the minimum stocking level, an establishment plan for establishment will be developed.
 - Where tree shelters are used, maintain tree protection twice per year by straightening leaning shelters, replacing broken stakes, and removing bird nets when the tree near the top of the shelter. If the shelter does not have a perforated line and is not photodegradable, the shelter must be cut off when the tree reaches 2.5 to 3 inches in diameter. Remove any competing vegetation and other obstructions inside the shelter. Check for fungus growing on the bark inside the shelter, and if found, remove the shelter.
 - If needed, apply nutrients to maintain vigor of desirable trees/shrubs.

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