

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SILVOPASTURE ESTABLISHMENT

(Ac.)

CODE 381

DEFINITION

An application establishing a combination of trees or shrubs and compatible forages are established on the same acreage.

PURPOSE

This practice is used to achieve one or more of the following purpose(s):

- Provide forage for livestock and the production of wood products.
- Increase carbon sequestration.
- Improve water quality.
- Reduce erosion.
- Enhance wildlife habitat.
- Reduce fire hazard.
- Provide shade for livestock.
- Develop renewable energy systems.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on any area that is suitable for the desired trees/shrubs and forage plants.

Situations where silvopasture establishment applies include:

- pasture where trees or shrubs can be added
- forest where forages can be added
- land on which neither the desired trees nor forages exist in sufficient quantity to meet the land user's objectives.

CRITERIA

Use the following criteria in planning and applying this practice. The general criteria apply to all silvopasture establishment. Additional

listed criteria apply based on the intended purpose(s) of the practice.

General Criteria Applicable to All Purposes

Selecting Plant Species

Tree/shrub species must be adapted to the site and compatible with planned livestock management.

Forage species must be adapted to the site and compatible with planned management.

Any grasses, forbs, and tree/shrub species may be used which are adapted to the site and have growth characteristics that provide desired forage and forest products. Examples of trees that have been used in successful silvopasture in the Southeast include Longleaf pine and Loblolly pine; forages that have been used in successful silvopasture in the Southeast include Bahiagrass, Tall fescue, and Bermudagrass, and some native grasses.

No plants on federal or state noxious weed lists shall be planted.

Select tree/shrub species that minimize adverse effects to selected forage (e.g. shade, allelopathy, competition of root systems/sprouts, pest harboring).

Density and Spacing of Trees

The distance between row sets of trees/shrubs and the general density of trees/shrubs will depend on:

- Tree/shrub management objectives
- Light requirements and growth period of forage crops.
- Erosion control needs
- Machinery widths and turning areas.

Site Preparation and Planting

Where trees/shrubs will be added to existing pasture, site preparation should be based on

Conservation practice standards are reviewed periodically and updated if needed. 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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existing vegetation and soil conditions (Refer to TREE/SHRUB SITE PREPARATION – NC Practice Standard 490). Trees/shrubs will be mechanically or hand planted at the recommended tree density (Refer to TREE/SHRUB ESTABLISHMENT – NC Practice Standard 612).

For existing forests where forage will be established, site preparation should include:

- Removal of a sufficient number of trees/shrubs to allow light penetration for forage crops. Pruning of trees may also be required (Refer to TREE/SHRUB PRUNING – NC Practice Standard 660).
- Prescribed burning where pine stands are being converted to silvopasture. (Refer to PRESCRIBED BURNING – NC Practice Standard 338).
- Seedbed Preparation. (If stumps interfere with equipment operation they should be allowed to decay before attempting to establish forage crops).

Establishment of forage species will be in accordance with PASTURE AND HAYLAND PLANTING – NC Practice Standard 512.

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

Planting shall be done at a time and manner to ensure survival and growth of selected species.

Other General Criteria

Comply with applicable federal, state and local laws and regulations, during the installation, operation (including product harvesting), and maintenance of this practice. Refer to INTEGRATED PEST MANAGEMENT – NC Practice Standard 595, for alternative pest management strategies and required mitigation practices if pesticides are used.

Note: Specific pesticide recommendations will be obtained from personnel who are licensed by the NC Department of Agriculture and Consumer Services in specialty area Agricultural Pest Plant Category O (agricultural, plant) or G (forest) - in accordance with North Carolina Pesticide Laws and Regulations.

All pesticides must be registered for use by North Carolina and approved for use by the U. S. Environmental Protection Agency (EPA). Refer to the current issue of "North Carolina

"Agricultural Chemicals Manual" for guidelines, rules and regulations regarding use of pesticides. Users must **always** follow instructions and safety precautions on the container label when handling, applying, or storing pesticides.

Additional Criteria to Provide Forage for Livestock and the Production of Forest Products

The forage species must be identified as suitable for the targeted livestock.

Livestock grazing shall be deferred until the average height of the tree's terminal bud exceeds the browsing height of the livestock, until trees are of sufficient size to resist breakage or until suitable use exclusion measures for the protection of the woody plants are established. A forage crop (hay, silage, etc.) may be harvested during this period (Refer to FORAGE HARVEST MANAGEMENT – NC Practice Standard 511).

When grazed, a prescribed grazing plan is required for the silvopasture area (Refer to PRESCRIBED GRAZING – NC Practice Standard 528).

The tree or shrub species must have potential to produce forest products; and, be planted/ managed at an appropriate density or stocking to allow production of both forage and forest products.

Additional Criteria to Increase Carbon Sequestration

Carbon sequestration is generally a secondary criterion for silvopasture. For optimal carbon sequestration, select woody plants (or mixtures of plants) that are adapted to the site to assure strong health and vigor. Make tree/shrub sets wider and therefore a greater part of the whole silvopasture area. Plant and manage the tree sets for an appropriate stocking rate to maximize biomass production. Some plants may fix carbon in biomass and soils more efficiently than others; consult current research on adapted plants that may sequester carbon more efficiently.

Prediction of carbon sequestration rates shall be made using current, approved carbon sequestration modeling technology.

Additional Criteria to Improve Water Quality

Favor trees, shrubs and forages that have growth characteristics conducive to high nutrient uptake.

Plan/ locate silvopasture in areas that intercept overland and shallow ground water flow from sources of potential pollutants.

Additional Criteria to Reduce Erosion

Place linear woody plantings on or near the contour where water erosion is a concern.

Use multiple rows of woody planting sets for enhanced reduction of surface water runoff and erosion where needed.

If wind erosion is a concern, align tree/shrub rows perpendicular to erosive winds as close as possible.

Additional Criteria to Enhance Wildlife Habitat

Establish/manage forage species and understory shrubs to provide forage, browse, seed, cover or nesting habitat for the wildlife species of concern. Refer to WILDLIFE UPLAND HABITAT MANAGEMENT – NC Practice Standard 645.

Favor herbaceous seed mixtures that include a diverse mix of native forbs and/or legumes to benefit wildlife (including pollinators).

Additional Criteria to Reduce Fire Hazard

Reducing fire hazard is generally a secondary criterion for silvopasture. Where fire hazard is a concern, select cool season forage species. If the silvopasture system is established in sets, plan the forage set width at least two times (2x) the expected height of tree/shrub sets, with 30 foot minimum forage set width.

Additional Criteria to Provide Shade for Livestock

Select tree/shrub species that will allow target livestock access underneath a shade canopy. Plan and manage trees at a density that will provide required shade and allow self pruning of lower branches.

Pruning may be required to facilitate livestock access to tree shade (Refer to TREE/SHRUB PRUNING – NC Practice Standard 660).

Temporary shade may need to be provided until trees sets are sufficient size to provide required shade.

Additional Criteria for Develop Renewable Energy Systems

Select plants that provide adequate kinds and amounts of plant material needed to produce bioenergy feedstocks.

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

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

CONSIDERATIONS

Silvopasture establishment may not be feasible in some existing forest/woodland communities.

Failure to manage forage adequately for livestock may result in excessive tree damage and/or loss.

Location and distribution of facilities for water, minerals or supplemental feed should be such that livestock are not encouraged to over-utilize areas of silvopasture.

Where feasible and practical, orient rows in an east-west direction to allow maximum sunlight onto grass strips.

If grazing does not maintain reduced fuel loads, prescribed burning should be considered, providing the woody plants are fire adapted and will not be damaged. (Refer to PRESCRIBED BURNING – North Carolina Practice Standard 338).

Consider wildlife and pollinator needs when selecting tree or shrub species. Additionally, species diversity, including use of native species, should be considered.

Consider invasive potential when selecting plant species.

Anticipate potential adverse off-site effects and modify the practice design accordingly.

Consider plant characteristics (rooting depths, growth pattern, etc.) of woody plantings. Where possible, choose plants that complement the

forage crop (i.e. one growing while one dormant, one deep and one shallow rooted, etc.).

Crown expansion of trees may eventually begin to shade the forage crops. If light demanding forages are desired for more than 15 years, widen tree/shrub spacing or planting sets (40 feet or more for planting sets).

High value trees or shrubs should be selected to maximize economic returns.

Consider cultural resources when planning this practice.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site (based on criteria addressed) and recorded using approved specification sheets, job sheets, technical notes and narrative statements in the conservation plan, or other acceptable documentation.

Minimum documentation for this practice includes:

- Plant materials or species (forage and tree/shrub) to be established.
- Plant spacing and arrangement/width of plantings (stocking rate of tree/shrubs).
- Site preparation and planting method(s)
- Site specific needs for soil amendments, cultural, pest management or other practices.
- Time or season of year to establish the silvopasture practice.
- Statement requiring compliance with all federal, state and local laws.
- Operation and maintenance requirements.

OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and up keep of the practice (maintenance):

- Forage and forest management will follow PRESCRIBED GRAZING – North Carolina Practice Standard 528 and FOREST

STAND IMPROVEMENT – North Carolina Practice Standard 666.

- Replanting will be required when plant survival is inadequate to meet practice and client objectives.
- Competing vegetation will be controlled until the trees are established.
- Periodic applications of nutrients may be needed for establishment, and to maintain plant vigor. (Refer to NUTRIENT MANAGEMENT – North Carolina Practice Standard 590).
- Inspect trees and shrubs periodically and protect from adverse impacts including insects, diseases or competing vegetation. Protect trees/shrubs from wildfire and damage from livestock and wildlife.

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