NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SILVOPASTURE ESTABLISHMENT

(Ac.)

CODE 381

DEFINITION

Establish and/or management of desired trees and forages on the same land unit.

PURPOSES

- Provide forage, shade, and/or shelter for livestock.
- Improve the productivity and health of trees/shrubs and forages.
- Improve water quality.
- Reduce erosion.
- Enhance wildlife habitat.
- Improve biological diversity.
- Improve soil quality.
- Increase carbon sequestration and storage.
- Provide for beneficial organisms and pollinators.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied only on existing pasture(s) where trees and shrubs can be added and where suitable for the desired forages, trees, and livestock.

CRITERIA

General Criteria Applicable to All Purposes

Use of this standard requires compliance with all applicable federal, state, and local laws and regulations.

Native plant species will be used whenever possible. Known invasive species will not be used.

This practice will be used to establish shrubs and trees into established forages that accomplish the design objective, are adapted to the climate, soil, and biological condition of the site and compatible with its planned livestock management, and do not function as hosts for diseases or become a source of weeds in the field.

Seedbed/site preparation, species selection, seeding mixes, seeding rates, dates, depths, fertility requirements, site adaptation and planting methods will be consistent with the requirements in the Indiana NRCS Seeding Tool and/or Tables in Indiana (IN) Field Office Technical Guide (FOTG) Standard (512) Pasture and Biomass Planting.

Forage species must be adapted to the site and compatible with the planned management of the site. Species that are more shade tolerant should be the majority of the forage mix in close proximity of the tree dripline or shaded area.

Manage grazing at appropriate levels to establish and maintain silvopasture productivity and function. Facilities for providing water, minerals, or supplemental feed will be located and distributed such that livestock will properly utilize forages in the silvopasture. Control livestock access to areas with sensitive soils (e.g., wetlands, riparian zones, habitats of concern, karst areas, etc.) according to IN FOTG (472) Access Control.

Where trees will be added to existing pasture, site preparation will be based on existing vegetation and soil conditions. Refer to IN FOTG Standard (612) Tree/Shrub Establishment for guidance on site preparation, species, plan specifications, and operations and maintenance.

Table 1 provides tree and shrub spacing. Trees will be thinned to maintain the understory of forages that accomplishes the producer's goals. Mature tree populations should be based on the following table to insure adequate photosynthesis for forages:

Table 1: Tree and Shrub Spacing

Species	Planting Spacing (ft.)	Mature Spacing (ft.)	#
Pecan	40	80	27
Standard Apple	30	60	27
Black Walnut	40	80	27
Crabapple	30	60	27
Hickory	40	80	27
Black Locust	40	80	27
Persimmon	30	60	27
Silky Dogwood	30	60	48
Sycamore	40	80	27
Tulip Popular	40	80	27
Shrub Willow	30	60	48

Silky Dogwood and Shrub Willow are best for small ruminants and where browse is needed and can be managed.

Generally, the lower tree densities optimize forage production. The mature canopy will be less than 30% to allow for sufficient photosynthesis to meet the energy requirements of grazing livestock.

If pesticides are used, follow label recommendations. Refer to IN FOTG Standard (595) Integrated Pest Management for guidance on pest prevention, avoidance, monitoring and suppression strategies.

Tree/shrub spacing needs to exceed width of equipment to be used in management.

Protect plantings from unacceptable adverse impacts from pests, wildlife, livestock, and/or fire.

Removal of products (e.g. nuts, and fruits) is allowed, provided that silvopasture conservation purpose(s) are not compromised by the loss of vegetation or by harvesting disturbance.

Additional Criteria to Provide Forage, Shade, and/or Shelter for Livestock

Use forage species that are suitable for the targeted livestock and compatible with the tree species.

Livestock grazing will be deferred until the average height of the tree's terminal bud exceeds the browsing height of the livestock or of sufficient size to resist breakage or until suitable use exclusion measures for the protection of the woody plants are established. Fence, if necessary, either permanent or temporary, will be used to protect the tree/shrub planting from excess livestock browsing and/or trampling damage, refer to IN FOTG Standards (472) Access Control and/or (382) Fence. Tree and shrub plantings will be located on western, southern, or south-west of pastures needing shade so livestock may or may not need direct access to the tree planting.

The use of protective measures such as tree shelter tubs and/or wire cages must be of sufficient height to protect the canopy of the trees/shrubs from livestock grazing and secure enough to withstand livestock damage.

Forage species will be adapted to the conditions present.

Additional Criteria to Improve Water Quality

Select trees and forages that have growth characteristics conducive to high nutrient uptake.

Additional Criteria to Reduce Erosion

Plant trees on or near the contour and use supporting erosion control practices as needed.

Additional Criteria to Enhance Wildlife Habitat

Establish plant species that will provide forage, browse, seed, cover, or nesting habitat for the desired wildlife species. Refer to species selection and establishment criteria in IN FOTG Standard (645) Upland Wildlife Habitat Management.

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

Choose species from Biology Technical Note Upland Wildlife Habitat (http://efotg.sc.egov.usda.gov/references/public/IN/Upland_Wildlife_Habitat_Technical_Note.pdf) or the IN Seeding Calculator, choosing wildlife friendly species.

Additional Criteria to Improve Biological Diversity

Select plant species/varieties that provide the desired biological diversity. Selected species may vary in attributes such as timing of flowering, production of leaves and fruit, or attractiveness to wildlife and pollinators of interest.

Additional Criteria to Increase Carbon Sequestration and Storage

Select stocking rates and tree species to optimize growth rates and lifespans, suited to site capability, to enhance and sustain carbon sequestration. Use forage species that are deeply rooted and allocate higher amounts of carbon to below-ground portions.

Additional Criteria to Provide Habitat for Beneficial Organisms and Pollinators

Manage silvopasture consistent with National Organic Program (NOP) guidelines for organic and transition-to-organic agricultural systems. Select a diverse variety of plant species that provide dietary, nesting, and cover requirements for desired beneficial organisms (e.g., soil microflora, pollinators, predatory and parasitic insects, spiders, insectivorous birds and bats, raptors, etc.), during critical periods for controlling target pests and pollinating desired plants, at a minimum, and ideally year-round.

Protect beneficial organisms from harmful pesticides and chemicals.

During vegetation establishment, natural mulches, such as wood products or hay can be used to control competing vegetation as an alternative to using herbicides.

CONSIDERATIONS

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

Failure to maintain adequate shade and shelter can lead to excessive soil compaction beneath tree canopies, damaging tree roots and leading to mortality.

Management practices such as no-till seeding, rotational grazing, and soil fertility maintenance can support greater soil biodiversity and health.

Integrated pest management techniques may be used for pest prevention, avoidance, monitoring and suppression.

Where new tree/shrub plantings are being protected through grazing deferral, forages may be harvested for hay, silage, etc. if practical.

Silvopasture establishment is not appropriate in certain existing forest and woodland communities (e.g., sites with high conservation value, sites supporting species of concern that may be sensitive to grazing or changes in forest density, areas where soil erosion or nutrients are difficult to manage, etc.).

Considerations for Organic Agricultural Systems

If needed, 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.

If needed, invasive plant species may be controlled through mulching with fully biodegradable materials; mowing; livestock grazing; hand weeding and mechanical cultivation; pre-irrigation; flame, heat, or electrical means.

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.

Rows should be oriented in an east-west orientation where feasible and practical to allow maximum sunlight onto grass strips.

Where water erosion and/or runoff from melting snow are a hazard, it should be controlled by supporting practices.

Wildlife and pollinators should be considered when selecting tree or shrub species. Species diversity, including use of native species, should be considered.

Consider using native vegetation. Also consider the invasive potential when selecting plant species.

This standard only involves pastures where trees/shrubs can be planted.

Consideration should be given to adverse offsite effects.

Plants established in cropping systems should have root systems that have minimal impact on crop growth.

Restrict access by livestock when soils are at or above field capacity (saturated soil conditions).

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the planning criteria and operation and maintenance requirements of this standard.

Prepare specifications for applying this practice using job sheets or other acceptable documentation. At a minimum, provide—

- Objective(s)
- Drawings to illustrate installation or implementation requirements
- Map showing the location of the silvopasture and any areas planned for planting. Soil map, and description of soils.
- Establishment methods.
- Species of plants to be established.
- Number of trees/shrubs to be planted per acre, by species.
- Establishment dates with considerations for seasonal factors, disease, insects, wildlife impacts, etc.
- A prescribed grazing plan according to NRCS IN FOTG Standard (528) Prescribed Grazing.

Replanting will be required when plant survival or canopy cover levels are inadequate to meet practice and client objectives.

Tree pruning may be needed to adjust light levels, improve wood products, or provide adequate space for machinery. Follow IN FOTG Standard (660) Tree/Shrub Pruning.

Plans and specifications for the establishment and management of the species of plants to be established may be recorded in narrative form, on job sheets, or on other forms.

OPERATION AND MAINTENANCE

The following actions will be carried out to insure 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 upkeep of the practice (maintenance):

- Forage and forest management will follow IN FOTG Standards (528) Prescribed Grazing and (666) Forest Stand Improvement.
- Manage trees, forages, and shrubs as needed to provide appropriate light conditions for forages, and shade/shelter conditions for livestock.
- Inspect the site at an appropriate time following planting to determine whether the tree and shrub survival rate meets practice and client objectives. Replant or provide supplemental planting when survival is inadequate.
- Control competing vegetation and livestock impacts until plantings are established.
- Periodic applications of nutrients may be needed for establishment and to maintain plant vigor. Refer to IN FOTG Standard (590) Nutrient Management for further guidance.
- Inspect trees and shrubs periodically and protect from adverse impacts including insects, diseases or competing vegetation. The trees or shrubs will also be protected from wildfire and damage from livestock and wildlife.
- Keep tree shelters and/or wire cages straight. Replace broken stakes. Remove bird netting if trees are at or above the top of the tube. Remove

shelters and stakes when the tree/shrub canopy is above grazing height, or are at a size when the tube or wire begins restricting tree stem diameter growth.

- Where wildlife habitat enhancement is an objective, maintenance practices and activities shall not disturb vegetative cover during the primary reproductive period (e.g., nesting period) of wildlife. Exceptions can be considered for periodic burning or mowing when necessary to maintain the health of the plant community.
- Any plant species, whose presence or overpopulation may jeopardize this practice or negatively impact off-site uses, will be controlled. Spraying or other control methods will be performed on a "spot" basis to protect forbs/legumes that benefit native pollinators and other wildlife.

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