

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE GENERAL SPECIFICATION**

SILVOPASTURE ESTABLISHMENT

(Ac.)

CODE 381

GENERAL SPECIFICATIONS

Procedures, technical details, and other information listed below provide additional guidance for carrying out selected components of the named practice. This material is referenced from the conservation practice standard for the named practice and supplements the requirements and considerations listed therein.

The mechanical tree planting components of this practice may adversely impact significant cultural resources and should be submitted to a cultural resource specialist for a determination of impacts before the practice commences.

METHODS

Silvopasture is a management option by which landowners can realize diverse income-generating possibilities from the same acreage. A primary goal of a silvopasture system is to produce high quality timber in the long term while grazing or browsing livestock on the same acreage in the short term.

Landowners must be prepared to engage in some management of both tree and forage components over time as silvopasture is not a “plant it and leave it” system.

Silvopasture systems can be established on any land capable of simultaneously supporting trees and forage. Typically, silvopasture systems have been established on existing pasturelands by planting single or double rows of trees with forage corridors between them. Silvopasture systems have also been established from existing stands of trees by thinning the forest to a desirable level to support forages or by removal of all trees in a designated area to create corridors or alley ways.

Considerations

TREES

While a number of hardwood species have been successfully incorporated into silvopasture systems with grazing animals, these species typically take a longer time

to establish and reach maturity. Hardwood species have a much longer rotation period between timber harvests. Hardwood seedlings demand extra protection in the establishment phase.

Wildlife should be considered when selecting tree or shrub species. Species diversity, including use of native warm season grasses, should be considered.

Trees should be established or spaced to optimize growing space and light penetration for high quality saw logs and forage. Forest sites will require thinning and tillage to provide a favorable seedbed for the establishment of forages. On pasture sites, competition control is required for 2 to 3 years to establish tree seedlings.

Scalping is highly recommended when planting tree seedlings into sod. Because grass is such a tough competitor for young seedlings, an herbicide strip 4 to 6 feet wide per tree row is strongly recommended.

For existing pasture where trees will be added, site preparation should be based on existing vegetation and soil conditions. See TREE/SHRUB SITE PREPARATION (490).

Establishment of trees will be in accordance with TREE/SHRUB ESTABLISHMENT (612).

Rows of woody plants should be in an east-west orientation where feasible and practical to allow maximum sunlight for forage production

On sloping land, rows should be oriented on the contour to prevent soil erosion within the tree rows during establishment.

Planting arrangement should consider management objectives, equipment operability, adequate growing space until the first tree harvest, companion-forage species needs, and wildlife habitat.

Landowner’s favoring timber and wildlife will lean toward having more trees per acre than those favoring the production of forage. A healthy tree stocking ranges from 200 to 400 trees per acre.

Trees may be grown in single rows or in aggregate rows

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 [Electronic Field Office Technical Guide](#).

**NRCS AR
September 2009**

called sets with wide alleys for forage production between sets. (See Table 1)

The ultimate goal of timber production in a silvopasture system is the production of high quality sawtimber. Widely spaced trees delay tree canopy closure benefiting forage crops but the "open grown" trees develop large branches that reduce wood quality if trees are not pruned. The object of pruning is to confine the knots created by these branches to a small diameter (four inches) of core wood thereby producing high quality, knot free wood on the outer diameter of the tree stem. Crop trees **MUST** be pruned to have a profitable timber component of a silvopasture system.

Pruning should be initiated when the crop trees reach 15 to 20 feet. Pruning should strive to remove all of the branches where the trunk diameter is greater than four inches, maintaining a live crown at least equal to 1/3 of the tree height.

Pruning operations should be scheduled periodically until the tree bole is pruned up to 18 feet. Each successive pruning operation proceeds up the main tree stem to a four-inch diameter core. Pruning operations continue until an 18-foot knot-free log is developed. Follow **TREE/SHRUB PRUNING (660)**.

Species of tree, spacing and pruning affect canopy cover. Loblolly pine has much denser shade than shortleaf pine and most hardwood species. Proper planning for planting densities and pruning regimes is much more critical for proper forage production when loblolly pine is used. On the other hand, loblolly pine has the fastest growth and the greatest potential for timber production.

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

1. Removing sufficient number of trees and/or prune existing trees to allow adequate light penetration for forage establishment/growth and silvopasture use. The initial thinning should leave approximately 100 trees per acre and uniformly spaced as possible. See **FOREST STAND IMPROVEMENT (666)** for guidance
2. Prepare the seed bed for the forage by prescribed burning (pine only) and disking. Stumps and logging debris that interfere with equipment operation they should be allowed to decay or be removed before attempting to establish perennial forage crops.

Trees generally have little impact on forage production until shading becomes dense enough to limit sunlight to the understory. Thinning of trees is scheduled to reduce canopy shade and tree competition for understory forage production. When the trees combined canopy exceeds 35

**NRCS, AR
September 2009**

to 45 percent, forage production of warm season grasses begins to decline. For cool season grasses, shade tolerance of some species may exceed 60 percent and still produce good forage yields. Trees must be thinned to keep canopy cover below the maximum shade tolerance level. This requires trees to be thinned every 5 to 7 years for pine and 12 to 15 years for hardwood.

Thinning should remove one third to one half of the stand each time. More than one half of the stand should never be removed at one time. Stands should never go below 25 trees per acre. Once the stand reaches 25 trees per acre, the next cut should be a final cut and the forest stand started over.

Continuous observation is important in making adjustment in the management strategy.

LIVESTOCK

Livestock **MUST** be intensively managed in silvopasture systems. Timing and duration of grazing, stocking rates, and carry capacity of the pasture must be carefully monitored to maintain site quality and tree seedling survival by minimizing damage to seedlings by trampling and rubbing, and preventing overgrazing and soil compaction.

A prescribed grazing plan must be followed according to **PRESCRIBED GRAZING (525)** to maintain a silvopasture system. Failure to do this may result in excessive tree loss.

Browsing by livestock is unlikely to kill young trees unless it is both severe and repeated several times. Removing the top bud or over half of the current year's foliage will reduce tree growth.

Some damage to trees from livestock is expected and proper prescribed grazing management will keep the damage to acceptable levels. Initial stocking considerations should allow for some losses due to livestock.

Where livestock damage must be minimized, young silvopastures may be hayed. Once the top branches of trees grow above the reach of livestock and a thick layer of bark has developed, potential for tree damage by livestock is minimal and management practices become the same as those for pastures.

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.

FORAGE

All forage species should be adapted to the site conditions, which may change throughout the property.

Select forage species compatible with the landowner’s management plans for timber production and wildlife.

Establishment of forage in a silvopasture system is not significantly different from accepted establishment practices in an open pasture.

Establishment of forage species will be in accordance with PASTURE AND HAY PLANTING (512).

Periodic applications of nutrients may be needed for establishment and to maintain plant vigor. Refer to NUTRIENT MANAGEMENT (590), for guidance.

Where wildlife is a priority forage species and understory shrubs that will provide forage, browse, seed, cover or nesting habitat for the desired wildlife species should be established. The grazing frequency and intensity for these areas should be detailed in the prescribed grazing plan.

Follow UPLAND WILDLIFE HABITAT MANAGEMENT (645) or WETLAND WILDLIFE HABITAT MANAGEMENT (644) for further wildlife guidance on species selection and design.

Table 1: Silvopasture Planting Options and Trees Per Acre												
		Single Row Set			Double Row Set				Triple Row Set			
		Tree to Tree in Row Spacing				Tree to Tree in Row Spacing				Tree to Tree in Row Spacing		
Alley Width	Row Spacing	6'	8'	10'	Row Spacing	6'	8'	10'	Row Spacing	6'	8'	10'
15'	Row spacing and alley width are the same for single-row sets	484	363	290	6'	691	518	414	6'	807	607	484
					8'	631	473	378	8'	703	528	422
					10'	580	435	348	10'	622	468	374
					12'	537	403	322	12'	558	418	335
20'		363	272	218	6'	558	418	335	6'	680	512	409
					8'	518	388	311	8'	605	455	363
					10'	484	363	290	10'	545	409	327
					12'	454	340	272	12'	495	372	297
30'		242	182	145	6'	403	303	242	6'	512	390	311
					8'	382	287	229	8'	473	356	284
					10'	363	272	218	10'	435	328	262
					12'	345	259	207	12'	403	303	242
40'	182	136	109	6'	315	237	189	6'	419	315	252	
				8'	303	227	182	8'	389	292	234	
				10'	290	218	174	10'	363	273	218	
				12'	279	209	167	12'	340	256	204	
400 trees per acre are outside of recommended planting rates for silvopasture												