

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

**SILVOPASTURE ESTABLISHMENT**

(acre)

**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 and the creation of corridors in existing trees component 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 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 seedlings demand extra care 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. Because grass is such a tough competitor for young seedlings, an herbicide strip 4 to 6 feet wide per tree row is strongly recommended. Consider scalping when planting into sod. 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 a east-west orientation where feasible and practical to allow maximum sunlight for forage production

The planting arrangement for the tree component depends on the landowner’s objective in achieving timber and forage growth and wildlife habitat. Landowner’s favoring timber and wildlife will lean toward more trees than those favoring the production of forage. A healthy tree stocking range is typically between 200 to 400 trees per acre.

When designing the layout of this practice, the width of the ally must take into account equipment size to be used on the site. Usually, allies should be at least 30 feet wide.

The ultimate goal of timber production in a silvopasture system is the production of high quality sawtimber. Open grown trees favor forage production but causes trees to have greater taper and larger side branches. These branches cause knots which reduce wood quality. Crop trees **MUST** be pruned to have a profitable timber component of a silvopasture system.

The tree canopy is managed for between 25 to 45 percent canopy for warm season grasses and 40 to 60 percent canopy for cool season grasses. This requires trees to be thinned every 5 to 7 years for pine and 12 to 15 years for hardwood.

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.

#### LIVESTOCK

Livestock **MUST** be intensively managed in silvopasture systems. Timing and duration of grazing, stocking rates, and carrying 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.

After seedlings are established, browsing by livestock is unlikely to kill young trees unless it is both severe and repeated several times (livestock can pull up freshly planted seedlings). Removing the top bud or over half of the current year's foliage will reduce tree growth.

Where livestock damage must be avoided, 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.

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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 a 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.

Establish forage species and understory shrubs that will provide forage, browse, seed, cover or nesting habitat for the desired wildlife species.

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

#### **From a Pasture to Silvopasture System**

##### TREE PLANTING

Determine the desired row spacing for the pine planting. Planting rates from 200 to 400 trees per acre are typically recommended for planting a silvopasture system. Trees may be grown in single rows or in aggregate rows called sets with wide alleys for forage production between sets. (See Table 1)

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

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

##### TREE MANAGEMENT

**Thinning.** 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 to 45 percent, forage production of warm season grasses begins to decline. Continuous observation is important in making adjustment in the management strategy. For cool season grasses, shade tolerance of some species may exceed 60 percent and still produce good forage yields. Trees must be periodically thinned to keep canopy cover below the maximum shade tolerance level for the desired grass cover. The shade tolerance level varies for the different species of grass.

**Pruning.** Widely spaced trees delay tree canopy closure benefiting forage crops but the "open grown" trees may develop large branches that can 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.

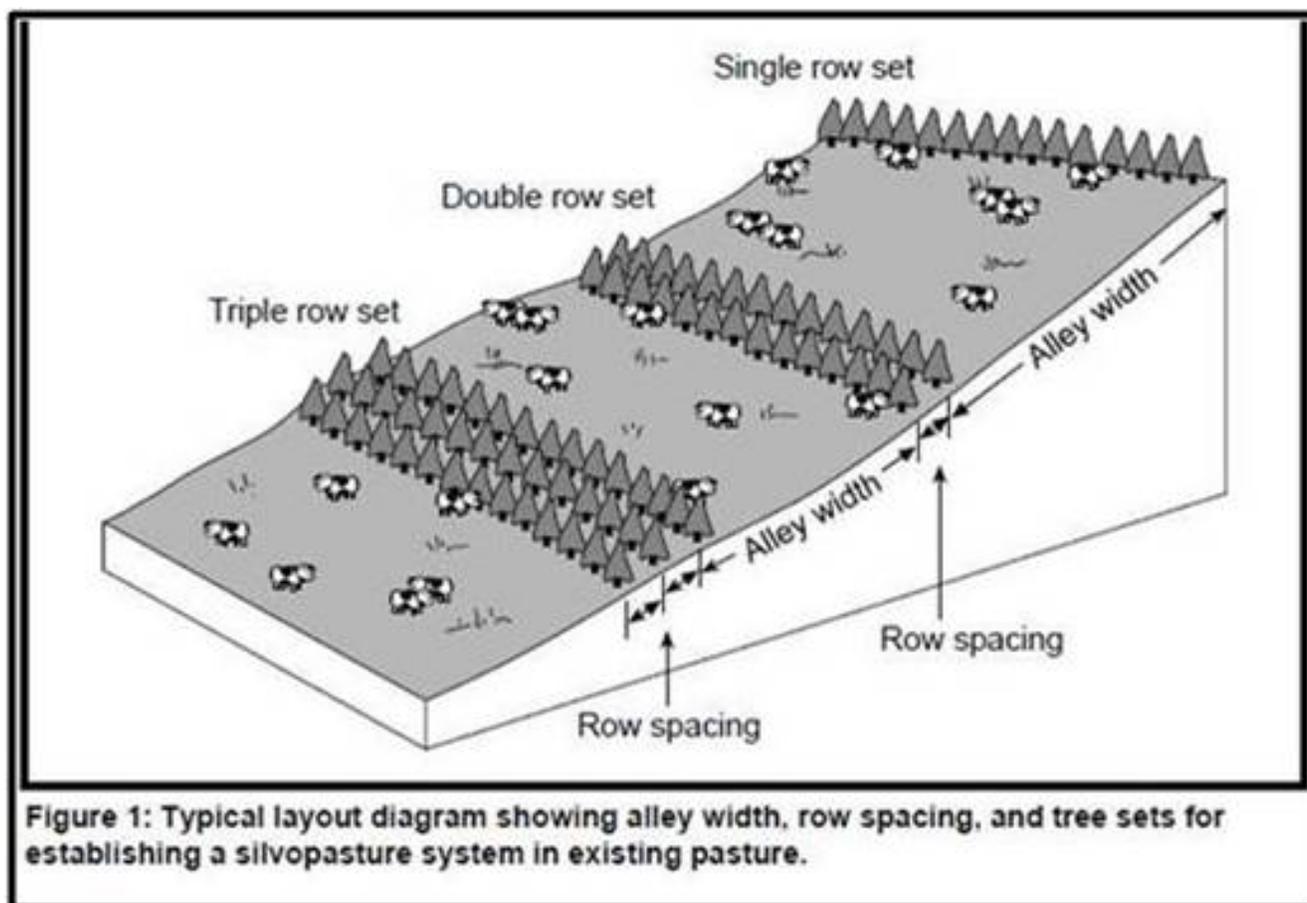
Pruning should be initiated when the crop trees reach 15 to 20 feet in height and/or the stump diameter reaches five inches at a height six inches above the ground.

Pruning should strive to remove all of the branches where the trunk diameter is greater than four inches. But, never remove more than 50 percent of the live canopy.

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 but removes no more than 1/3 to 1/2 of the total crown while maintaining a live crown at least 1/3 of the tree height.

Pruning operations continue until a 18-foot knot-free log is developed.

Pruning will be in accordance with TREE/SHRUB PRUNING 660 Specifications.



Alley Width	Single-Row Set			Double-Row Set			Triple-Row Set						
	Row Spacing	Tree-to-tree-in-row spac-			Row Spacing	Tree-to-tree-in-row spac-			Row Spacing	Tree-to-tree-in-row spac-			
		6 foot	8 foot	10 foot		6 foot	8 foot	10 foot		6 foot	8 foot	10 foot	
15 feet	Row spacing and alley width are the same for single-row sets.	6 foot	484	363	290	6 foot	<b>691</b>	<b>518</b>	<b>414</b>	6 foot	<b>807</b>	<b>607</b>	<b>484</b>
		8 foot				8 foot	<b>631</b>	<b>473</b>	378	8 foot	<b>703</b>	<b>528</b>	<b>422</b>
		10 foot				10 foot	<b>580</b>	<b>435</b>	348	10 foot	<b>622</b>	<b>468</b>	374
		12 foot				12 foot	<b>537</b>	<b>403</b>	322	12 foot	<b>558</b>	<b>418</b>	335
20 feet		6 foot	363	272	218	6 foot	<b>558</b>	<b>418</b>	335	6 foot	<b>680</b>	<b>512</b>	<b>409</b>
		8 foot				8 foot	<b>518</b>	388	311	8 foot	<b>605</b>	<b>455</b>	363
		10 foot				10 foot	<b>484</b>	363	290	10 foot	<b>545</b>	<b>409</b>	327
		12 foot				12 foot	<b>454</b>	340	272	12 foot	<b>495</b>	372	297
30 feet		6 foot	242	182	145	6 foot	<b>403</b>	303	242	6 foot	<b>512</b>	390	311
		8 foot				8 foot	382	287	229	8 foot	<b>473</b>	356	284
		10 foot				10 foot	363	272	218	10 foot	<b>435</b>	328	262
		12 foot				12 foot	345	259	207	12 foot	<b>403</b>	303	242
40 feet		6 foot	182	136	109	6 foot	315	237	189	6 foot	<b>419</b>	315	252
		8 foot				8 foot	303	227	182	8 foot	389	292	234
		10 foot				10 foot	290	218	174	10 foot	363	273	218
		12 foot				12 foot	279	209	167	12 foot	340	256	204

**Bold figures are outside of recommended planting rates for silvopasture**  
\*Field shape and planting design may cause some variation in trees-per-acre.