

Silvopasture Management

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INTRODUCTION

The use of silvopastures is an agroforestry practice that intentionally integrates trees, forages, and livestock, forming a structural system of mutually beneficial interactions. Unlike forest range grazing, silvopastoral management practices focus on interactions among components rather than the individual components.

Silvopastures are developed by establishing improved forages under an existing tree canopy or by planting trees on pastureland or abandoned cropland. Productivity is determined by the extent to which the integrated components benefit rather than impede each other. Subsequently, component productivity and its impact on the other components determine the success of a silvopasture. Trees produce marketable yields of wood commodities and enhance livestock production by providing shade and windbreaks. Forage crops provide livestock with a dependable grazing resource, provide trees with supplemental fertilizer, and serve as living mulches for weed suppression and soil erosion reduction. Livestock generate a short-term cash crop and control competing understory vegetation.

A silvopasture is neither a timber nor a livestock production system. It is a land-use management system that simultaneously maintains production continuity of commercial timber and livestock enterprises.

TREE COMPONENT

Thinning. Generally, plantation regeneration practices plant more trees than required for a final crop. This ensures adequate growing site occupancy during early plantation development and provides a larger pool of trees for final crop tree selection. A pre-commercial thinning can be applied between ages 3 and 6 to remove surplus trees that impact final crop tree growth and forage production potential. This is a noncommercial operation that uses mechanical or chemical means to remove poorly formed and less vigorous trees. Its efficiency can be improved by selecting potential crop trees prior to the thinning.

Commercial thinnings are used to enhance final crop tree

growth, maintain forage production, and provide intermediate income for the silvopasture investment. Prior to initiating a commercial thinning, consider the following factors:

- Determine if a market exists for the extracted wood.
- Develop a harvesting plan that includes landing sites and designated skid trails.
- Employ a high-quality certified harvesting contractor.
- Evaluate the financial impact of the thinning on the silvopasture investment.

Pruning. Pruning removes green branches from the stems of selected crop trees. Although pruning is costly and slows tree diameter growth, it produces knot-free wood of superior quality and high value. Without pruning, the low tree stocking densities required for silvopasture management would yield poorly formed trees with large branches, excessive taper, numerous forks, and very low value. Removing the lower branches will enhance sunlight and aeration beneath the tree canopy, improving forage productivity.

During the pruning operation the length of stem from which limbs are removed is termed a pruning lift. The objective of pruning is to develop a defect core of uniform diameter in the center of the stem so that the inferior wood is isolated from the more valuable knot-free wood. Defect core diameter includes the limb whorl branch stubs and the occlusion scar tissue, but it is the limb whorl branch stub diameter that triggers a pruning operation.

The target stub diameter, which varies by site, has an upper and lower limit. These limits are determined prior to the first pruning operation when mean crop tree height reaches 5 to 6 m. The upper limit is the mean stump diameter (15 cm above the ground) for all crop trees and the lower limit is the mean stem diameter 3 m below the tip of all crop trees. The upper and lower limits of the target diameter normally range between 13 and 19 cm. Since a homogeneous yield of knot-free wood has a marketing advantage, a pruning operation should consider the following factors:

- Pruning should be initiated when crop tree height averages 6 m.
- Crop trees should be pruned when the lowest limb whorl branch stub diameter approaches the upper limit of the target diameter.
- Pruning lifts should not exceed the height of the lower target diameter or remove more than 50 percent of the live canopy.
- Number of pruning lifts should be adequate to produce a 6.5m knot-free log.

FORAGE COMPONENT

Fertilization. After the forage crop is established, annual fertilization is necessary to maintain forage production continuity. Fertilization strategies will vary depending on location, grazing objective, animal grazing density, and primary forage crop, warm or cool season crops with or with legumes. Mineral nutrients, particularly phosphorus and potassium, should be applied at rates recommended for a given forage crop prior the primary growing season.

The preferred nitrogen fertilizer sources are ammonium nitrate and ammonium sulfate, rather than urea. Nitrogen fertilizer applications should be split between the early and middle portions of the growing season. Soil testing should be used to monitor mineral nutrient levels, such as calcium, magnesium, sulfur, phosphorus, and potassium. If legumes are part of the forage crop component, then soil testing is necessary to monitor pH and determine

liming requirement. If available, broiler litter or other organic waste material may be used as an alternative to commercial fertilizer.

Grazing. Livestock grazing should be managed so that forage quality is maintained and tree damage is minimized. Since young trees are vulnerable to browsing damage, grazing should be excluded until trees attain a height of 2 m. The timing and duration of grazing depends on animal stocking density and the method of pasture utilization. Animal stocking density should not exceed 2.5 animal month units, and pasture utilization should be on a rotational basis. For most landowners, a multi-pasture rotation system would be more efficient than the more intense system of numerous small paddocks. Electric fencing, portable water systems, and strategically placed mineral blocks can be used to encourage uniform animal distribution.

LIVESTOCK COMPONENT

Livestock Species. The primary livestock choices for a commercially productive system are cattle and sheep. All types of beef cattle - dry pregnant cows, cows and calves, breeding cows, and stocker cattle - perform well in a silvopasture.