



## Pruning

The ultimate goal of timber production in a silvopasture system is the production of high-quality sawtimber. Widely spaced trees delay canopy closure which benefit forage crops by allowing more sunlight to reach the ground. However, open grown trees tend to develop a greater taper and larger side branches that can reduce wood quality (through larger knots) if trees are not pruned.

Pruning is a necessary part of a profitable silvopasture system. The object of pruning is to confine the knots produced by these branches to a small diameter, thereby producing higher quality, knot-free wood on the outer diameter of the tree stem. An 8 feet x 8 feet x 40 feet stocking would likely produce knots that are slightly larger (on average) than a more dense square spacing (i.e. 10 feet x 10 feet). However, at a given stocking, rectangular spacing might not affect other traits of loblolly pine. Pruning has the added benefit of raising the tree canopy which allows more light to hit the ground, thus providing higher production potential for the pasture element of the system and producing an aesthetic open environment.

**The following guidelines provide steps for pruning in a silvopasture system:**

- Pruning should be initiated when the trees reach 15 to 20 feet tall and/or the diameter of the tree reaches 5 inches at a height of 6 inches above the ground.
- Pruning should remove all of the branches where the trunk diameter is > 4 inches but never more than one-third to one-half of the total crown. Maintain a live crown equal to one-third of the tree height.
- This is repeated as the tree grows until you have the desired height of 18 to 32 feet. While pruning has

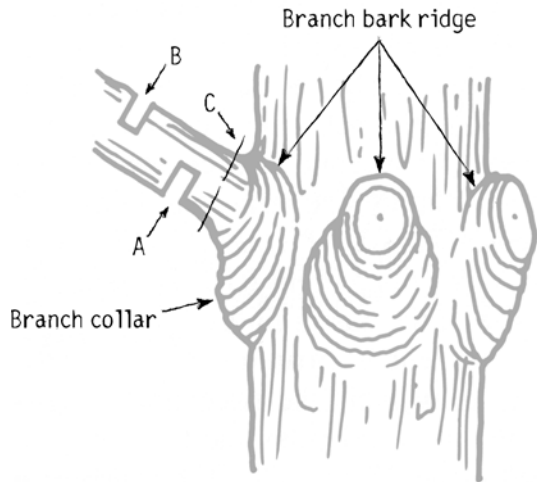


traditionally been carried out to a bole (trunk) height of 16 feet, it has been shown that remaining branches tend to create larger knots in the remainder of the tree stem. If pruning equipment is

## Where to prune

All pruning cuts should be made outside the branch bark ridge.

- Small branches, < 2 inches in diameter, may be pruned with a single cut along line C.
- Larger branches should be pruned using a 3-cut method.
- The partial undercut, A, prevents the bark from peeling away from the trunk as the second cut, B, is being completed.
- After the weight of the branch is gone, remove the remaining stub with the third cut, C, without injuring or cutting the branch collar.

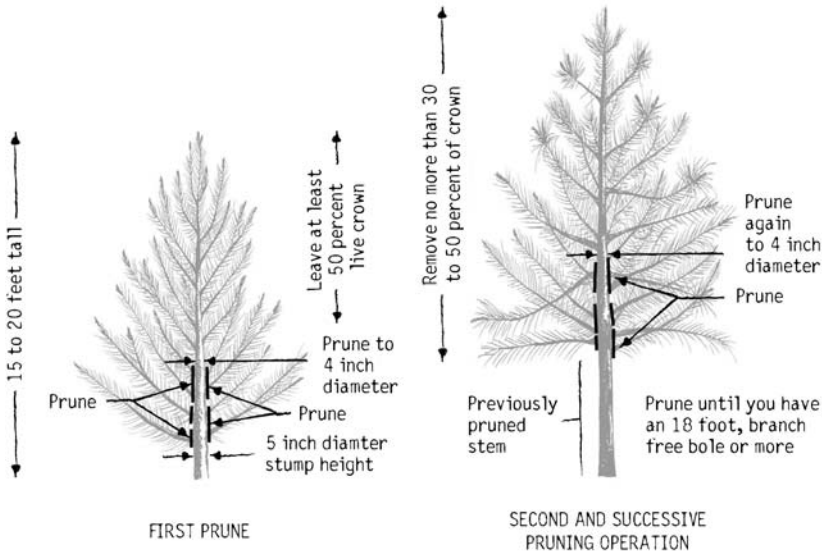


available, it is recommended to continue pruning to a height of 32 feet—thereby producing high quality, knot free wood on the outer diameter of the tree stem with only a 4- to 5-inch defect core.

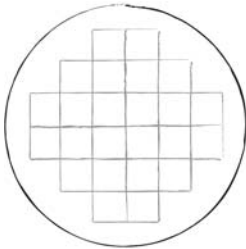
- The best time to prune living branches is late in the dormant season (winter) or very early spring before active tree growth begins.
- The fastest and most economical way to prune trees for maximum quality is by using a lopper or lopping shears. Most loppers can effectively prune branches that are 2 inches or less in diameter.
- Never prune with a machete. Using a machete, while quicker, can cause irregular breakage of limbs and create excessive wounds to the tree.

## Canopy management

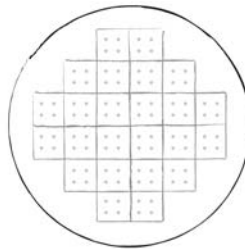
The tree canopy is managed for between 25- to 45-percent canopy for warm season grasses and 40- to 60-percent canopy for cool season grasses. This management scheme will require thinning at intervals of approximately every 5 to 7 years depending upon site productivity to keep the canopy within the desired range. If canopy begins to exceed the desired amount, forage production will begin to decline. If the plantation has been in forest for a significant time there will probably be a plethora of vegetation besides the desired grasses that begin to grow. Management of the understory vegetation is a must using chemical or biological control to favor the desired forage species. If the plantation never had forage grass established on the acreage, grass and or legumes may have to be established to get the desired vegetation.



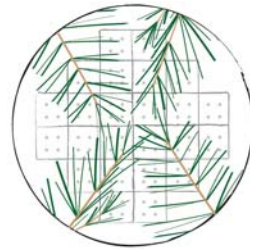
In most cases, individuals use an ocular estimate to determine the canopy percentage. It is hard to prove whether the ocular estimate is right or wrong, but it has been shown difficult for two people to obtain a similar answer. One tool that helps maintain consistency in the canopy estimate is the spherical densiometer. Hold the instrument level, 12 to 18 inches in front of the body and at elbow height, so that the operator's head is outside the mirror grid area.



Depending on the model, the densiometer will contain a concave or convex mirror with a grid on it.



While there are no dots on the grid assume four equal spaced dots in each square on the grid.



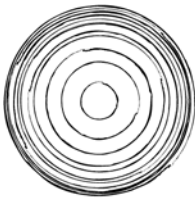
Systematically count the dots that are covered by leaves, stems, or branches. Multiply the total count by 0.96 to obtain the percentage occupied by vegetation or percent canopy. Assuming each dot represents 1 percent is generally considered accurate enough.

# Wood quality

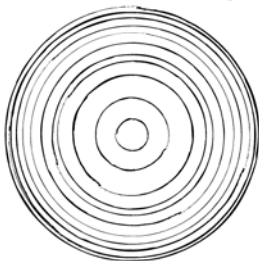
Wood quality—that is, density, strength, and ultimately, value—is commonly thought to be compromised with fast growing trees from wide-spaced plantations. The misunderstanding is that fast growing trees have a higher percentage of juvenile or core wood that is less dense and weaker. In fact, other factors, such as species, percentage of summerwood, and age affect wood characteristics far more than spacing and growth rate.

It is tree age, not growth rate, that most significantly affects wood density of southern pines. This fact is sometimes misunderstood because fast growing trees can reach harvestable diameters at an earlier age. It is these younger trees that have a higher proportion of less dense juvenile wood. However, if these widely-spaced, fast growing trees are harvested at the same age as closely-spaced, slower growing trees, the wood density is nearly the same. In fact, 32-year-old slash pines that

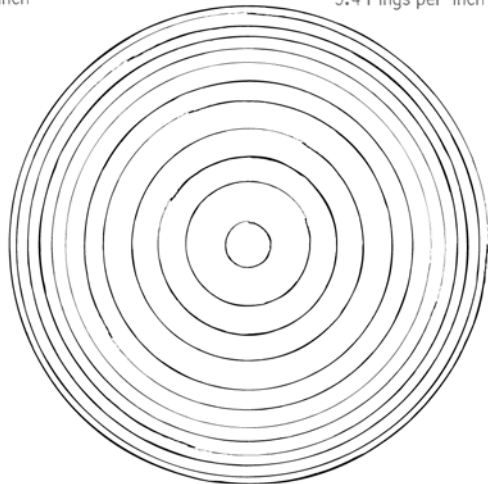
Proper tree pattern will produce larger logs. For stumpage, size is valued more than number of rings per inch.



6 feet x 6 feet  
\$7 per ton  
Pulpwood  
9.6 rings per inch



8 feet x 8 feet  
\$28 per ton  
Chip 'n' saw  
7.8 rings per inch



15 feet x 15 feet  
\$46 per ton  
Sawtimber  
5.4 rings per inch

## Effects of spacing on wood properties

30-YEAR-OLD LOBLOLLY PINE IN PIEDMONT OF SOUTH CAROLINA	8' x 8' not thinned	8' x 8' thinned	12' x 12' not thinned	12' x 12' thinned
Core wood diameter	6.0"	6.0"	7.7"	7.7"
Diameter at breast height (d.b.h.)	9.0"	10.0"	11.3"	12.9"
Rings per inch	6.2	5.6	4.9	4.3
Basal area in core wood	44%	36%	46%	36%
Sawlogs (tons per acre)	15	37	68	76
Specific gravity	0.46	0.51	0.47	0.50

Sawlog data and thinning values were produced from a growth and yield program where half of the trees were row-thinned at age 14 years.

were planted 15 feet apart might have a smaller percentage of core wood in the first sawlog than trees spaced 6 or 8 feet apart.

It is true that trees grown in more widely spaced configurations have fewer rings per inch and greater diameter of core wood. However, wide spaced loblolly pine trees have a higher specific density and yield greater tons per acre of sawlogs, than closely spaced trees, without increasing the total basal area of trees with core or juvenile wood.

The two most common measures of wood quality are: strength, Modulus of Rupture (MOR), and stiffness, Modulus of Elasticity (MOE). In both cases, tree spacing has been shown to have minimal affect on dimension lumber sawn from unthinned 40-year-old slash pine growing in the Georgia Coastal Plain.

All this being said, it is not a simple matter to market larger diameter, high quality silvopasture logs for a higher value. As pointed out by David South, Ph.D., "When log sizes are the same, many sawmills might not pay more per green ton for denser, older saw logs. However, a few specialty sawmills do not purchase younger, plantation grown pines that are known to

INITIAL STOCKING (trees per acre)	HARVEST AGE (years)					
	22	24	26	28	30	31
	PROPORTION OF BASAL AREA IN JUVENILE WOOD (%)					
300	51	45	42	39	36	35
600	53	49	45	42	39	38
900	54	49	46	41	39	37

Influence of stocking on the percent of basal area in juvenile wood of loblolly pine.

produce wood that has a specific gravity < 0.48. Therefore, it would be useful for landowners who operate their own portable sawmills to know how to produce denser wood when planting less than 500 pines per acre.”