



Spring 2006

# What Is The “Correct” Planting Density For Loblolly Pine?... Depends On Who You Ask

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I met a landowner who was getting out of the cattle business and wanted to plant trees for some income, to encourage wildlife, and for recreation. She asked me how many loblolly pine seedlings she should plant on her pastureland. I replied, “It depends on your objectives and who you ask.”

You see, there are two schools of thought regarding the number of seedlings per acre (SPA).

One school recommends high planting densities (>500 SPA) and the other recommends low stocking levels (<400 SPA). Most foresters from the “plant-‘em thick and cut-‘em quick” school recommend planting 650 SPA or more. Since I am from the “plant-‘em thin and you’ll likely win” school, I think 346 SPA (14 feet between rows and 9 feet between trees) would be a better target. When I was asked why there

was such a difference, I said the difference could be due to a number of reasons including:

- holding on to traditional practices;
- assuming a low price ratio between sawtimber and pulpwood (\$S/P);
- using poor quality seedlings;
- relying on an unrealistic growth-and-yield program;
- assuming logging costs do not vary with log size;
- assuming everyone’s land is close to a mill; and
- a fear that a low stocking will reduce both wood quality and stumpage values.

Early tree planting recommendations in the U.S. were handed down to us by European foresters. Foresters in Scotland have been planting about 1,000 SPA for over a century (6.6 foot rows



Low density planting, like this stand, can also be used as a silvopasture.

## Calendar

- Apr 4-10** - NACD, Portland, OR
- Apr 11** - Leadership Team Meeting, Auburn, AL
- Apr 11-13** - So. Pasture Forage Crop Improvement Conference, Auburn, AL
- Apr 12-13** - CR Training for Principal Staff, Auburn, AL
- May 3** - AACD/Executive Board-Planning Com, Montgomery, AL
- May 6** - Cahaba River Float, Birmingham, AL
- May 17** - Colbert Co Water Festival, Tusculmbia, AL
- May 22-25** - National Agronomy Meeting, Auburn Conference Center, AL
- Jun 5-9** - Plant Materials Meeting, Puerto Rico
- Jun 7-9** - AL Chapter of SWCS, Huntsville, AL
- Jun 12-16** - Environmental Ed Week, Madison Co, AL
- Jun 18-21** - National RC&D Council, Savannah, GA
- Jun 21-23** - NRCS/RC&D Workshop
- Jul 14** - FAC Meeting, Montgomery, AL
- Jul 18** - Leadership Team Meeting, Montgomery, AL
- Jul 20** - Area IV Annual Supervisors’ Meeting
- Jul 23-26** - International SWCS Meeting, CO
- Jul 27** - Area III Supervisors’ Meeting, Hale Co, AL

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and 6.6 feet between trees) and the “Forestry Handbook” (published in 1953 by the Alabama Forestry Council) gave almost the same recommendation (7 foot rows and 6 feet between trees). In the past, the objective of planting “thick” was to “maximize pulpwood production” on lands owned by paper companies. However, if the objective of a private landowner is to “optimize sawlog production” with reduced establishment costs, then most computer models (Figure 1) and most spacing trials point to low planting rates.

When the market results in a small \$S/P ratio (e.g. 2), it makes sense to concentrate on volume production instead of sawtimber production. However, stumpage \$S/P ratios tend to be higher than

ratios based on prices obtained at the mill. For example, a mill \$S/P ratio can be 2.8 (\$56/ton vs \$20/ton) while the stumpage ratio is 7.5 (\$45/ton vs \$6/ton). Historically, pine sawtimber has increased in real value over time while pulpwood has remained the same. Those of us from the “plant-‘em-thin” school tend to use stumpage \$S/P ratios when determining the economic optimum SPA for private landowners. In contrast, members of the “plant-‘em-thick” school often use lower mill \$S/P ratios and fixed logging costs (i.e. the same logging cost for all tree sizes) to determine the SPA that company foresters should use. In one case, a mill \$S/P ratio of 2 was used to conclude 1,294 SPA would be the optimum stocking level in Georgia.

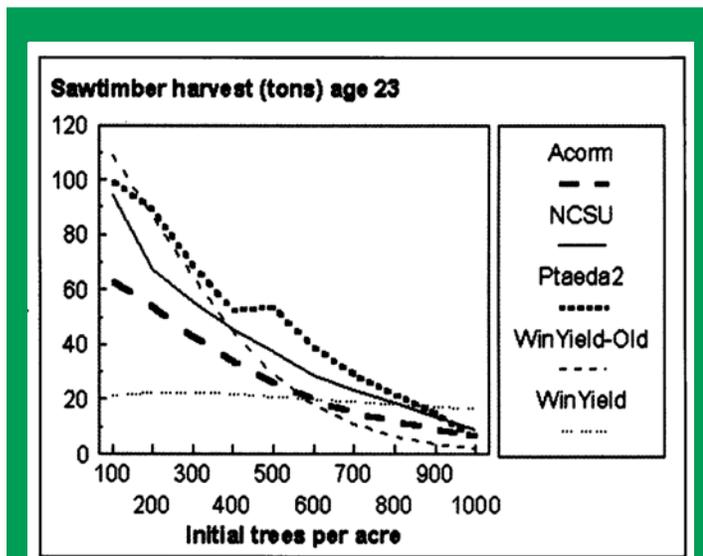


Figure 1. Predicted effect of stocking rate on sawtimber harvest of an unthinned loblolly pine plantation using five growth and yield programs. Site index=80 feet (base age 25 yr). Four models are for cutover sites, but WinYield-old model is for an old-field site.

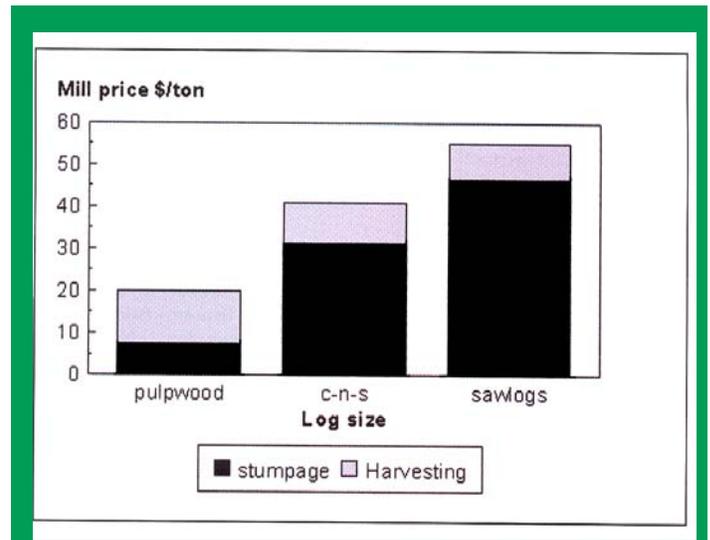


Figure 2. Stumpage value and mill value of loblolly pine pulpwood, chip-n-saw, and sawlogs. Typically, about 2/3's of the mill value of pulpwood is harvesting and transportation costs.

She asked why the distance to the mill would affect SPA recommendations. The difference relates to how much money it takes to get the wood to the mill. Currently, about two-thirds of the value of pulpwood at the mill is the cost of harvesting and trucking to the mill (Figure 2). In some distant locations, transportation costs can eat up all the value of pulpwood. Therefore, it makes more sense to grow mostly sawtimber and chip-n-saw if your land is far from a chip-mill.

She asked why seedling quality would affect the recommended SPA. In the old days, nursery managers often grew seedlings too thick (30 to 50 seedlings per square foot) in seedbeds and, therefore, tree planters in the South became accustomed to planting small seedlings with small roots. First-

year survival of 70 percent was deemed acceptable during the 1950s, but in dry years, or on weedy sites, poor quality seedlings and poor hand-planting practices resulted in low survival. This often resulted in having to conduct a replant (most foresters do not like to interplant). To avoid having to start over, foresters would plant twice as many trees as needed and would plan on fixing any overstocked stands by removing the extra trees during the first thinning. Today, some nurseries grow “morphologically improved” loblolly pine at around 19 seedlings per square foot and when lifted properly, these seedlings have large roots and a greater capacity for survival. By planting large-diameter seedlings (root-collars 6 to 10 mm) and providing good planting

supervision, many farmers in New Zealand hand-plant 330 SPA using planting spades.

Next she wanted to know why I recommend a rectangular instead of square spacing. For an old pasture, I recommend a scalping treatment combined with machine planting. Machine planting usually results in planting trees about 6 inches deeper than they grew in the nursery (without machine planting, ripping should be conducted prior to hand planting because this allows the crew to plant seedlings deeper). A rectangular spacing will have economic advantages when using machines during establishment. For large acreages, it will be about 42 percent quicker to machine-plant 14-foot rows instead of 8-foot rows (tractor speed does not change). Therefore, when renting equipment, it will cost proportionally less to use wide row spacings. Herbicide costs will also be less when applying a banded treatment. The wide row spacings also make it easier to move equipment through the stand after the canopy closes. Row spacing of 14-foot allows thinning to be selective while 8-foot rows require a row-thinning (which removes all large, straight trees in the row). Of course when planting 346 SPA, seedling costs will be half that when planting 700 SPA.

Since wildlife habitat is often a stated objective of landowners, the 346 SPA spacing will be more beneficial to some browsers than a spacing of 650 SPA. Wildlife studies find the amount of forage is related to tree stocking. Up until age 25, there should be more sunlight reaching the ground when using the lower stocking.

She said one forester warned her against planting 346 SPA because the faster growth would reduce specific gravity (density), reduce average tree heights, reduce the number of rings per inch and increase the live-crown ratio. In addition, average branch size would increase and the larger knots would produce weaker 2x4s. She asked the forester how much of a decrease in lumber or stumpage value would occur by planting at the lower stocking and he admitted he did not know; that was not taught at his forestry school. He also could not say how much bigger the knots would be when going from 650 to 346 SPA.

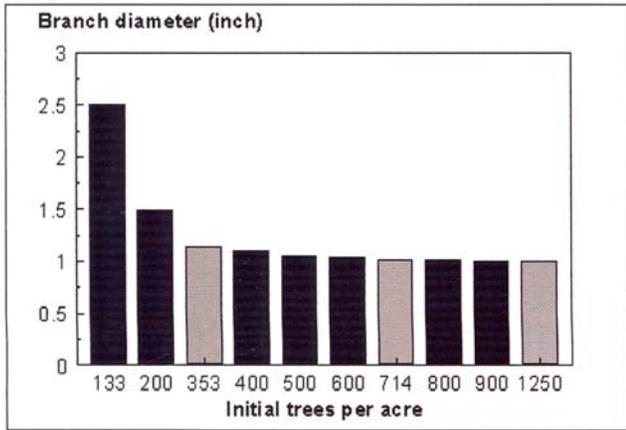
First of all, the forester is wrong when he said the lower stocking would result in wood of lower specific gravity. This myth has been in the forestry field for over 50 years. Qualified researchers who compare pine trees of the same age conclude “there is no inherent relationship between growth rate and

specific gravity” (Table 1). In fact, sometimes when pines grow fast in wet summers, they produce more “late wood” and have higher specific gravity than pines growing in regions with dry summers. However, specific gravity is affected by harvest age (since it affects the amount of juvenile wood percentage). Loblolly trees in the Atlantic Coastal plain may contain 100 percent juvenile wood when harvested at age 10 (with a specific gravity of 0.47). In contrast, at age 31, the tree may have a specific gravity of 0.54 and contain 35 percent juvenile wood. Pines harvested at age 20 will have lower specific gravity wood than pines harvested at age 31, but this difference is due to age, not growth-rate (see Table 1).

Planting 346 SPA will not result in shorter trees but it will result in wider growth rings than 650 SPA (Table 2). However, most sawmills typically buy wood based on weight and size, not on rings per inch (there are a few exceptions). The landowner who sells 56-year-old 14 inch sawlogs by weight at the mill-gate will likely not benefit financially from growing the trees slowly. To check this out, I told her to call her local sawmill to see how much difference there would be in the price paid for a ton of 14 inch sawlogs with 4- versus 8-rings per inch. Even so, some researchers report that 50-year-old Grade 1 logs (12 to 16-inches in diameter) might be worth \$2/green ton more to a sawmill owner than 25-year-old Grade 1 logs of the same diameter.

Species	Initial trees per acre	Average DBH (inches)	Average Height (feet)	Specific gravity
Loblolly	1210	8	68	0.46
	650	9	71	0.46
	435	9.7	71	0.47
	303	11.3	73	0.47
Slash	1210	7.3	60	0.51
	650	8.9	71	0.52
	435	10.7	74	0.54
	194	12.9	76	0.54

**Table 1. Effect of growth rate on diameter at breast height (DBH), height and weighted specific gravity at breast height of 30-year-old loblolly and 35-year-old slash pine (Clark and Saucier 1989).**

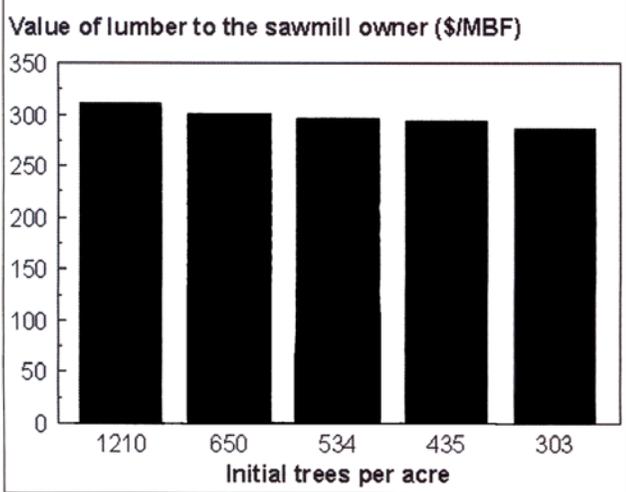


**Figure 3.** Effect of initial trees per acre on average branch diameter of loblolly pine (gray bars represent data from Baldwin, Peterson, Clark, Ferguson, Strub, and Bower 2000; black bars are adapted from Oberg 1990).

Knot size is related to initial stocking but the effect is slight until stocking drops below 150 SPA (Figure 3). For example, by age 38, the average branch size for 353 SPA may only be 0.12 inch greater than at 714 SPA. I doubt many people can even detect this small difference when walking through a plantation. Many “plant-‘em-thick” foresters

imagine the difference will be much greater because they see large branches on pines that are “open-grown.”

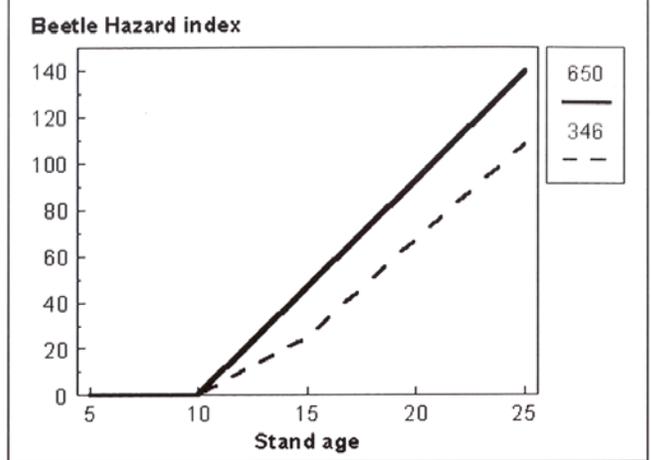
Pruning is currently practiced by Weyerhaeuser, Gulf States Paper, and a few other companies. Although knot free wood is valuable to a sawmill owner, it will likely not prove as valuable to a private landowner who



**Figure 4.** Effect of initial trees per acre on lumber value produced at the sawmill from 38-year-old trees (from Clark, Saucier, Baldwin and Bower 1994).

has invested in pruning. When a truck of pruned logs is scaled, it can be difficult to tell if the trees have been properly pruned. As a result, the landowner likely will be unable to sell pruned trees for twice that of unpruned trees. In the South, there are no pruning certification programs like those in New Zealand to help farmers obtain higher prices for their pruned logs.

(Figure 4). I seriously doubt this small difference would ever be reflected in either the stumpage price or the gate price. Besides, 10 percent more sawtimber volume was produced at 303 SPA (23.5 MBF/acre) than at 680 SPA (21.3 MBF/acre). This greater sawtimber volume more than made up for decrease in wood quality. Not only was the 303 SPA stand worth \$300 more per acre, but



**Figure 5.** Beetle hazard index of loblolly pine stands planted at two different stocking levels (650 vs 346 initial trees per acre). Beetle hazard index of the lower stocked plantation lags about 2 years behind the higher stocked plantation.

Some studies show a relationship between tree stocking and the strength of 2x4s made from unpruned loblolly and slash pines planted at low stockings. USFS researchers in Georgia reported that for loblolly pine, harvested at age 38, a stand planted at 680 SPA produced wood that was worth 4.5 percent more PER SAWN BOARD FOOT to the sawmill owner than trees planted at 303 SPA

it cost approximately \$41 less per acre to plant (at 5 cents per seedling and 6 cents to plant) than the 680 SPA stand.

She was curious why the term “cut-‘em-quick” was part of the “plant-‘em-thick” school. This is in part due to the southern pine beetle. Stressed pine stands are susceptible to beetle attack and the risk of attack increases with both stocking rate and age (Figure 5). Pre-

commercial thinning reduces the stress caused by overstocking but most landowners are reluctant to pay \$75 per acre for a treatment that receives no income. In today's market, landowners might receive no income from the first pulpwood thinning. Therefore, many stands owned by private landowners are not thinned and in dry years this can lead to beetle losses. Some landowners clear-cut stands a year or two quicker than normal to reduce beetle hazard. In some "hot-spots," some companies clear-cut their thick plantations as quick as 17-years in order to reduce the risk of beetle infestations.

The effect of compounding is another economic reason to "cut-'em-quick." Forest

economists often use discount rates of 6 percent or more, and this explains why the final harvest is often less than age 26, regardless of which school is involved. Although lumber from a 50-year-old, 12" diameter tree is worth more to a sawmill than lumber from a 25-year-old, 12" diameter tree, the effect of discounting makes a 25-year-rotation more attractive to a landowner who plants old-cropland with pines (Figure 6).

Landowners who are willing to accept a lower discount rate (e.g. 2% to 4%) can justify longer rotations. I showed her some of the differences that might occur when following the recommendations of the two schools (Table 2).

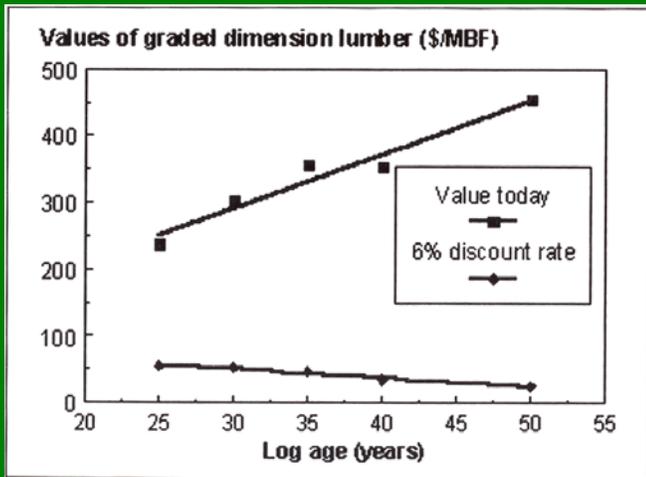


Figure 6. The effect of log age and discount rate on the value of graded dimension lumber (adapted from Biblis and Carino 2002). Today, a 50-year-old log that is 13 inches in DBH (and 16 feet long) is worth more to a sawmill owner than a 25-year-old log of similar volume. However, when using a 6 percent discount rate, a 13-inch log harvested in year 2027 is worth more (in today's dollars) to a sawmill owner who invests in tree planting, herbicides, fertilization, etc., than a 13-inch log harvested in 2052.

Table 2. A hypothetical comparison of wood properties, stand characterizes and economics of two unthinned loblolly pine stands that vary in initial stocking.

	School of Thought	
	Plant-'em thick	Plant-'em thin
<b>WOOD PROPERTIES</b>		
Average rings per inch	4.8	3.9
Specific gravity (at DBH)	0.45	0.45
Average branch size (inch)	1.02	1.14
Basal area in juvenile wood (12 rings)	58%	54%
Modulus of elasticity (lbs/in <sup>2</sup> )	1,300,000	1,300,000
Moisture content	120%	120%
Pulp yield (sulfate process)	48%	48%
<b>STAND CHARACTERISTICS</b>		
Planted trees per acre	650	346
Row spacing (feet)	8	14
Initial survival	85%	85%
Final survival at harvest	69%	76%
Average DBH - age 12 (inches)	5.6	6.2
Average height - age 12 (feet)	34.2	35.1
Average DBH at harvest (inches)	8.8 (age 21)	10.7 (age 23)
Average height at harvest	62.4	69.8
Live crown ratio at harvest	32%	33%
Beetle hazard index (age 21)	116	102
Harvest age (years)	21	23
Sawtimber per acre (tons)	10	47
Chip-n-saw per acre (tons)	33	10
Pulpwood per acre (tons)	74	60
Total merchantable (tons)	117	117
Tons/acre/year	5.6	5.1
<b>ECONOMICS</b>		
Seedling cost per acre	\$33	\$18
Machine planting cost per acre	\$50	\$45
Herbicide cost (4' band) per acre	\$50	\$45
Total establishment costs per acre	\$133	\$108
Mill value - sawtimber (\$46/ton)	460	2162
Mill value - chip-n-saw (\$41/ton)	1353	410
Mill value - pulpwood (\$20/ton)	1480	1200
Harvesting efficiency (trees per ton)	3.85	2.25
Harvest cost - sawtimber (\$9/ton)	-90	-423
Harvest cost - chip-n-saw (\$10/ton)	-330	-100
Harvest cost - pulpwood (\$14/ton)	-1036	-840
Average harvesting cost per ton	\$12.44	\$11.65
Net revenue at harvest	\$1,837	\$2,409
Net present value	\$407	\$523
Bare land value	\$576	\$709

6% interest rate. \$5/acre annual tax; \$5/acre hunting lease.

The risk from beetle infestation is almost never taken into account in economic analyses of planting density, but it was included in the 650 SPA example (i.e. the stand is harvested two years quicker than normal). I asked her to think about the differences on this table before deciding on which planting density to use. I gave her my business card and she said she would let me know her final decision. About a month later she called to say she decided to plant 109 seedlings per acre (40 foot rows and 10 feet between trees). I was taken back and said “nobody plants pines that low... the lowest pine stocking I know is Carter Holt Harvey in New Zealand who currently plants 220 pine seedlings per acre!” She then said, “I should have told you I decided to keep my cows and plant longleaf pine for silvopasture.” I replied “Oh, of course landowner objectives do affect planting density.”

David South is a Professor in the School of Forestry and Wildlife Sciences at Auburn University. He received his Ph.D. in Forestry from Auburn in 1983. He is the author of over 100 articles on nursery management and reforestation. He is a member of AU’s Southern Forest Nursery Management Cooperative. Dr. South can be reached at [southdb@auburn.edu](mailto:southdb@auburn.edu) or at

334-844-1022. For more information and references, visit [www.forestry.auburn.edu/sfnmc/class/density.htm](http://www.forestry.auburn.edu/sfnmc/class/density.htm)

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Loblolly pines planted at a density of about 691 trees per acre

Loblolly pines naturally seeded with a density of about 1,000 trees per acre

# Restoring Shortleaf Pine in Alabama

by Tim Albritton, State Staff Forester, USDA-NRCS, Auburn, AL

It may seem a bit odd to use the term *restoration* with a species as widely distributed as shortleaf pine. In Alabama, however, it is declining. Natural shortleaf pine is often harvested without replanting, and if the site is replanted, it is usually replaced with loblolly pines that are thought to have superior growth. The soils and climatic conditions in many counties of north Alabama, however,

often favor shortleaf over loblolly.

One benefit to shortleaf over loblolly is that it is less susceptible to ice damage. You may not think this is important in Alabama because of the minimal threat of ice damage, but it's not as infrequent as you might think. The Federal Emergency Management Agency (FEMA) keeps track of all major disasters across the United States. Alabama has been listed

four times since 1993 for winter storms, ice storms, or freezing rain. That is approximately one ice storm every 3 years or 9 ice storms during a 30-year rotation. Makes you think, doesn't it!

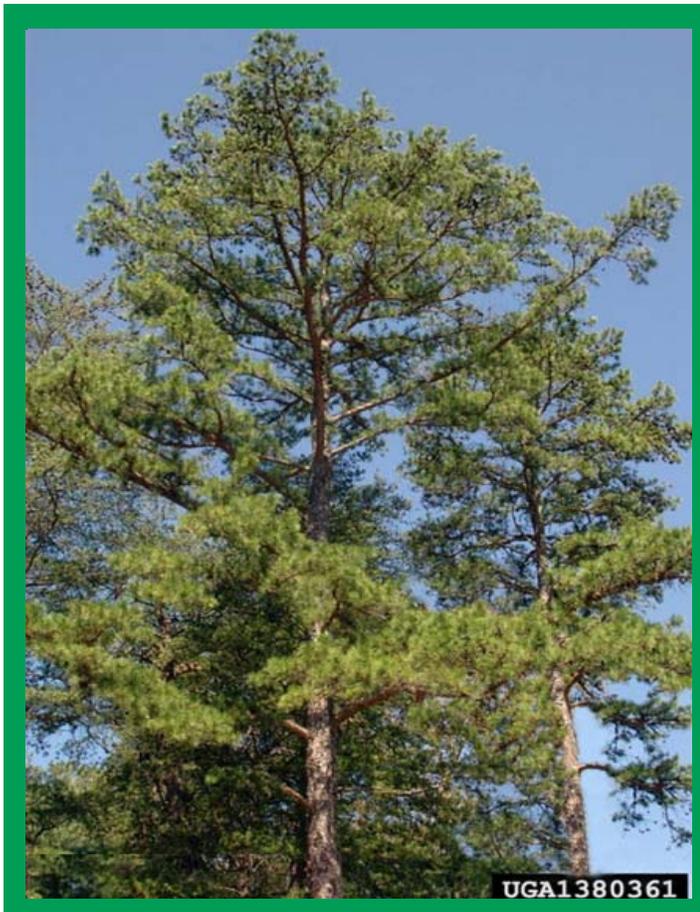
Until recently, landowners wanting to plant shortleaf pine could not use cost-share funds. This year, USDA-Natural Resources Conservation Service (NRCS) added shortleaf replanting to the Environmental Quality Incentives Program (EQIP). It was added to the Forest Health and Wildlife portion of EQIP to provide north Alabama landowners a practical alternative to loblolly pine without having to compromise their timber production goals.

Shortleaf pine is one of the four most important southern pines. Shortleaf has the widest geographic range of any of its counterparts, and is second only to loblolly pine in standing timber volume. Shortleaf's expansive success can be attributed to its ability to grow on a wide range of soil and

**S**hortleaf pine is one of the four most important southern pines and has the widest geographic range of any of its counterparts.

site conditions. It can withstand competition from other vegetation longer than most other pines. Found on drier ridge sites where there is less competing vegetation, the species will grow best on deep, well-drained soils. Shortleaf is one of the few pines that can sprout from the root collar if the stem is damaged or killed by fire or other injuries, but only until age 8 to 12 years.

One of the problems associated with shortleaf pine is a disease called littleleaf. It is the most serious disease of shortleaf pine in Alabama and the southern U.S. It is caused by a complex of factors including the fungus *Phytophthora cinnamomi* Rands, low soil nitrogen, and poor



internal soil drainage. Often, microscopic roundworms called nematodes and a species of the fungal genus *Pythium* are associated with the disease. It is a particular problem on worn out, highly eroded lands.

Because of littleleaf disease problems in central and south Alabama, planting shortleaf pines under EQIP is only eligible in the following counties: Blount, Cherokee, Cullman, DeKalb, Etowah, Jackson, Lawrence, Limestone, Madison, Marshall, Morgan, Walker, Winston, and the eastern portions of Colbert, Lauderdale, Fayette, Franklin, and Marion that are outside the coastal plain soils.

### Shortleaf Pine Uses

**Human:** lumber, plywood, pulpwood, structural materials, boxes, crates, and ornamental vegetation. The lumber is often of better quality than that produced by loblolly. Many log-home builders and owners prefer shortleaf logs to other pine species for its dense wood, aesthetic, and sound structural qualities.

**Wildlife:** provides habitat and food for bobwhite quail and wild turkey after mid-rotation thinning and burning. Also, the early stages of a shortleaf plantation

provide habitat for eastern cottontail rabbit, white-tailed deer, and a variety of songbirds.

**Other common names:** Arkansas pine, Arkansas shortleaf pine, Arkansas soft pine, bull pine, Carolina pine, forest pine, North Carolina pine, old-field pine, short needle pine, and others.

### Shortleaf Pine in the Southeast

The Georgia Forestry Commission is helping landowners plant shortleaf pine in low density stocking rates in an attempt to prevent, or minimize, impacts of future southern pine beetle infestations or to restore areas already impacted by these destructive insects.



The Missouri Department of Conservation and other sponsors are holding a Shortleaf Pine Symposium this fall in Springfield, Missouri.

The theme of the symposium is "Restoration and Ecology of Shortleaf Pine in the Ozarks."

The Forest Service is studying the effects of restoring a closed,

densely stocked shortleaf pine forest to the open pine woodland conditions described by early explorers in southern Missouri.

In the National Register of Big Trees, the champion shortleaf pine is in Georgia and the co-champion is in Mississippi.



# The Southern Alliance For The Utilization Of Biomass Resources (SAUBR)



A Partnership for Rural Development through the Production of Energy and Chemicals from Forests and Farms in the Southern United States

The regional Southern Alliance for the Utilization of Biomass Resources (SAUBR) formed in May 2004, to create an industry which will use biomass resources in the 13 southern states to produce energy and chemicals. The Alliance will foster communications, coordination and collaboration among members and others to enhance the development of a biomass-based industry in the South. This Alliance is composed of a growing number of forest and farm owners and their organizations, private businesses, universities, government

agencies, and others who are applying their resources and skills to ensure the success of this new industry. The Alliance will capitalize on the individual and combined strengths of its members to launch a biomass-based industry that will provide an economic stimulus to the rural economy in the southern United States, and through the innovative use of our forest and farm resources, will complement the nation's Homeland Security goal of decreasing our dependence on imported oil and natural gas.

## Need For A Biomass-Based Industry

The new industry will create high-volume, non-cyclical markets for trees

and agricultural crops, forest and farm residues, wood manufacturing residues, and poultry litter. The industry will revive the depressed timber market caused by global markets and the closure of pulp mills and sawmills across the southeastern United States, as well as strengthening regional agricultural markets. Having another market for timber, farm crops, and their residues will increase the productivity, profitability, and value of the region's existing forests and farms. New jobs will be created, lost jobs restored, and existing jobs retained. New tax revenues will be generated at local, state,

and national levels, and will grow as the industry expands. Areas targeted for the conversion facilities will be those which are economically depressed, have abundant feedstocks, and relevant infrastructure available. There are 214 million acres of forestland in the 13 southeastern states. Of the nation's 338 million acres of farmland, 128 million are in the southeast. With wise use of this enormous land resource, we can increase the energy security of the country by significantly reducing our dependence on fossil fuels, without degrading air and water quality or compromising our food and timber supplies, while creating a much-needed economic stimulus to our rural economy.

The resources used in this new industry are renewable and sustainable, and can be expanded as the need increases. Biomass fuels have the potential to reduce our dependence on natural gas and imported oil, and should be an integral part of state and national energy policy. The southeastern states have energy infrastructures well suited for the inte-



gration of biomass energy conversion facilities.

There are significant environmental benefits associated with using biomass to produce energy. Emissions can be less than from the burning of fossil fuels. When forests are managed to include an early energy thinning, the remaining stand will be healthier and of higher quality, wildlife habitat will be improved, and wildfire risk reduced, all without compromising air or water quality.

### Why An Alliance?

Universities, private research organizations, government agencies, and private businesses are pursuing aspects of biomass utilization industry relevant to their specific interests and disciplines. However, there is no organization or mechanism to coordinate the work of the constituent groups and address the needs of this new industry as it emerges. SAUBR will facilitate the collaborative use of resources within these entities to accelerate the creation of the new biomass-based industry. Members will share in the responsibility of the work of the Alliance, and through their collaboration and coop-

eration, accelerate the delivery of the benefits of their work to taxpayers.

### Governance and Membership

The Alliance is a non-profit organization governed by a 16-member Board of Directors. It consists of forest and farm landowners and their associations, economic development organizations, logging contractors, industry representatives, government agencies, universities, and research organizations.

### Programs

The Alliance will develop a strategy and outline programs to create and nurture the biomass-based industry. Working groups of members will be responsible for the implementation of the programs.

### Program Examples

1. Legislative Education – Provide resources to Congress and state legislatures to understand the biomass industry
2. Public Education/ Outreach – Develop informational materials and programs to increase public awareness of the benefits of biomass utilization.

3. Membership – Recruiting, retention, and supporting members
4. Technology/Technology Transfer – Disseminate results of research; create pilot programs
5. Research – Creating specific focus areas in biomass utilization
6. Funding – Identify and acquire funding from federal, state, and foundation resources
7. Policy – Develop national, regional, and state biomass utilization policies
8. Economic/Rural Development – Determine the economic impact of conversion facilities, direct the growth of the biomass utilization industry to achieve maximum benefit to rural economies, and co-ordinate with economic development organizations
9. Forest Related Industry – Identify needs, opportunities, and capabilities to support the creation of the biomass utilization industry
10. Agriculture Related Industry – Identify needs, opportunities, and capabilities to support the creation of the biomass utilization industry

### Funding

“Seed money” for the formation and start-up of SAUBR, and for on-going operations, will be sought from various sources. Limited funding will also come from member donations.

### Summary

SAUBR is based at the Alabama Institute for Manufacturing Excellence on the University of Alabama campus in Tuscaloosa, Alabama. Officers and Directors have been elected and By-Laws created. A strategic plan is being developed and seed money pursued. The direct involvement and support of the legislatures, governors, and congressional delegations of the 13 southern states will ensure its success.

### For More Information

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