Shortleaf Leaflet
North Carolina Forest Service
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Silvics of Shortleaf Pine

Shortleaf pine, *Pinus echinata*, is the most widely distributed, but perhaps least understood of the four major southern yellow pines[2]. Growing in 22 states from southern New York to eastern Texas, it occupies the largest range of any pine in the southeastern United States[5]. Its extensive distribution reflects an adaptability to a great variety of soils, average annual temperatures (48- 70-degree F), total precipitation (40-60 inches) and elevations (up to 3000 feet) [6]. Throughout much of its range, but especially in the East, it is a species of minor and varying occurrence often found growing with other pines and hardwoods. In Arkansas and Missouri, where it is the only naturally occurring pine, we find widespread areas of pure and mixed shortleaf-oak stands. In North Carolina is found on dry upland sites in the Piedmont and lower elevations of the mountains.

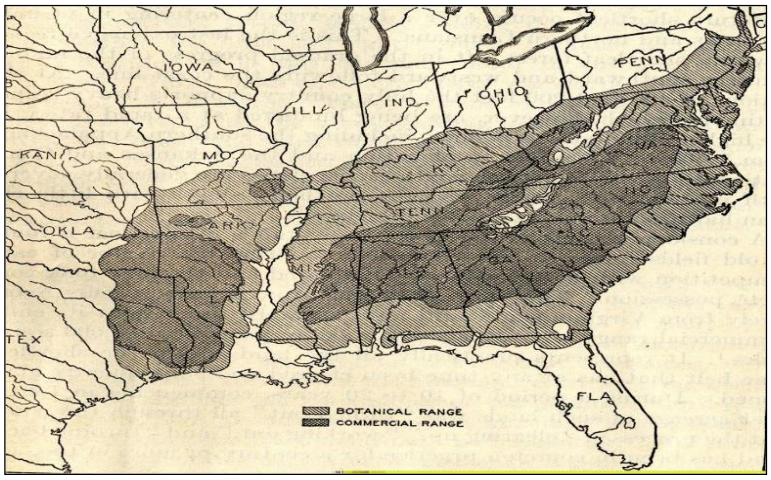

Figure 1: Range map showing the distribution of shortleaf across the east and depicting commercial and botanical distribution. Credit: Mattoon, 1915.

Shortleaf pine is a medium to large tree reaching 80 to 100 feet tall and 2-3 feet in diameter in a lifespan of 200 years. The straight bole with low taper supports a small pyramidal crown. The short needles, small cones, and platy bark with distinct small resin pockets, allow for easy identification of mature trees. We can distinguish shortleaf seedlings from other pines by the distinctive double crook formed at or just below the forest floor[8]. Seedlings and saplings top-killed after a fire have the ability to sprout from special reproductive buds located in this basal crook[7]. The sprouting ability provides shortleaf a unique competitive advantage over many other species.

Figure 2: This shortleaf seedling shows the species unique basal crook and its ability to sprout after fire damage.



Figure 3. Shortleaf pine needles are 3-5 inches long in clusters of 2's sometimes 3's. Shortleaf platy bark with resinous pockets. Shortleaf cones are short stalked, ovoid, 1 ½ – 2 ½ inches long, and armed with a short spine.

Although found on many different types of soil, shortleaf is most competitive on dry shallow nutrient poor soils. Shortleaf pine is found in pure or mixed stands on upland sites associated with loblolly and Virginia pine, a variety of oaks including, white, black, scarlet, post, and chestnut, eastern red cedar, and hickory[6]. Shortleaf has low tolerance for poor soil aeration or a high water table. As a pioneer species, it is well suited to invade old fields or disturbed sites, but usually gives way to faster growing, more competitive species. Shortleaf is favored on south and west facing aspects; thin, rocky soils, on higher elevations north and west of the loblolly range, and on sites too dry, warm, and infertile for eastern white pine.

Shortleaf pine trees begin to produce seed crops around age 20. Trees greater than 12 inches in diameter are most likely to produce more and higher quality seed. Although some trees produce seed every year, good to excellent cone crops happen every 3-6 years in the southern and western areas of its range; and 3-10 years in the northern and eastern areas[6]. Overall, poor, irregular seed crops are common for shortleaf pine. Seedfall begins in late October to early November with a majority of the seed falling 75 to 150 feet from the tree. Each of the small cones contains 25-30 seed. A tree may have 130 cones in a good year.

Foresters describe the growth of shortleaf pine as slow but steady. For its first 2 years, shortleaf pine uses most of its resources developing a root system. During this period, faster growing competitors easily overtop it. Shortleaf pine feeder roots are smaller and more abundant in the upper few inches of the soil than loblolly.[11] It is considered windfirm thanks to a deep taproot and extensive lateral roots.[4,8] Shortleaf pine exhibits slow annual growth rate during its first 10-20 years. By age 20, its growth rate becomes close to that of loblolly pine and around age 50 is greater.[10] The steady growth rate and the species greater lifespan favor long rotations.[9]

Shortleaf is shade intolerant. Foresters usually manage it as an even aged stand. It persists in very dense stand conditions and responds to release thinning even when the trees are mature[6,13]. Shortleaf tolerates competition longer than loblolly pine. Control of understory competition increases the growth rate. Its growth rate and sprouting ability is similar to several oak species allowing for mixed stand management with oaks.

Figure 4: This 70 year old shortleaf depicts the straightness, taper, small branches, and slow growth desired for top grade lumber.

Shortleaf pine is a valued timber tree. Its wood quality, including the juvenile wood, is superior to loblolly pine. The qualities required for high grade sawtimber include; straightness, low taper, high wood density, small branches, high proportion of latewood, and no fewer than 4 growth rings in the last inch of radial growth[1,12]. At age 40 the proportion of high-value pole size timber may be as high as 40 percent. Most studies have documented that loblolly pine has 10– 15 point site quality index (base 50) advantage over shortleaf pine. However, Harrington reported the difference between loblolly and shortleaf site quality indexes decreased as the site quality increased; the highest quality sites have little growth advantage[3].

Shortleaf is a favored pine of the southern pine beetle, in part because its low resin flow cannot expel invading beetles. Shortleaf pine is resistant to fusiform rust, a common problem of loblolly and slash pine plantations. Littleleaf disease is a serious threat to shortleaf, one that reduces growth rates and causes mortality. Shortleaf has the lowest risk to ice storms damage of the major southern pines.

Figure 5. A 100 year old mixed shortleaf-hardwood stand located in the northern Piedmont of North Carolina. This forest likely seeded in with shortleaf after a farm field was abandoned and succeeded to a mix pine – hardwood stand in the absence of fire.

Figure 6. A shortleaf pine - bluestem grass forest located in the Ouachita Mountains of Arkansas. This ecosystem is maintained with frequent prescribed burns.

Comparison of traits among the four major southern pines[12]. 1=High and 4=Low

Trait	Shortleaf	Loblolly	Longleaf
Fusiform resistance	1	2	1
Southern Pine Beetle susceptibility	1	2	4
Littleleaf susceptibility	1	2	4
Drought resistance	2	3	2
Cold resistance	1	2	3
Ice resistance	1	2	3
Tolerance of wet soils	3	2	3
Fertility needs	3	1	3
Resistance to stagnation	2	3	3

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