THE PERFORMANCE OF A MARYLAND SOURCE OF LOBLOLLY PINE IN EAST-CENTRAL ILLINOIS

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ABSTRACT.—A 16-year-old plantation of loblolly pine (*Pinus taeda* L.), established in east-central Illinois from a Maryland seed source, is 325 miles north of its natural range in Tennessee. This is the northernmost plantation of this species in Illinois, which can be considered successful from the standpoint of survival, growth, and hardiness. The apparent success of loblolly pine at this northerly location suggests a greater use of it for forest planting in southern Illinois.

Loblolly pine (*Pinus taeda* L.) is an important commercial timber species in the southern United States. Because of its fast growth, its adaptability to a wide variety of soils, and its excellent qualities as a timber tree, it has been used extensively for reforestation outside of its natural range. One of the earliest plantings on record of loblolly pine in Illinois was made in 1932 by the University of Illinois at Elizabethtown, Hardin County. In Illinois it has been planted mostly south of United States Highway 40 (approximately 39 degrees north latitude); however, even here its use has been limited because of its questionable hardiness.

Minckler (1950) found that after one growing season in southern Illinois, trees from South Carolina and Mississippi seed sources had greater mean heights than did sources from Arkansas, North Carolina, Maryland, and Virginia. However, the trees from Mississippi, North Carolina, and South Carolina seed sources were severely frost damaged during the second winter after planting (Minckler, 1952). He concluded that the trees from seed collected in Maryland and Virginia were definitely superior for planting in upland, old fields of southern Illinois. At age 10 trees from a Maryland seed source had the greatest mean diameter, mean height, and basal area per acre (Woerkside, 1959).

This study reports on the survival and growth of a 16-year-old plantation of loblolly pine at the Robert Allerton Park in east-central Illinois (Lat. 40° 05′ N., Long. 88° 40′ W.).

DESCRIPTION OF PLANTATION

The Allerton plantation in Piatt County was established April 1948 with one-year-old seedlings from a Maryland seed source. Approximately 1,200 trees were planted on one acre. This is the most northerly plantation of loblolly pine in Illinois with sufficient survival to exhibit normal stocking. The nearest native loblolly pine is 325 miles south in Tennessee. The soil is classified by the Illinois Soil Survey as Sunbury silt loam (No. 234). This is a grayish-brown silt loam which is a transition between Gray-Brown Podzolic forest soils and Brunizem soils. It has moderate surface drainage.

Climatic Factors

The mid-continental location and latitude of Illinois result in hot summers and cool to cold winters, often with rapidly fluctuating temperatures. Piatt County has approximately 175 frost-free days and 37 inches of annual rainfall with good distribution during the growing season (Page, 1949). January is usually the coldest month of the year. Average monthly temperatures fall below 32° F. for December, January, and February. Minimum temperatures recorded by the Weather Bureau (1948-1963) for Urbana, which lies 25 miles to the east, are listed in Table 1. According to these data, the plantation withstood a low temperature of approximately —15° F., during the winter following its third growing season, without serious injury.

The Allerton plantation was subjected to a severe ice storm during the period of January 19 through 21, 1959, when it was 11 years old. Ice accumulated on the twigs and branches to a thickness of one-half to one inch. State Climatologist Lother A. Joos labeled this storm as the worst recorded for east-central Illinois during the preceding 50 years. The tops of 30 per cent of the trees in the Allerton plantation were broken by the weight of the accumulated ice. No appreciable ice damage occurred in the adjacent plantations of jack, red, and white pines. The greater susceptibility of loblolly pine to cold weather and glaze damage, compared to other conifers in southern Illinois plantations, was described by Boggess and McMillan (1954).

Table 1.—Minimum Temperatures Recorded at Urbana, Illinois, During the Years 1948 Through 1963 by the Weather Bureau.

Dec. 22, 1948	4° F.
Jan. 30, 1949	—3° F.
Nov. 25, 1950	—5° F.
Feb. 2, 1951	—18° F.
Jan. 29, 1952	2° F.
Dec. 17, 1953	1° F.
Jan. 17, 1954	—1° F.
Feb. 11, 1955	—9° F.
Jan. 23, 1956	1° F.
Jan. 14, 1957	—6° F.
Dec. 9, 1958	—6° F.
Jan. 5, 1959	—9° F.
Dec. 23, 1960	—11° F.
Jan. 28, 1961	—5° F.
Jan. 10, 1962	—10° F.
Jan. 22, 1963	—14° F.

Growth

The early survival and growth of loblolly pine at Allerton Park are remarkable, considering its northerly location. Survival and height data are given in Table 2. The excellent growth of this species of pine is best shown by comparing it with the growth of five other species on comparable sites in the same field. Loblolly pine, at age 16, had the greatest diameter and height growth as shown in Table 3. A stand and stock table is presented for the plantation in Table 4. The mean height

Table 2.—Average Height and Percent Survival of Loblolly Pine at the Robert Allerton Park.

Plantation age, years	Average height, ft.	Survival, percent
1	0.9	98
2	2.4	96
3	4.0	92
4	5.7	88
5	8.4	87
10	24.9	86
16	37.4	78

of the dominant and codominant trees of 39 feet, at age 16, corresponds to a site index of 50 at age 25 according to site index curves developed by Gilmore and Metcalf (1961) for plantation loblolly pine in southern Illinois.

Discussion

There are 750,000 acres in the southernmost 16 Illinois counties in need of reforestation (Spaeth, 1948). Most of the area would be highly productive if planted to pine. The growth performance of the rather frequently planted shortleaf pine (*Pinus echinata*) in southern Illinois has been generally poor and below that of loblolly pine. Boggess and Gilmore (1963) have confirmed the superior growth of loblolly pine over that of shortleaf pine in southern Illinois.

Conclusions

The loblolly pine plantation at the Robert Allerton Park in east-central Illinois is the northernmost plantation of this species in Illinois which can be considered successful from the standpoint of survival, growth and hardiness. An interest has been shown in the plantation for breeding purposes and as a possible seed source for the production of hardy planting stock. Efforts to establish plantations

Table 3.—Diameter and Height of Loblolly and Other Species of Pine at the Robert Allerton Park, Age 16 Years.

Species	Average diameter breast high, in.	Average height, ft.
Red pine (*P. resinosa* Ait.)	4.7	23
Jack pine (*P. banksiana* Lamb.)	3.7	24
Shortleaf pine (*P. echinata* Mill.)	4.8	28
E. white pine (*P. strobus* L.)	5.0	29
Virginia pine (*P. virginiana* Mill.)	5.1	31
Loblolly pine (*P. taeda* L.)	5.4	37

Table 4.—A Stand Table for Loblolly Pine, Robert Allerton Park, Plantation Age 16 Years.

Diameter, breast high, in.	Trees per acre, no.	Basal area per acre, sq. ft.	Curved height, ft.	Total period volume per acre ($.0024D^2H$), cu. ft.
3	7	0.1	29	
4	141	13.7	34	185
5	355	49.6	37	701
6	289	57.1	39	978
7	59	15.1	39	272
8	7	2.2	40	43
	858	138.1		2,273

of loblolly pine from Arkansas seed sources at Urbana during the years 1952, 1953, and 1955 and at Allerton Park in 1962 failed because of winter injury. The apparent success of the 16-year-old plantation of loblolly pine, established at Allerton Park from a Maryland seed source, does not justify its use for forest planting in central Illinois. Nevertheless, the excellent growth and hardiness qualities exhibited by this plantation would certainly indicate a greater use of this species for forest planting in southern Illinois.

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