GROWTH OF MANAGED EASTERN WHITE PINE PLANTATION IN NORTHERN ILLINOIS

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This is an interim report of a long-time study on an eastern white pine plantation at Sinnissippi Forest, Ogle County, which lies in north-central Illinois. The object was to determine tree growth and cultural practices best suited to the management of white pine for timber and other forest products. Four one-quarter acre permanent growth-study plots were established in a 16-acre stand of 34-year-old white pine in 1941. Prior to this time, all trees had been pruned to a height of about 15 feet, but the stand had never been thinned.

The first thinning was made in 1941. About 225 well-formed, vigorous trees per acre were selected and designated as crop trees. These crop trees were then pruned to a height of 17 feet. Two additional thinnings were made in 1946 and 1951. The details of these studies may be found in two previous publications (3, 5). The plantation is on light sandy soil, most of which is classed as dune sand by the University of Illinois soil survey (8).

Sinnissippi Forest

Sinnissippi Forest comprises 2,300 acres of native woodland and pine plantations and is operated by Dr. and Mrs. C. Phillip Miller. The Forest maintains a sawmill and a semi-commercial treating plant for the cold-soak treatment of pine fence posts (4). The smaller trees obtained from the thinnings were cut into 7-foot fence posts and the larger trees were sawn into lumber. These products were sold at retail by Sinnissippi Forest.

The average annual precipitation for Ogle County is approximately 34 inches and there are about 160 frost-free days during the growing season (6). Temperatures recorded during the past 54 years at Dixon, Illinois, 15 miles to the south, averaged 49.1°F. (6).

Stand and Stocking Data

Table 1 presents stand and stocking data for three measurements made at the ages of 34, 39, and 44 years. Volume tables presented in Harvard Forest Bulletin 13 were used to calculate the cubic and board-foot volumes shown in table 1; however, they exceeded the utilization standards practiced at Sinnissippi Forest. The stand density index is based on the number of trees per acre and their average diameter (7).

Thinning Yields

Yields of forest products and their values are given in table 2 for three thinnings made in 1941, 1946, and 1951. The monetary value of the forest products was their sale value at Sinnissippi Forest. A total gross return of $1,153.95 per acre was obtained from the three thinnings. The returns include, in addition to stumpage values, the profit from cutting, sawing, treating, and marketing the forest products. Previous studies (5) showed average net stumpage returns of approximately $100 per acre for the 1941 and 1946 thinnings.

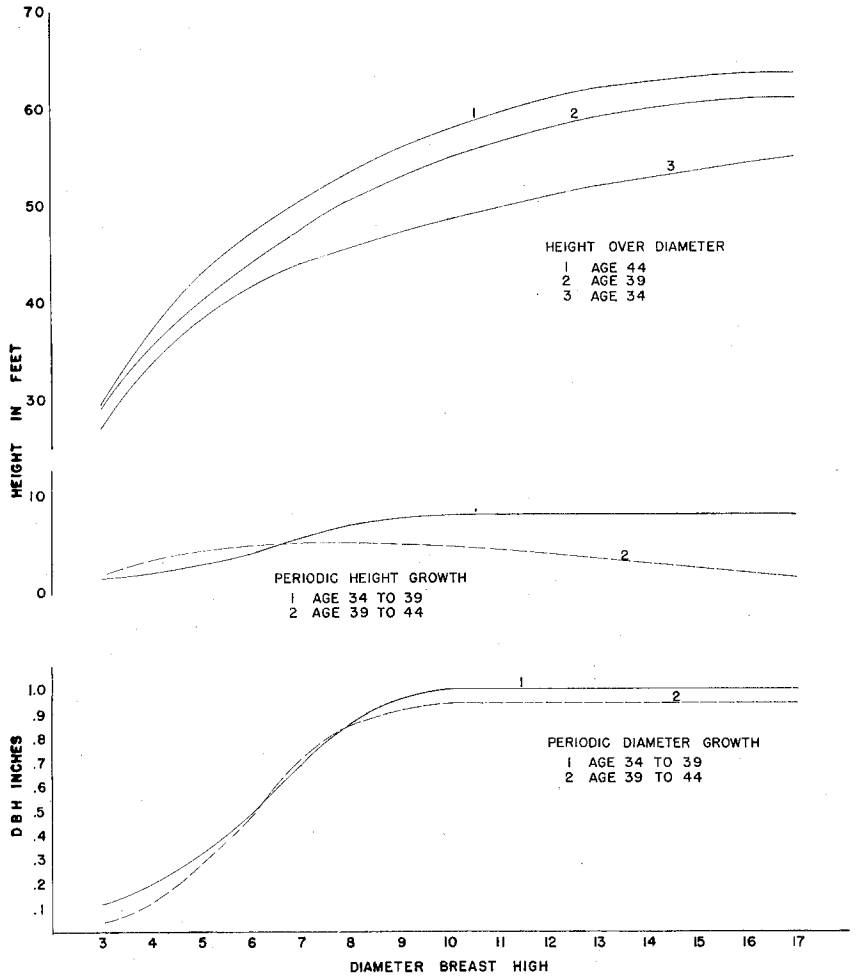

FIG. 1.—Curves of height over-diameter, periodic height growth, and periodic diameter growth.

GROWTH DATA

Figure 1 presents the height-diameter curves for the stand at ages 34, 39, and 44. Periodic height and diameter growth curves are also presented. Additional growth data appear in table 1. The dominant and codominant trees increased their diameter 0.2 inch annually or approximately 1 inch for each 5-year period from age 34 to 44. The total height growth for the 5-year period from age 34 to 39 was considerably greater than it was for the 5-year period from age 39 to 44. Based on present information, it appears that the mean annual growth has reached its point of culmination or will do so in the next 10 years.

The site index declined from 72

TABLE 1.—COMBINED DATA FOR FOUR ONE-QUARTER ACRE PLOTS

Eastern white-pine thinning and pruning plots

Sinnissippi Forest, Ogle County

Age	Trees per acre	Basal area	Av. height		Av. D. B. H.			Diam. range	Stand density	Volume per acre[a]	
			All trees	Dom. and codom.	Site index	All trees	Dom. and codom.			Trees 2″ and over	Trees 8″ and over
Years	No.	Sq. ft.	Ft.	Ft.	Ft.	In.	In.	In.	index	Cu. ft.	Bd. ft.
					Stand before thinning						
34	636	181	42	46	72	7.2	8.2	3–15	375	3,942	13,665
					Material removed in thinning						
34	148	38	40	..	..	6.9	....	3–12	...	821	2,742
					Stand after thinning						
34	488	143	43	46	72	7.3	8.2	4–15	294	3,121	10,923
					Stand before thinning						
39	452	161	49	53	70	8.2	8.9	3–16	329	3,937	17,869
					Material removed in thinning						
39	132	30	44	..	..	6.5	....	3–14	...	683	1,746
					Stand after thinning						
39	320	131	51	53	70	8.7	8.9	4–16	256	3,254	16,123
					Stand before thinning						
44	319	156	56	58	67	9.5	10.2	4–17	293	4,107	22,410
					Material removed in thinning						
44	85	30	52	..	..	8.0	....	4–13	...	760	3,112
					Stand after thinning						
44	234	126	57	58	67	10.0	10.2	5–17	234	3,347	19,298

a Volumes from Harvard Forest Bull. 13, Form class 65.

TABLE 2.—PERIODIC THINNING YIELDS AND RETURNS FROM ONE ACRE OF EASTERN WHITE PINE

(Based on Four ¼-Acre Plots)

Age 34—1941		
392 posts[a] @ 55c	$215.60	
1,634 bd. ft. @ $65 per M	106.21	$321.81
Age 39—1946		
453 posts[a] @ 72c	$326.16	
861 bd. ft. @ $85 per M	73.18	399.34
Age 44—1951		
304 posts[b] @ 80c	$243.20	
1,580 bd. ft. @ $120 per M	189.60	432.80
Total yield and income from 3 thinnings 1,149 posts and 4,075 bd. ft		$1,153.95

a 7-foot posts with a minimum top D. I. B. of 3½ inches.
b 7-foot posts with a minimum top D. I. B. of 3 inches.
All board-foot measurements were based on ¼-inch International log rule.

feet at age 34 to 67 feet at age 44. Lorenz and Spaeth (2) have shown that most of the conifers growing on heavy prairie soil in central Illinois declined rapidly in height growth after reaching age 25 or 30 years, resulting in a decline in site index. This growth phenomenon for conifers, on the heavy prairie soils of central Illinois, was much more pronounced than that of the white pine stand at Sinnissippi Forest.

White Pines Forest State Park, which lies only 6 miles to the west, is the present southernmost native white pine stand in Illinois. The stand has maintained its growth fairly well with age. In 1941 the larger trees were approximately 100 years old, 26 inches in diameter, and 100 feet high.

The planting stock for the Sinnissippi stand was shipped in from Massachusetts, so the seed may have been of New England origin. If that were true, it would suggest the possibility of an improper seed source.

SUMMARY AND CONCLUSION

Growth and thinning studies begun in 1941 have been continued on four quarter-acre plots established in an eastern white pine plantation at Sinnissippi Forest. Thinnings made in 1941, 1946, and 1951 totaled 1149 fence posts and 4075 board feet of lumber which together yielded a gross return of $1,153.95. Net stumpage returns for the 1941 and 1946 thinnings averaged approximately $100 per acre each. These returns should encourage the planting of white pine in northern Illinois on soils not suited for agricultural crops. The site index declined from 72 feet at age 34 to 67 feet at age 44. Although this decline was gradual, it definitely points out the importance of establishing long-time growth patterns before any one species can be recommended for planting on a given site.

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