# EARLY THINNINGS FROM PINE PLANTATIONS

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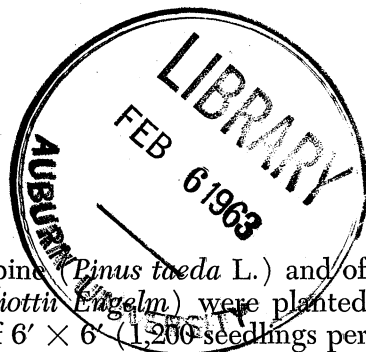
LARGE ACREAGES of pine plantations have been established by many landowners over the past two decades.

New plantations are continually being established while older plantations are ready for cutting. Some key questions that the landowner must answer are: (1) What original planting spacing will prove most profitable? (2) What type cutting or thinning should be followed and when made? and (3) What financial return will be realized? Answers to these questions will vary with circumstances of particular owners, and all cannot be covered in a restricted number of tests. Data presented represent results obtained from tests made on the Fayette Experiment Forest, of Auburn University Agricultural Experiment Station. Conditions involved are typical Upper Coastal Plain small acreage plantations.

## DESCRIPTION of AREA

The Fayette Forest is in Alabama's Upper Coastal Plain Region with upland red and yellow podzolic soils. Areas planted have specific soil type designations of Ora or Ruston fine sandy loams or both. Topography is gentle to moderately sloping. Plots were located on old field areas with moderate to severe sheet erosion caused by cultivation. Based on measurements taken in 1961, site quality (site index) ranged from 82 to 90 and averaged 85. The Girard form class (taper) on present stems averaged 70 on all stands.

Blocks of loblolly pine (*Pinus taeda* L.) and of slash pine (*Pinus elliottii* Engelm.) were planted in 1945 at spacings of 6' × 6' (1,200 seedlings per acre) and 5' × 5' (1,600 seedlings per acre). In 1946 another block of slash pine was planted at a 5' × 5' spacing.

Two types of thinnings were tested. These were selective thinning (individual stem selection) and row thinning (removal of all trees in one row regardless of size). The 1946 planting of slash pine was left unthinned.

Initial thinnings from all stands were cut into farm fence posts, which utilized stems to a minimum of 2¼" d.i.b., at the small end. All subsequent cuttings were for pulpwood, with a minimum of 3.6" d.i.b.

The selective system of thinning was applied to blocks of both loblolly and slash pine planted at 6' × 6' spacings (see table, parts A and B). First thinnings were made in 1955. A second thinning was made in 1958.

The row system of thinning was applied to blocks of loblolly and blocks of slash pine planted at both spacings (6' × 6' and 5' × 5'). Initial cuttings in all row-thinned blocks removed every 4th row. Second cuttings, again by rows, removed the alternate row leaving half of the original number of planted trees. The first row thinnings were made in 1955 on stands of both species that were planted 6' × 6' (see table, parts C and D). Second row thinnings were made in 1957. Planted trees were left at a spacing approximately 6' × 12'. The

| Year | Description | Trees | | Basal area total | Volume 3.6" up | Debits[1] | Credits[2] |
|------|-------------|-------|-------|------------|--------------|---------|----------|
| | | Total | 3.6" up | | | | |
| | | *Number* | *Number* | *Sq. ft* | *Std. cds.* | *Dollars* | *Dollars* |
| **STAND A (Loblolly pine—selectively thinned)** | | | | | | | |
| 1945 | Planted 6′ × 6′ | 1,200 | | | | 23.87 | |
| 1955 | Sel.-thin. (posts) | 200 | | 21.60 | 3.0 | | 15.30 |
| 1958 | Sel.-thin. (pulp) | 260 | | 17.14 | 2.4 | | 12.77 |
| 1961 | Residual | 650 | 550 | 108.10 | 18.67 | | 91.48 |
| | Total | | | 146.84 | 24.07 | 23.87 | 119.55 |
| | Balance | | | | | | 95.68 |
| | Net earnings per acre per year[3] | | | | | | 4.39 |
| **STAND B (Slash pine—Selectively thinned)** | | | | | | | |
| 1945 | Planted 6′ × 6′ | 1,200 | | | | 23.87 | |
| 1955 | Sel.-thin. (posts) | 240 | | 23.35 | 3.3 | | 18.22 |
| 1958 | Sel.-thin. (pulp) | 260 | | 11.36 | 1.6 | | 8.40 |
| 1961 | Residual | 1,200 | 650 | 125.78 | 21.81 | | 106.87 |
| | Total | | | 160.49 | 26.71 | 23.87 | 133.49 |
| | Balance | | | | | | 109.62 |
| | Net earnings per acre per year | | | | | | 5.02 |
| **STAND C (Loblolly pine—row thinned)** | | | | | | | |
| 1945 | Planted 6′ × 6′ | 1,200 | | | | 23.87 | |
| 1955 | Row-thin. (posts) | 200 | | 24.68 | 3.2 | | 18.29 |
| 1957 | Row-thin. (pulp) | ? | | 34.00 | 2.8 | | 16.05 |
| 1961 | Residual | 620 | 470 | 95.27 | 13.65 | | 66.89 |
| | Total | | | 153.95 | 19.65 | 23.87 | 101.23 |
| | Balance | | | | | | 77.36 |
| | Net earnings per acre per year | | | | | | 3.55 |
| **STAND D (Slash pine—row thinned)** | | | | | | | |
| 1945 | Planted 6′ × 6′ | 1,200 | | | | 23.87 | |
| 1955 | Row-thin. (posts) | 170 | | 20.34 | 3.7 | | 21.15 |
| 1957 | Row-thin. (pulp) | ? | | 31.79 | 2.4 | | 13.76 |
| 1961 | Sel.-thin. (pulp) | ? | | 9.41 | 1.6 | | 7.84 |
| 1961 | Residual | 570 | 460 | 92.01 | 15.54 | | 76.15 |
| | Total | | | 153.55 | 23.24 | 23.87 | 118.90 |
| | Balance | | | | | | 95.03 |
| | Net earnings per acre per year | | | | | | 4.36 |
| **STAND E (Loblolly pine—row thinned)** | | | | | | | |
| 1945 | Planted 5′ × 5′ | 1,600 | | | | 27.62 | |
| 1957 | Row-thin. (posts) | ? | | 8.00 | 1.6 | | 8.42 |
| 1961 | Row-thin. (pulp) | ? | | 8.12 | 1.3 | | 6.37 |
| 1961 | Residual | 760 | 630 | 95.75 | 12.91 | | 63.26 |
| | Total | | | 111.87 | 15.81 | 27.62 | 78.05 |
| | Balance | | | | | | 50.43 |
| | Net earnings per acre per year | | | | | | 2.31 |
| **STAND F (Slash pine—row thinned)** | | | | | | | |
| 1945 | Planted 5′ × 5′ | 1,600 | | | | 27.62 | |
| 1957 | Row-thin. (posts) | ? | | 25.87 | 5.25 | | 27.65 |
| 1961 | Row-thin. (pulp) | ? | | 18.82 | 3.2 | | 15.68 |
| 1961 | Residual | 720 | 480 | 98.79 | 17.14 | | 83.99 |
| | Total | | | 143.48 | 25.59 | 27.62 | 127.32 |
| | Balance | | | | | | 99.70 |
| | Net earnings per acre per year | | | | | | 4.57 |
| **STAND G (Slash pine—unthinned)** | | | | | | | |
| 1946 | Planted 5′ × 5′ | 1,600 | | | | 26.41 | |
| 1961 | Residual | 1,420 | 950 | 141.15 | 18.07 | | 88.54 |
| | Total | | | 141.15 | 18.07 | 26.41 | 88.54 |
| | Balance | | | | | | 62.13 |
| | Net earnings per acre per year | | | | | | 3.10 |

[1] Includes planting costs of $11.00/acre for 1,200 trees and $13.00 per acre for 1,600 trees plus $0.15 per acre per year taxes and protection all compounded at 4% interest to 1961.

[2] All credits received prior to 1961 compounded at 4% to 1961.

[3] Net earnings are figured as annuity of balance at 4%.

slash pine stands of this group were thinned for a third time in 1961. For this thinning the selective system was used. First thinnings in stands of both species planted at spacings of 5′ × 5′ were made in 1957 (see table, parts E and F). A second row thinning was made in 1961 to remove alternate rows leaving planted trees at a spacing of 5′ × 10′.

Stems were considered large enough at 10 years from planting for a cutting of merchantable fence posts from all stands planted at spacings 6′ × 6′. Stems on stands planted 5′ × 5′ did not reach this size until age of 12 years. Stumpage value for posts from selectively thinned stands averaged $4.35 per cord as compared with $4.50 per cord for stands of row-thinned posts. Differences in these figures can be directly related to reduced cost of marking trees and removal of products from row-thinned stands in relation to the costs involved in selectively thinned stands. This difference would have been greater except that volunteer pines, seeding in from adjoining areas, increased the number of stems to be removed for row thinning above the original planted spacing. Many volunteers were less than 3.6″ d.b.h. and had little influence on final cordwood volumes or on basal areas.

Pulpwood cuttings were begun at age 12 years in row-thinned 6′ × 6′ stands, whereas row-thinned 5′ × 5′ stands were not large enough for a pulpwood cutting until age 16 years. Pulpwood stumpage values ranged from $4.75 per cord from selective thinnings to $4.90 per cord from row thinnings. Differences were attributed to reasons given under post stumpage values. A third thinning in one of the row-thinned slash pine stands (stand D in table) was made on the selective system for the following reasons: (1) Row-thinning at a 90 degree angle to the original row thinnings was impractical because of the irregular spacing of trees within the plantation rows. (2) Each aisle was now wide enough for a pulpwood hauling vehicle to travel, thereby reducing the cost of removal by the selective method. (3) Trees were now of the size where selectivity was mandatory if maximum quality was desired for future cuttings. All future cuttings will be planned for each stand when basal areas average between 110 and 125 sq. ft.

## RESULTS

Stocking of trees over 3.6″ d.b.h. ranged from 460 to 650 per acre on the thinned stands and 950 per acre on unthinned stand of slash pine.

Total basal area and cordwood volume were greater on most thinned stands than on unthinned stand. One exception to this condition was row-thinned loblolly stand (stand E in table) where sheet erosion had been severe. Only one thinned stand was in need of immediate thinning in 1961. It was selectively thinned slash, (stand B), supporting a basal area of 125.8 square feet. The unthinned stand with a basal area of 141.15 sq. ft. needed thinning. Stand B had an average growth rate of 1.7 cords per acre per year.

Net earnings were consistently greater for slash stands than for loblolly receiving comparable treatments. Selectively thinned slash stands gave a higher net return ($5.02 per acre per year) than row-thinned slash stands ($4.36 and $4.57). Selectively-thinned loblolly stands also gave a higher net return ($4.39 per acre per year) than row-thinned loblolly stands ($3.55 and $2.13). All thinned slash pine stands yielded a higher net return than when left unthinned for 15 years at a 5′ × 5′ spacing. Differences in net returns from original spacing (for the row-thinned loblolly and slash) were not consistent.