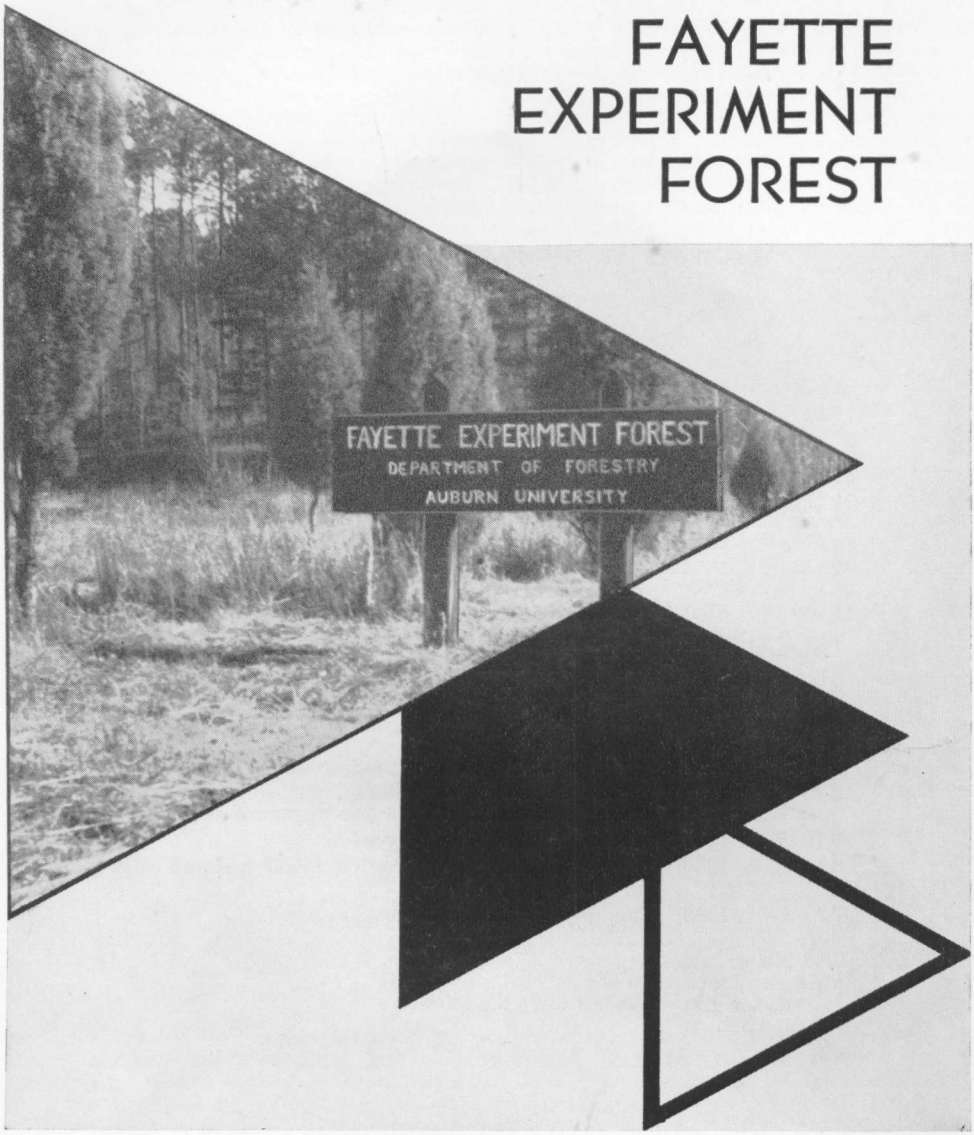
FAYETTE EXPERIMENT FOREST



AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
E. V. Smith, Director
Auburn, Alabama

PROJECTS AT THE FAYETTE EXPERIMENT FOREST[1]

Code	Date	Description
0.01	1944	Research in silviculture, utilization and management of small woodland areas in Fayette County.
3.61[2]	1950	Methods of peeling and service test of posts.
7.75[2]	1950	Growth and utilization of Arizona Cypress Christmas trees.
7.14[3]	1950	Controlling undesirable hardwoods with ammate.
	1950	Mixed plantations of loblolly and slash pine.
7.15	1951	Use of fire and poisons to maintain and regenerate stands of loblolly.
1.47[3]	1951	Returns from the production of fence posts from thinnings.
1.46	1951	Improvement of growth and quality of rundown shortleaf loblolly forests.
5.74[3]	1953	Effects of site preparation on the cultivation and growth of old field plantings of yellow poplar.
7.151[2 3]	1953	Soil study on 7.15.
5.412[2 3]	1954	Growth of root pruned pine seedlings.
6.73	1957	Cone production of loblolly pine in Ala. Upper Coastal Plains in relation to time and degree of release.
5.75	1959	Hardwoods to pine conversion.
5.16	1960	Effect of seed bed preparation on survival and early growth of yellow poplar.
7.17	1962	Improving mixed hardwood stands.

Nat. Natural areas.
[1] See map for location of projects.
[2] Assistance given to others using the forest.
[3] Completed.

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FAYETTE EXPERIMENT FOREST

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INTRODUCTION

Description of Area of Influence. The Fayette Experiment Forest of the Auburn University Agricultural Experiment Station System is representative of a region that includes a wide strip from the north central part of Mississippi through north central Alabama and central Georgia. The immediate area originates in the Upper Coastal Plain Soils where its representative timber types and problems extend into Piedmont and Lower Mountain Soils. The area is largely hilly with narrow ridges and interspersed with narrow stream bottoms.

Forestry Problem. The main forestry problem is the natural invasion of hardwood species that do not produce quality timber at good growth rates as compared with the southern yellow pines, particularly loblolly and shortleaf pines. Most of the area is best suited to growing pines but some of it is capable of producing high quality hardwoods.

Location and Association. The Fayette Experiment Forest is located 9 miles north of Fayette, Alabama, on U.S. Highway 43. The forest is one of four units used for research and maintained by the Department of Forestry, Agricultural Experiment Station System, Auburn University, Auburn, Alabama.

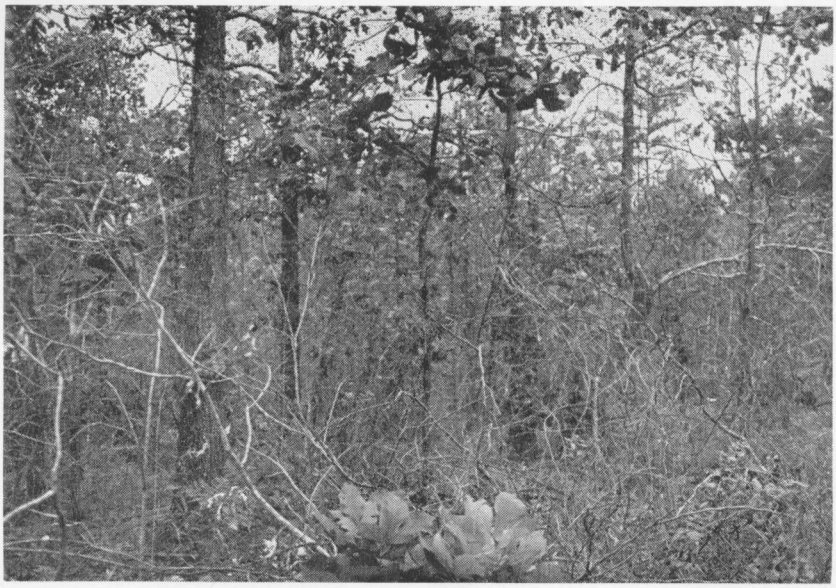


FIG. 1. Shown here is regrowth of hardwoods following clearcutting.

Establishment. The land was purchased by Alabama Polytechnic Institute (now Auburn University) from local landowners, several of whom had abandoned their land for crop production. A resident forester was assigned to the Fayette forest in 1946 and a technical assistant was added in 1954. It is the largest of the four forest units of Auburn University and the only one that is manned by resident personnel.

DESCRIPTION

Area. The forest project was established in 1944 with an original purchase of 910 acres. Additional purchases in 1946 increased the area to the present total of about 1,400 acres. Boundaries are irregular but all the land is in one unit. At present the administrative area consists of 10 acres, while roads, rights-of-way, and a small pond occupy another 25 acres. The remaining 1,365 acres are in various stages of timber production.

Condition. At the time of purchase, the forest consisted of cut-over, burned-over, low-grade stands of loblolly-shortleaf pines and miscellaneous hardwoods. A large portion of the forest had only scattered or no trees of merchantable size. Approximately 35 per cent of merchantable sizes in better stands consisted of

culls or undesirable species with low values. Desirable reproduction was unsatisfactory on 60 per cent of the area. Basal areas averaged under 20 sq. ft. and merchantable volumes approximately 600 bd. ft. (Int. ¼" Rule) per acre.

Present Timber Types. Present natural timber types are largely loblolly-shortleaf, pine-hardwoods (oak and hickory) with areas of oak-hickory, pure loblolly pine, mixed hardwoods and pine, white oak, and yellow poplar. The latter two types are limited to the upper ends of a few narrow stream bottoms. Age classes range from 0 to 60 years. Even and uneven aged stands are represented.

Early plantations were mostly loblolly or slash pine with only two small areas of longleaf. Later plantations have generally been loblolly.

Forest Soils and Site Conditions. The Fayette Experiment Forest is entirely in the Upper Coastal Plain soil region. It is characterized by narrow ridge tops, fairly steep slopes, and narrow winding valleys. The soils are derived from thick beds of acid sand and clay marine sediments. Most of the soils are well or moderately well-drained. The dominant soils on the narrow ridge tops have 6 to 12 inches of brown or dark brown fine sandy loam surface layers over 18 to 30 inches of yellowish red to dark red friable sandy clay loam. These are underlain by dark brown to red sandy loam or loamy sand material. The steep slopes have a complex soil. The dominant ones have grayish brown to pale brown sandy loam surface layers 8 to 15 inches deep. The subsoils of half of the area are yellowish red sandy clay loam 18 to 24 inches thick over dark brown sandy loam or loamy sand. The subsoils of most of the remainder of the steep slopes are brown to red firm silty clay loam to clay 8 inches deep and underlain by mottled gray, red and brown silty clay or clay. About 5 per cent of the soil types consist of sand and gravel several feet in depth. The soils in the narrow valleys consist of well to imperfectly drained sandy or loamy material ranging from 3 to 6 or more feet deep. Elevations range from 400 to 600 feet above sea level. Most slopes have less than 100 feet difference in elevation from top to bottom.

Climatic Conditions. The annual precipitation averages 53 inches per year with extremes from 40 to 75 inches. Mean annual temperature is 61.4°F. with extremes of −15°F. to 108°F. An average of 231 days are frost free.

FOREST POLICY

The original plan of operation for this forest was begun in 1945. The program was designed to study and evaluate reproduction, growth, quality, and composition of stands resulting from different methods of handling natural stands; to determine the economics of establishing, producing, and utilizing artificial stands of pine; and to develop a profitable use for inferior hardwoods.

Function. The preliminary management plan or policy had two objectives: (1) to conduct extensive research in forest management as related to small holdings; and (2) to conduct intensive research in silviculture and utilization. All research on the unit, when sufficiently advanced, gives results on forestry problems of the area or related areas.

Timber is generally removed by sale of stumpage on an advertised bid basis. Most timber products in the past have been sold to local operators. Where necessary because of specific research projects or special salvage, local temporary labor is hired to help the one full-time laborer remove special products under the forester's supervision.

FIG. 2. Most of the overstory in this area, management unit 2, has been marked for a better stand.

Objectives. The main objectives for current studies are as follows:

(1) To study in natural stands the effects of different methods of cutting, thinning, and release on:

(a) The reproduction and growth of pine and hardwoods
(b) The rate of timber growth
(c) The quality of timber
(d) The immediate and ultimate composition of stands

(2) To study the economics of planting, developing, and utilizing artificial stands of pine on abandoned fields or denuded areas.

(3) To study methods and costs of eradicating inferior type hardwoods and of establishing desirable softwoods by natural or artificial means.

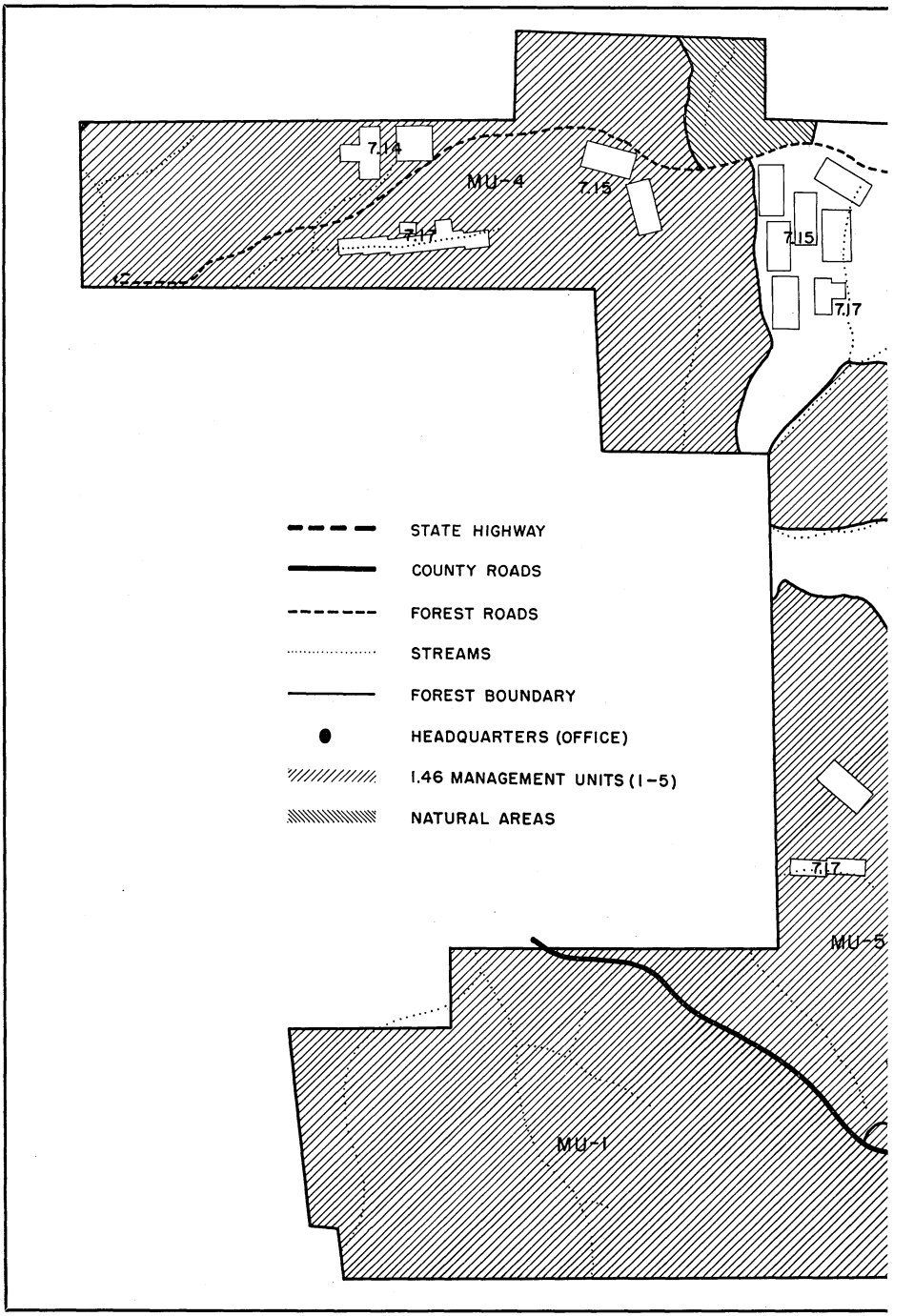
RESEARCH PROGRAM

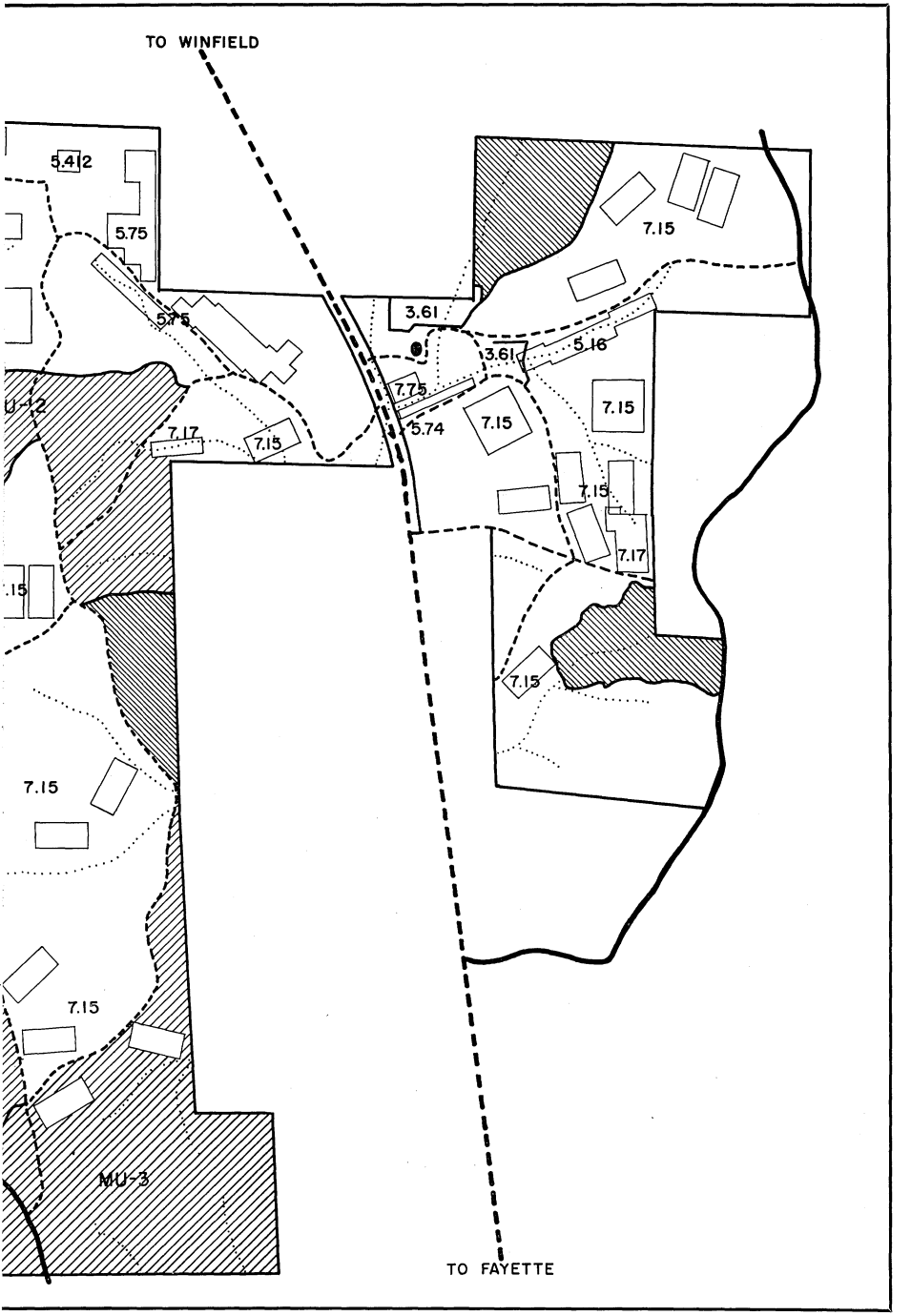
Management. The average farm woodlot today is a poor producer. Yet the woodland owner would like to have his timber producing a good return—but he wants to do it within the income of the forest area involved, that is to say, pay its own way. Extensive management and economic studies were the first to be established.

Woodland Management. A woodland management study was established on 5 forest units in 1951 ranging in size from 80 to 240 acres and totalling 720 acres. The objectives of this study were to improve the quantity and quality of growing stock and to produce the largest quantity of high quality forest products possible while keeping the cultural costs within the income from these units.

The initial improvement cuttings removed trees that were defective, wolfish, diseased (especially littleleaf-diseased shortleaf pines) and poor species crowding desirable reproduction. Cull trees over 3 inches in diameter and undesirable hardwoods were removed where desirable reproduction was present in satisfactory numbers. Other treatments were aimed at converting areas that were understocked to satisfactory stocking by using herbicides to eradicate weed trees, then planting or seeding desirable species.

Data from the operation on one unit as shown in Table 1 are fairly representative of the area. Results indicate that even a run-down forest of loblolly-shortleaf pine and hardwoods can be improved in a 10-year period and still produce some net returns.


7.14
MU-4
7.15
7.17
7.15
7.17
STATE HIGHWAY
COUNTY ROADS
FOREST ROADS
STREAMS
FOREST BOUNDARY
HEADQUARTERS (OFFICE)
1.46 MANAGEMENT UNITS (1-5)
NATURAL AREAS
7.17
MU-5
MU-1


TO WINFIELD
5.412
5.75
5.75
3.61
3.61
5.16
7.15
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5.74
7.15
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MU-3
TO FAYETTE

TABLE 1. RESULTS OF 10 YEARS OF EXTENSIVE MANAGEMENT

Date	Gross returns	Cultural costs	Area in pine	Volume
	Dol.	*Dol.*	*Per cent*	*Cu. ft.*
1951	$ 669.00	$ 354.00	43.7	224.6
1956	1,676.00	1,062.00	55.0	145.9
1961	1,920.00	700.00	70.4	521.0
Total	$4,265.00	$2,116.00	237 acres	------

As a comparison to the managed forest units, four natural areas were established with permanent plots for inventory every 5 years.

Economics of Early Thinning. Planted or naturally seeded areas frequently support more stems per acre than are necessary or desirable for a good stand of merchantable pulpwood or sawlog trees. Early thinnings in such stands reduce early mortality and increase or assist in continuing the rapid growth of residual stems.

A study of producing fence posts from early thinnings was established in 1951. The main objectives were to determine the cost of producing fence posts and stumpage return from a fencepost operation.

FIG. 3. This area has been row-thinned to proper stand.

Results indicate that producing fence posts was profitable and that thinning by rows was more economical than thinning by selection. Thinnings for fence posts increased the commercial cubic foot volume by as much as 20 per cent.

Silviculture. Intensive studies in the field of silviculture involve hardwoods as well as pine and include such problems as site preparation for seeding or planting, and weed tree control by fire, herbicides, or machinery.

Special Studies. Woodlot owners may be overlooking an opportunity by not regenerating or planting yellow poplar on good hardwood sites. Well-drained bottoms recently cut over or lands formerly cleared can produce good stands of yellow poplar.

In 1953, a study of the effects of site preparation and cultivation on yellow poplar was begun on an old field. The field had a mixed stand of sericea clover, Johnsongrass, broomsedge, trumpet vine, and briars on an alluvium soil. Seedlings were small and 2 years of extreme drought prevailed. The main objective was to determine the best method for planting yellow poplar in old fields.

Results indicated that plantings on undisturbed soils and in furrows were practically failures, whereas plantings in plowed ground followed by two cultivations was highly successful; heights averaged approximately 33 feet in 7 years.

A similar study of the effect of seedbed preparation on survival and early growth of yellow poplar was established in 1960. This study began with a seed tree cutting that left a limited number

FIG. 4. Stand of yellow poplar at left is from furrow plantings including replanted stems. The stand at right was cultivated for one year following planting. Replanted stems were hoed only. Trees are four and seven years old.

of mature seed trees and was followed by a scarification treatment by bulldozer and by a tractor-drawn disk. The main objective was to determine the values of various methods of seedbed preparation following seed tree cutting on germination, survival, and early growth of yellow poplar.

Early results indicated that germination was good under treatments by either method of scarification but that germination on the non-scarified or check areas was a complete failure.

Weed Trees. Control of weed trees is an ever-present problem in most forest areas of eastern United States. The questions posed by many forest managers are numerous. Some of the main ones are as follows: (1) what herbicides give the best results; (2) what methods of application are best suited to the area involved; (3) what minimum diameter should be treated or how extensive should one treat an area; and (4) what are some of the costs involved?

One early study established in 1951 was on the use of ammate to control hardwood weed trees. The objective was to determine the effect of ammate as applied to poor quality overstory hardwoods on the release of pine and desirable hardwood reproduction. Results were generally unsatisfactory, but the ammate was

FIG. 5. This area received bulldozer treatment.

a very effective killer of blackjack oak, 50 per cent effective on all other oaks, and not effective on hickories.

A study in progress since 1959 is on the conversion of upland hardwoods to pine. The objectives are: (1) to study the effectiveness of several different methods of hardwood control; (2) to determine survival and growth of loblolly pine on areas subjected to different hardwood control treatments; and (3) to determine the relative cost of methods of hardwood control prior to planting or following planting with loblolly pine.

Early results, as given in Table 2, were statistically analyzed and indicated that all treatments were only partially effective and to different degrees. After 3 years no significant differences could be found between cumulative height growths of pine in areas treated by bulldozer, injector, ax frill and treat girdle only, and chain frill and treat. However, there were significant differences between these treatments and both the foliage treatment and the check area. The foliage spray treatment which required further application and the bulldozer treatment were much more expensive than all others.

An intensive study was begun in 1952 on the use of fire and herbicides to control hardwoods in mixed loblolly-shortleaf pine stands. Half of the plot was treated with herbicides and other half was not treated, but both halves were burned by controlled fires in either August or January. All plots were burned in the '52-53 season and again in '54-55 season. Objectives were to determine: (1) the method that will reduce the hardwoods most effectively; (2) the method that will encourage regeneration of pine

TABLE 2. SURVIVAL AND TOTAL HEIGHTS OF PLANTED PINE AT THE END OF THREE GROWING SEASONS FOLLOWING SITE AND STEM TREATMENT AND RELATIVE COSTS

Treatment	Survival	Per acre[1]	Total heights[2]	Relative cost rating[3]
	No.	*Per cent*	*Ft.*	*Position*
1. Bulldozer	719	89.1	4,817	6
2. Axe frill and treatment	663	82.2	4,442	4
3. Injector	673	83.4	4,240	3
4. Girdle only	590	73.1	3,894	2
5. Chain frill and treatment	581	72.0	3,718	5
6. Foliage spray	438	54.3	2,365	7
7. Check	599	74.2	1,917	1

[1] Original stand of 807/acre.
[2] Total heights are the sum of the heights of all live trees.
[3] Rating of 1, least expensive.

FIG. 6. Shown here is the check area used at the forest.

stands of high purity; and (3) the effects of these methods on the growth of loblolly and shortleaf pines.

Results indicated only small differences between burned areas and treated and burned areas and that August burns reduced the hardwood growth more than January burns. However, 5 years after burning most hardwood had sprouted and still competed with the pine. Pine regeneration was greatest following August burns, but, because of extreme drought and poor seed years, most

FIG. 7. The areas here show plot immediately after January burn in 1952 and the same area five years after second January burn.

areas did not seed well until 3 years after the last fire. August burns caused considerable damage to pines up to 6 inches in diameter, but had little or no effect on growth of the larger trees.

A study begun in 1962 deals with the improvement of mixed hardwood stands in minor bottoms by treating undesirable stems or areas with silvicides applied with an injector, by basal spray and by mist blower, and injection for larger trees. Objectives are: (1) to determine the cost of stand improvement treatments on cutover and uncut mixed hardwood stands; (2) to evaluate the effectiveness of silvicides applied to control undesirable species in both understory and overstory; and (3) to correlate initial establishment of hardwood reproduction.

The only results available now are the costs of treatments. Data indicated that treatments by injection only were least expensive, mist spray and injection next, and basal spray the most expensive. The cost of treating cutover areas was 1½ to 2 times greater than the same treatment on uncut areas.

The Department of Forestry at the Main Station at Auburn has used the Fayette Experiment Forest to study the durability of fence posts, the use of Arizona Cypress for Christmas Trees, and chemical changes in the soils of plots treated with herbicides and prescribed fires.