

NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

ANNUAL REPORT

AGRICULTURAL PRODUCTION
MANAGEMENT AND NATURAL RESOURCE USE PROJECT (III)

Title of Project

Forestry
Section

1962
Annual Year

Name and Title of Worker	Percentage of Time Devoted to Entire Project by Each Worker
John Gray ¹ In Charge, Forestry Extension Project Leader	100 %
Forest Management Extension Specialists	
Walter M. Keller, Head	100 %
J. C. Jones ²	100 %
E. M. Jones	100 %
F. E. Whitfield	100 %
Ross S. Douglass	100 %
John Gilliam ³	100 %
Leonard Hampton	100 %
W. M. Stanton ⁴	100 %
Study Leave	
1/ 11/1/ - 12/30, 1962	
2/ 1/1 - 7/31, 1962	
3/ 1/1 - 8/31, 1962	
4/ 9/1 - 12/30, 1962	

Signed _____
Project Leader

Date Submitted March 14, 1963

A N N U A L R E P O R T

F A R M F O R E S T R Y E X T E N S I O N W O R K

N O R T H C A R O L I N A

January 1, 1962 - December 31, 1962, Inclusive

John L. Gray, In Charge, Forestry Extension
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ANNUAL REPORT

FOREST MANAGEMENT SECTION

AGRICULTURAL PRODUCTION, MANAGEMENT AND NATURAL-RESOURCE USE (III)

1962

John L. Gray, In Charge, Forestry Extension
Walter M. Keller, Head, Forest Management Extension Section.

I. Program Accomplishments

A. From the "Plan of Action" section of the Plan of Work

the following paragraph is quoted:

"Although the possibilities for large-scale expansion in timber growing are not wide open at this time, certain opportunities exist. These include:

1. expansion in production of large, high-quality hardwoods;
2. improvement of landowner knowledge of existing hardwood and specialty markets and marketing methods;
3. the development of a large-scale Christmas tree enterprise in the mountain area;
4. the development of a sound business approach to, and increased efficiency in, forest management and forest development;
5. reduction of losses caused by forest diseases, insects and storm damage."

This report will deal with progress and developments in these five major areas of interest. Programs which are on a continuing basis and change little from year to year have been dealt with in past annual reports and will

not receive further emphasis in this report.

1. Expansion in production of large, high-quality hardwoods

In recent years good-quality hardwoods have come more and more in demand by the wood-using industries. Present and future outlooks indicate that this trend will continue, and at a rapidly accelerating rate. As a result of this situation many of the wood-using industries are becoming increasingly aware of the need for more information on the proper management and production of desirable hardwoods. The Extension Forestry Department was among the first to recognize this need, and it has taken the lead in this hardwood program in North Carolina.

Several industrial landowners approached the College and requested specific recommendations for the management of their bottomland hardwood problem areas. In most cases little or no information was available. This meant that basic information would have to be gathered in the field. It was decided that the best approach would be to establish method and result demonstration areas large enough to be operational and give valid data on results.

Two large wood-using companies have worked closely with the forestry specialist, and as a result five demonstration areas totaling 80 acres have been established. This is believed to be the largest and most complete set of hardwood management plots located close to each other in the Southeast.

Four different situations exist on the river-bottom lands belonging to the Riverside Manufacturing Company of Murfreesboro, N. C. They are as follows: (1) low, non-productive lands that are flooded during winter and spring months; (2) mature tupelo-gum stands; (3) young tupelo-gum stands; and (4) growing (60-year age class) sweetgum stands. On the low, non-productive sites the problem is one of successfully establishing proper species in adequate numbers to assure full stocking for a good stand. In the other three situations it is basically a question of knowing what management principles to apply and when and how to apply them.

On Georgia-Pacific Corporation lands the most pressing problem was how to get heavily cutover areas back in full production with the desired species.

Low, non-productive areas are typical of about 1500 acres of bottomland belonging to Riverside Manufacturing Company. The predominant vegetative type is

made up of such non-commercial species as deciduous holly, hawthorn, greenbrier and wild grape. There is a scattering of green ash, soft elm and cypress on the area. A 22-acre block was marked for cutting, leaving only the green ash to reseed the area. All other merchantable trees were marked for cutting. After the marking was completed, 20 permanent plot centers were established in the 22-acre block. Each center was the center of 4 plots as follows: (1) a 1/5-acre plot on which sawtimber volume data was taken on all merchantable trees over 11" DBH; (2) a 1/10-acre plot on which pulpwood volume data was collected on all trees between 4 and 11 inches DBH; (3) a 1/20-acre plot on which number and species of poles and saplings between 2 and 4 inches DBH were tallied; and (4) four mil-acre plots on which reproduction counts were made. Basal area was taken on each plot before and after cutting. The leave-tree closest to each plot center was marked with a wide band of paint as a witness tree for the plot center. The distance and bearing from the witness tree to the plot center was recorded.

At this point, the 22-acre plot was divided in

half; 11 acres to be cut and 11 acres to be left as a check plot.

The area to be cut was logged by a company logging contractor, and complete records were kept on the time, costs, and material removed. The sawtimber volume cut averaged almost 4 thousand board feet per acre. The logs were carried to the company sawmill or veneer mill for use.

When the harvesting was completed, a timber stand improvement crew poisoned all the remaining non-merchantable trees, leaving only the green ash for seed trees. The TSI costs came to \$10 per acre; and after deducting this from the income received for the logs, the company was pleasantly surprised to find that they could make a reasonable profit from such an operation. A good stand of green ash reproduction should be established on this area in a few years.

In addition to the preceding 22 acres, a 5-acre plot in this same non-productive area was cleared with a bulldozer and prepared as a planting site. This 5-acre block was divided into 4 plots and planted to hardwoods. Sweetgum, blackgum and tupelo seedlings were planted on 3 of the plots, and cottonwood cuttings

were planted on the other.

Twenty acres was selected and measured off in a large, uniform stand of sweetgum. The stand was 60 years old and averaged 120 feet in height. Five acres of this was set aside as a check area, and the remaining 15 acres was marked for a salvage cut, removing both pulpwood and sawtimber. On the 15 acres, the basal area was reduced from 140 to 90 square feet by the cutting. After the area was marked, but prior to cutting, 15 permanent plot centers were established - 10 in the area to be cut and 5 in the check area. Around each plot center, 1/5, 1/10, 1/20 and 4 mil-acre plots were established in the same manner as described in the preceding low, non-productive areas.

From the area marked for cutting a per acre average of 10 cords of pulpwood and 4 thousand board feet of sawlogs and veneer bolts was cut, leaving an average of 10 thousand board feet per acre in high-quality veneer trees for additional growth. The landowner realized about \$140 per acre from this salvage cut that otherwise would have been lost. With several thousand acres of this timber type needing this same salvage cut, this landowner can expect a substantial

income that would otherwise have been lost. After the logging was completed, a TSI crew went over the area and poisoned the remaining undesirable, non-merchantable trees at a cost of \$8 per acre.

Similar demonstration areas were selected and marked in the tupelo-gum stands belonging to Riverside Manufacturing Company and in the cutover areas belonging to Georgia-Pacific Corporation. Because of bad weather and the resultant flooding of these lowlands it was not possible to log these areas. They will be logged in the dry season during the summer and fall of 1963.

Edward M. Jones, Extension Forest Management Specialist, has headed up and coordinated this bottom-land hardwood work.

John Putnam, hardwood specialist from the U. S. Forest Service's Hardwood Research Center at Stoneville, Mississippi, spent several days with Mr. Jones helping plan, establish and mark these demonstration plots.

In addition, excellent cooperation and support was provided by Charles Hale, forester for Riverside Manufacturing Company, and by Lacy Rowe, forester for the Georgia-Pacific Corporation.

R. S. Douglass and W. M. Keller, of the Extension Forestry staff, assisted Mr. Jones from time to time.

2. Improvement of landowner knowledge of existing hardwood and specialty markets and marketing methods

The objectives were to better inform landowners of the economic advantages to be gained from marketing specialty timber products such as poles, piles and high-quality veneer logs. Combination cuttings of sawtimber and pulpwood were to be encouraged.

In some areas of the state, primarily the eastern section, logging crews began combination harvesting of woodlands. These harvests consisted mainly of sawtimber and pulpwood, with an occasional removal of veneer logs and poles, being primarily determined by the markets available for these specialty items at the time of harvest. Combination cuttings were not only economically feasible for the landowner, but also proved to be advantageous to the logging operators who were equipped to handle the removal of the various timber products.

In some cases landowners were advised to harvest only one specialty item, such as poles or veneer blocks. These decisions were based on available markets, current prices and availability of qualified

logging contractors. Removal of a single specialty product often meant increased returns for the individual trees cut, and a larger return from the woodland area as a whole.

Results were obtained through meetings, field demonstrations and individual instructions given to landowners and buyers of timber products. The most effective results were achieved from individual instruction given while visiting a landowner's woodlands or a logger's cutting operation. An experience with a landowner in Edgecombe County was a good example of the effectiveness of this approach. The owner had been working closely with the Extension forester for more than fifteen years and carrying out all recommended practices. One block of pine timber had been thinned several times and was now ready for the final harvest cut. The forestry specialist recommended clear-cutting and suggested the entire stand be scaled by a consulting forester. The owner hired a consulting forester, had the timber scaled and advertised for sealed bids. When the bids were opened, all of them were from sawmills; and they were lower than the owner had hoped for. The bids were rejected, and the

owner again called in the Extension forester. This time the Extension forester suggested the possibility of a combination pole-piling and sawtimber harvest and put the owner in contact with a pole and piling buyer. This type of sale was new in this county, but the owner followed through on the recommendation and sold his timber to the pole and piling buyer. The owner received \$3,000 more than the highest bid he had been offered for the timber as sawtimber alone. The buyer cut all the poles and piles he could from the stand, and cut the remaining trees into sawlogs and sold the logs to a local sawmill.

All the members of the Forestry Extension staff worked on this phase of the program.

3. Development of a large-scale Christmas tree enterprise in the mountain area

On the Plan of Work for 1962, five steps were outlined to develop the Christmas tree program.

- a. "To promote the development of private sources of Fraser fir planting stock for Christmas trees in the mountain area."

Two landowners were contacted in this area - one in Jackson County and one in Ashe County. Each

was encouraged to produce 1 million Fraser fir 2 + 2 transplants for sale to growers in the state. This private production will supplement the state nursery's production of 1/2 million. Both agreed to produce these seedlings and are now in the process of establishing a nursery operation. An FHA loan management plan for this operation was initiated to obtain the necessary capital for this business. By 1967, approximately 2 1/2 million Fraser fir (2 + 2) will be available to growers in North Carolina.

Four of the forestry specialists assisted with this phase of work - Leonard Hampton, John Gilliam, Fred Whitfield and Ross Douglass.

- b. "To promote the planting of at least 1/2 million Fraser fir and 100,000 Scotch pine seedlings in the mountain area for Christmas tree purposes."

A lack of suitable Fraser fir planting stock restricted the planting in 1962 to approximately 300,000 Fraser fir. The goal of 100,000 Scotch pine planted was reached. In addition, 1/2 million white pine, Douglas fir and other species

were planted. About 1 million of all species were planted.

The following methods were used to promote this program:

- (1) Television
- (2) Radio
- (3) News articles
- (4) Personal contacts
- (5) Variety demonstrations
- (6) Group meetings with growers
- (7) Meetings with professional Agricultural workers
- (8) Letters to members of the growers' cooperative
- (9) Quarterly newsletter (A-1)

Leonard Hampton assisted in this program.

- c. "To assist landowners in the mountain area to increase income by \$50,000 in 1962-63 through the sale of small bagged-and-burlapped Fraser fir."

Income to Christmas tree growers and nurserymen was increased approximately \$250,000 because of improved quality resulting from shearing Fraser fir and white pine. This better-quality stock commanded a higher price on existing markets and also broadened market opportunities.

The following methods were used to accomplish this:

- (1) Field demonstrations in the technique of shearing
- (2) Group meetings with growers using prepared color slides on cultural practices necessary for the production of quality trees
- (3) Requests from buyers to the Extension Forestry and county offices concerning sources of balled-and-burlapped stock were made known to interested buyers. This served to coordinate the marketing of this stock

The forestry specialists assisting with this program were Leonard Hampton and John Gilliam.

- d. "To reduce cost of weed control in Christmas tree plantations."

Method and result demonstrations were established using several weed control chemicals to determine their effectiveness in terms of control and cost. From these demonstrations it was determined that on sites too steep and rough for mechanical mowing Simazine was most effective. Several growers are now using chemicals for this purpose and, consequently, reduced their cost of weed control by two-thirds over hand weeding and cultivation.

Methods used:

- (1) Results of chemical weed control demonstrations were made known to the growers through the quarterly newsletter
- (2) Group meetings
- (3) Personal contact with growers

Assisting with this weed control were John Gilliam and Leonard Hampton of the Extension Forestry Department and Dr. Bryson James of the Extension Horticulture Department.

- f. "To keep tree growers informed on the best cultural practices for producing a premium tree at the lowest possible cost."

A newsletter (A-1) was prepared by the Extension Forestry staff and sent to the secretary of the North Carolina Christmas Tree Growers' Cooperative in Newland, N. C. The newsletter was then sent to each member of the Cooperative, each county agricultural agent in the mountain area, and other key people throughout the state. The newsletter served as a link between various sources of research material and the grower. This enabled the grower to keep abreast of the latest techniques on planting, management, and marketing of Christmas trees.

A series of meetings and field demonstrations were conducted throughout the mountain area by the Forestry Extension staff to teach shearing techniques and other cultural practices necessary

to produce a premium-grade tree.

Nine test demonstrations on Christmas tree plantings were established to demonstrate the economic practicality of applying commercial fertilizers to improve quality and growth rate.

Also established was a test demonstration to demonstrate the relative merits of four different planting methods and various sizes and grades of Fraser fir seedlings. Because of seedling costs and value of the crop, these factors have very significant economic importance in Christmas tree production.

The bulletin Growing and Marketing Christmas Trees (A-2) by John H. Gilliam was released in September, 1962; and by the end of December the original 15,000 copies were all gone. The bulletin was reprinted.

4. The development of a sound business approach to, and increased efficiency in, forest management and forest development

All costs in forest management, including an acceptable rate of compound interest, must be balanced off by the value of harvested products if forest

production is to be a profitable enterprise from a business viewpoint. Assuming that good management practices are followed, the value of harvests is directly related to the productive capacity of the soil. Therefore, before money is invested in the production of a timber crop, the landowner should be reasonably sure that the soil is capable of production that will pay off the investment.

To promulgate this idea among timberland owners, the following things were done:

- a. A tour in mountain counties for professional agricultural workers
- b. A night meeting in mountain counties for professional agricultural workers and timberland owners
- c. A presentation and discussion of this information before Union County U.S.D.A. workers' council
- d. Radio program at Troy
- e. A presentation and discussion of this information with an indoor meeting and tour of vocational agriculture teachers at an area-wide meeting at Asheboro (A-3)
- f. Demonstrations of the productive capacity of soil at two contrasting stops on tour of Gilmore forest in Moore County (A-4)
- g. Three-day short course for Extension Forest Management staff
- h. Classroom discussions and tours for North Carolina State College Agricultural Institute forestry class on the following:

- (1) Soil site index and tree growth
 - (2) Soil site index and economics
 - (3) Soil site index and economics tour
 - (4) Pine regeneration by natural means
 - (5) Hand and machine planting
 - (6) Mechanical site preparation
 - (7) Fire presuppression and fire damage
 - (8) North Carolina Forest Service organization
 - (9) North Carolina Forest Service organization tour
- i. Assisted with forestry program planning at Area Development and Rural Area Development meetings (A-10)
 - j. Continuation of test demonstration work showing the necessity of culling out poor-quality seedlings when planting on adverse sites
 - k. Two TV shows on forest planting
 - l. Preparation of cost and return information based on soil quality of three contrasting areas in Alexander County for forestry tour of Northwest North Carolina Development Association (A-9)

This phase of the department program was handled by Ross S. Douglass, with all the other staff members also helping.

5. Reduction of losses caused by forest insects, diseases and storms

The southern pine beetle outbreak in two counties last year became a serious epidemic during the summer of 1962. The range of infestation continued until at least seven Piedmont counties are now in epidemic stages. Losses are estimated to be in excess of \$500,000.

To assist agents in telling landowners of the losses caused by insect attack and of the potential threat next summer, a "Farm Forestry Facts" (A-5) sheet was prepared for distribution explaining to landowners methods of control and salvage in case of attack.

A news article was prepared, a network TV program prepared and presented, as well as network radio program.

Personal visits to agents in infested counties accomplished very much because on-the-spot information seemed to impress the agents more.

A feature of an agent training meeting to keep landowners informed of long-range outlook for forest products was a stop at a serious attack of southern pine beetle. Agents from thirteen counties were given in-the-woods training on how to identify, salvage and control this insect pest.

Agent training was also given in counties attacked to acquaint local landowners with the ravages of another insect epidemic in western North Carolina counties. The elm spanworm continued to spread northward and eastward during the summer of 1962. The biggest

problem is to keep landowners informed to counteract false tales that tend to get people frightened.

The same teaching method was used to keep agents in eight counties informed on the continued spread of the balsam woolly aphid in western North Carolina mountains. Fraser fir mortality continued at an increasing rate, and its spread also continued. No effective method of control has been found for forest trees, but Christmas trees may be protected by chemical sprays even though this has not yet become a problem in western North Carolina.

A motion picture was produced and televised over the several stations carrying the Aspect program. The Visual Aids Department and the radio and television editor collaborated in this production showing the devastation caused by the balsam woolly aphid.

A 1400-acre forest fire was followed by an epidemic of Ips engraver beetles in Richmond County. The Visual Aids Department assisted, and a motion picture was produced and televised state-wide showing how this beetle killed two hundred acres of pines. Since these insects attack pines each year, they destroy a larger volume of timber in the long run than any other insect.

Foresters at Fort Bragg requested assistance in determining the cause of trees dying on the reservation. In cooperation with the State Forest Service and U. S. Forest Service a survey was made to determine the cause of the death of many trees. A determination was made, and recommendations were given to the forestry department, which in turn presented them to officials at the Fort for disposition.

Madison-Mayodan schools again conducted their outdoor education program for the fifth-grade students of Rockingham County. Forest entomology was presented to the students at this two-day in-the-field instruction program. Entomology was one of six subjects presented.

A similar training program was presented by the city schools of Greensboro, at which time forest insects and diseases was presented. This training was given at Umstead Park in Wake County.

Test demonstration plots were established in Edgecombe County to show mortality of advanced and newly-established reproduction caused by pales weevil and other insects in a clear-cut area of pines.

Test plots were also set up in Avery and Watauga

Counties to show the insects infesting various forest-stand types and the insects attacking Christmas trees. These plots were prepared with the aid of the Entomology Department.

A "Farm Forestry Facts" sheet (A-6) was prepared on diseases of Christmas trees to assist Christmas tree growers in managing stands for more profitable production. This material was distributed by the county agents and in a newsletter of the Christmas Tree Growers' Association.

A "Farm Forestry Facts" sheet (A-7) was prepared on "Some Insects That Attack Christmas Trees." This was distributed by the county agents and also through the newsletter of the Christmas Tree Growers' Association.

Assistance was given to two paper company foresters on insect and disease pests in seed orchards. One other paper company forester was assisted in determining cause of injury in their slash pine plantations.

The U. S. Forest Service requested and received assistance in determining whether or not a cork oak insect was established in North Carolina.

Cooperation was given the North Carolina Forest Service, the U. S. Forest Service and the Pathology Department in announcing the detection of the Dutch elm disease in North Carolina.

Fred E. Whitfield was the staff member handling this phase of the program.

B. In addition to the preceding, the department was involved in many other matters both of a routine and an emergency nature. Some of the high spots of these are reported very briefly in the following paragraphs:

1. Early in 1962, the North Carolina Agricultural Extension Service embarked on an intensive campaign to raise farm income in the state from 1.2 billion dollars to 1.6 billion dollars by the year 1966. This program was given the name: 1.6 in '66. As their part, the Extension Forestry Department drafted a comprehensive 21-page program (see Appendix A-8) setting forth specific 5-year goals and methods of attainment. Several of the goals set forth have already been attained, and this report is the guide for the Department's annual plans of work.
2. In the spring of 1962, the state forester was faced with a large surplus of pine seedlings which would

have to be plowed under. Rather than destroy these seedlings, the Board of Conservation and Development authorized the state forester to offer them free of charge to 4-H and FFA members. On April 4, a letter (A-11) was sent to the State 4-H Leader announcing this offer. The offer had a termination date of April 20. The Extension forester and State 4-H Leader got out a letter (A-12), and in slightly less than two weeks were successful in placing over 100,000 pine seedlings in the hands of 4-H Club members.

3. At the request of the wood-treating industry, the Extension Forestry Department prepared a consumer education analysis of wood versus steel guardrail posts and helped present this information to the Chief Engineer, North Carolina State Highway Commission. This got a favorable hearing from the Highway Engineer.
4. At the request of the Dean of Agriculture, a complete outline was prepared for a forestry elective course for the two-year Agricultural Institute students.
5. A report was prepared by the Extension Forestry office for the North Carolina Forestry Association on "Assistance to Small Forest Owners in North Carolina."

The Extension forester accompanied the Association's officers to Washington and helped present this information to Undersecretary of Agriculture Murphy.

6. The Extension forester made a study and prepared a report for the North Carolina Forestry Council on:
"Public forester-consulting forester relationships."
7. The Extension forester made the following two major talks to out-of-state groups:
 - a. Talked to the Washington, D. C., Section of the Society of American Foresters on "Translating Research into Action."
 - b. Talked to the Southern Pulpwood Conservation Association annual meeting on "As Others See the Pulpwood Industry."

A. T. Davison, Pres. Herbert Aldridge, Vice-Pres. Walter Tennant, Sec.-Treas.
 Durham, N. C. Banner Elk, N. C. Crossnore, N. C.

NORTH CAROLINA CHRISTMAS TREE GROWERS ASSOCIATION

Newsletter #5

March, 1962

DIRECTORS

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 Box 7317, Asheville, N. C.

DIRECTORS

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Seedling Situation

According to reports from the North Carolina tree-seedling nurseries, the following species are available as of March 1, 1962:

Fraser fir	2-1	506,000
	2-0	1,499,000
Scotch pine	1-0	644,500
White pine	2-0	1,554,600

Secretary's Report by Walter Tennant

The annual winter meeting was held on November 17, 1961, at the courthouse in Newland, N. C. At this meeting, the following directors were elected to serve a three-year term: Mr. Don Wiseman, Mr. A. T. Davison (re-elected), Mr. R. C. Heath (re-elected). Mr. Fred Lowe was elected to fill the remaining term of Mr. Robert Snyder.

In the board of directors' meeting, the following officers were elected for the new year: Mr. A. T. Davison, President; Mr. Herbert Aldridge, Vice-President; and Mr. Walter Tennant, Secretary-Treasurer.

The membership dues are now payable and should be sent at the earliest possible date. Due to the increase in the price of the Journal and proposed increase of national dues, the membership fee was raised from \$7.00 to \$10.00. Affiliation with the National Christmas Tree Growers Association requires that all membership dues be paid by the first of April.

The outlook for the Cooperative for the coming year is very promising. All members are encouraged to participate in the meetings' activities.

The following excerpts are quoted directly from the Christmas Tree Report, issued by the New York State Department of Agriculture and Markets, dated February 2, 1962:

SUMMARY OF THE 1961 CHRISTMAS TREE SEASON

In 1961 quality was the key to success.

Most New York State producers were quite successful in selling better-quality trees at prices comparable to 1960, while U. S. No. 2 and poorer quality moved slowly - if at all.

The early selling period of September and October was very erratic. No pattern was established and confusion reigned. Earlier indications were toward a strong market, but conditions did not materialize and throughout the early season the market remained in a "State of Flux." Buyer inquiry was reasonably good, but few actual sales were made. Buyers appeared to be trying to tie up trees verbally, while they awaited development.

Unsettled market conditions continued into early November and sales made up to this time were mostly along quality lines. Premium grade and some U. S. No. 1 grade were improving in demand, and sales were fairly active in some sections. The weather remained unseasonably good and was blamed by many as the determining factor for the overall slowness of sales.

Around the later part of November the situation reversed itself, and buyers were actively purchasing trees in increasing numbers. Quality still remained a factor and U. S. No. 2 or poorer tree sales were few. At this point even though active buying was two to three weeks later than usual, it appeared that most producers would fare well for the season.

By the first part of December buying activity was past the peak and quality Scotch Pine, White Spruce, all kinds of Douglas Fir and good plantation Balsam were fast becoming scarce. The "Wholesale to Retail" sales were well underway and full retail lots appeared in all areas.

Toward the middle of December producer sales were small lot and local. Wholesalers had moved trees into retail outlets and the retail trade should have been reaching its peak. However, the anticipated heavy retail buying did not materialize and many lots wound up the season with most of their poorer quality trees still on hand. Experienced retailers and producer-retailers who offered good trees were mostly sold out, while speculators, chain stores and some others did not fare as well.

In summary the buying season started two to three weeks later than usual. Buyers were quality conscious. Producers in general sold fewer trees, but had little trouble moving their quality trees. Wholesale dealers bought less and sold most of their trees. Retailers again this year met with varying successes. Many junk trees were dumped as consumers were "choosie" and there was less consumer purchasing.

The trend noted last year, where dealers were purchasing or leasing plantations became a fact this season, as this activity increased.

The artificial tree that caused some concern last year has now become a definite problem to the fresh tree industry. Prices of these trees were reasonable and they were handled in grocery stores, hardwares, department stores and chains. It is a fact that sales of these trees increased over the entire north-east and it is also a fact that sales of fresh trees decreased. The proportions may not have been comparable, but the problem is definitely here to stay - as many fresh tree retailers will confirm.

New England areas sold up to 25% less trees this year.

SYRACUSE - This year there were 259 loads of trees on the Central New York Regional Market which consisted of Balsam, Spruce, Douglas Fir, Scotch Pine (both sheared and plain), Red Pine, etc.

With the exception of Sheared Pine and Douglas Fir they were selling at wholesale from \$1.25 up depending on size and quality. Sheared Scotch Pine was starting at \$2.00 and Douglas Fir at \$3.00. Retail prices were practically double wholesale prices.

ROCHESTER - The 1961 Christmas tree market in the Rochester, New York area got off to a slow start. Wholesale buyers were scarce in producing areas early in the season and few volume sales were made by mid-November. The last week in November demand was improved and practically all trees of good quality sold quickly.

Scotch Pine continued to be the most popular tree but principally because it was the most plentiful. There was an excellent demand for White Spruce. Douglas Fir continued the prestige tree.

State of the Industry

All the market reports that our Extension Forestry offices have received during the past marketing season for wholesale cut trees, indicate that buyers are more quality conscious than ever before in the history of Christmas tree production. I am sure most of you will agree that quality will be the key to success of any producer in marketing his trees for the top dollar.

To obtain this quality, first plant the best-quality seedlings you can find. Be sure that the species is well suited to the particular site you have selected for planting. Follow a planned program of management to include a satisfactory method of weed control, shearing and, if necessary, fertilization.

North Carolina Christmas tree growers must collectively produce large numbers of good-quality trees in order to attract an outside market.

Mr. Walter Keller, forestry Extension specialist in charge of Forest Management Section at State College, reminds North Carolina growers, and I quote:

"30,000 acres should be planted to Christmas trees in North Carolina to meet the needs of the Southern markets. This would mean 81,000,000 trees. This figure is not as large as it seems since it takes approximately 8 years to grow a 6-foot tree. Also, consider that only 60% of the trees planted will make quality trees. This cuts the total number to about 45,000,000. Spread this over eight years, and it cuts the annual production to between five and six million trees. With quality trees and a good

marketing program, North Carolina Christmas tree growers can move this number into the market without too much difficulty."

Remember one thing - we can help accomplish this through a strong, active membership in the Association. Encourage your friends who are beginning to plant Christmas trees to join the Association and go to work to support it.

Tree Tips

On rough, steep terrain where water for spraying equipment is scarce, granular chemicals seem to be the answer for weed control in Christmas tree plantations. In the mountains, most of the upland sites planted to Christmas trees are too steep for mowing or mechanical spray equipment. As one grower put it, it's either granular chemical or none at all for me. He went on to say he was not fully convinced that granular chemical was the answer until he attempted a few trips to the "upper field" with a hand sprayer filled with solution.

The problem still resolves itself to controlling weeds and grass in the plantation whether you plan to mow or use chemicals, either in liquid or granular form.

Dr. Bryson L. James, Extension Horticulture specialist at North Carolina State College, has the following suggestion for nurserymen and Christmas tree growers:

"For weed and grass control in Fraser fir and white pine plantations, try granular Simazine applied in March, before weed and grass seeds germinate, at the rate of 2 pounds actual (50 pounds Simazine 4G) per acre. Apply with a cyclone seeder or any other applicator which will give uniform coverage. Apply half the material walking in one direction and the other half at right angles to the first.

"In areas accessible with tractor-drawn spray equipment, use the wetttable powder Simazine at 2 pounds actual (2½ pounds Simazine 80W) per acre. Apply with enough water to insure uniform coverage. Apply both these materials just before a rain if possible."

Shearing

The accepted time for shearing fir and spruce is during the dormant season. If you have trees that are approaching 2½ to 3 feet, now is the time to begin shaping the tree for top grade. The first shearing will normally require very little work. A few snips with the hedge clippers should kick your tree off to a good start. One man should be able to shear 300 trees or more per hour for that first shearing if your plantation is fairly easy to move around in. (And you do not lean on your shears!)

Care of Seedlings upon Arrival

Your success or failure as a tree grower will begin at the time you receive your bundle of seedlings.

If you are planning to plant your seedlings within a 3-to-4-week period after they arrive, they can be safely held in the shipping package provided you do the following:

1. When the seedlings arrive, pour water into the open ends of the bundle. Roll the bundle on the ground to ensure the roots and moss are wet thoroughly.
2. Store the bundle in a cool building where the seedlings will not freeze.
3. Place the bundle on a rack at such an angle any excess water will drain out. Experiments have shown that it is harmful to keep seedling roots continually soaked in water.
4. Repeat the watering process once a week if necessary.

Planting

Be sure the seedling is planted in such a way the roots are not cramped or curled in the planting ball. The seedling should be planted to at least the depth it grew in the nursery. It can be planted deeper.

Planting Bar

For those who use the dibble or planting bar, I wish to remind you of the new-type wedge bar that is available on the market. This bar is especially desirable for planting rocky soil and abandoned pasture land. The blade is wedge-shaped and tapers to a sharp point. This sharp point will glance off a small rock and will also penetrate the hard crust that is sometimes found on the surface of pasture land. Overall, the bar is a little larger and heavier than the flat-type bar. It is known as the KBC planting bar and can be purchased for about \$6.00.

Contact your county agricultural agent for details about this tool.

General: Fertilization, Chemical and Planting Demonstrations

Fertilizer:

Plans are underway to establish additional experimental study plots this spring, using several different analyses of fertilizer and several methods of application. These plots will be laid off systematically, measuring height of each tree at the time of establishment, in order to determine the exact change in growth rate, to be measured at a later time.

Chemical:

Additional chemical plots for weed control in Christmas tree plantations will be established in the spring in order to continue the search for more answers concerning weed control.

Planting Methods:

Plots will be established during the planting season using at least three different types of planting tools. The purpose of these plots will be to determine changes in rate of growth (if any) through different planting techniques.

Christmas Tree Publication

The Christmas tree publication that John Gilliam has been sweating over for the past several months is now at the printer's. We hope this very fine publication will be ready for distribution sometime this spring.

The following special report on the major insect pests of Christmas trees was prepared by Fred Whitfield, forest management Extension specialist at North Carolina State College:

Christmas trees, like any other farm crop, are subject to injury or death by insects. Some insects will attack several different kinds of trees, while others are more specific and attack only one kind of tree. Therefore, a knowledge of major insects that attack evergreen trees is important.

Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco)

This species is well out of its natural range. It is not possible, therefore, to determine which pests will become most important in North Carolina.

Fraser fir (*Abies fraseri* (Pursh) Poir.)

Balsam woolly aphid (*Chermes piceae* (Ratz.)) is a tiny European insect imported to United States about 1908. This insect has moved into many areas of the United States and Canada where it attacks and kills many of the true firs. It is very difficult to detect at first, but it later causes white woolly patches on the trunks and twigs. This insect sucks sap through the bark and if allowed to continue without controls, the tree will die within two or three years. It has caused the death of many Fraser firs in natural stands in western North Carolina during the past few years.

This insect has not been a serious problem in Christmas tree plantations to date. Christmas tree growers should examine plantings of fir carefully to determine if the trees have been attacked. If your trees have been attacked, the insect can be controlled by spraying the entire tree with a solution of BHC 11% emulsifiable concentrate at the rate of 5 tablespoons per gallon of water as a late dormant spray during the last half of May.

Information on costs of spraying may be obtained from your county agent's office.

Balsam gall midge (*Cecidomyia balsamicola* (Lint.)) lays its eggs in the needles of balsam fir and Fraser fir. Galls become noticeable (yellowish oval swellings) near needle bases on new growth about midsummer. Trees heavily infested are not killed but may lose many of their needles before or after trees have been cut for use at Christmas. No satisfactory chemical control is known.

Norway spruce (*Picea abies* (L.) Karst.)

Spruce spider mite or red spider (*Oligonychus ununguis* (Jac.)) is the name most often applied to this species of web-spinning mites. These pests cause pale-brownish speckling which may later cover the needles of the entire tree

and a web sometimes so dense as to be plainly visible on the leaves. During hot, dry weather an infestation will damage spruces because these pests suck juices from leaves. They can be controlled by spraying with Malathion or Aramite if properly applied. Two or three applications at seven- to ten-day intervals usually will be necessary. (See Rev. Extension Folder No. 164, "Spider Mite Control on Ornamentals.")

Sawflies (See White pine)

White pine weevil (See White pine)

White pine (*Pinus strobus* L.)

Pine bark aphid (*Pineus strobi* Htg.) attacks white pine, causing unsightly white woolly patches on the trunk and twigs. They suck sap through the bark and weaken the tree. To control, spray on a warm, sunny day with $1\frac{1}{2}$ teaspoons 40% nicotine sulfate to one gallon of water to which one ounce of soap has been added. Use pressure to penetrate waxy mass.

White pine weevil (*Pissodes strobi* (Peck)) (See attached "Farm Forestry Facts" sheet.)

Sawflies (*Neodiprion* spp.) are yellowish to greenish-looking larvae that feed in clusters on needles. Unless controlled, they may devour all the needles of the tree, but usually the tree will recover. They can be easily controlled by applying DDT 25% emulsifiable concentrate at the rate of 2 teaspoons per gallon of water or DDT 50% wettable powder at the rate of 2 tablespoons per gallon of water. Apply when larvae are first noticed.

Pine tip moths (*Rhyacionia* spp.) kill the buds and twigs of pines. They also feed on the outside of new shoots, causing a distorted shoot. Severe repeated attacks may result in stunted, deformed trees. These insects are very difficult to control, and treated areas usually become reinfested.

Spray with DDT 25% emulsifiable concentrate at the rate of 8 tablespoons per gallon of water when new shoots start growing and again at the end of their growth period or in June. Shearing, when properly done, also helps to control these pests. To further help control these pests, pick and burn the infested shoots.

Pine leaf aphid (*Pineus pinefoliae*) (Fitch) attacks white pine and spruce. This insect overwinters on white pine and sometimes kills the tips of branches. This injury may not be noticed until late summer or early fall. In early spring the insects may move from white pine to the past year's needles on spruce. The new growth of spruce is attacked, causing the tree to form cone-like galls. When the galls mature and turn brown, the insects are released and they fly to white pine where they attach themselves to the past year's needles. The exact time of these flights cannot be predicted because the rate of development of this insect is controlled by the weather. The time of migration to white pine must be determined by frequent examination of last year's needles during June. The adults are very similar to winged plant lice.

To control this insect, thoroughly wet the branch tips when the adults are attached to the needles with a spray of Malathion emulsifiable concentrate (5 lbs./gal.) at the rate of 4 teaspoons to a gallon of water.

Pales weevils (Hylobius pales) feed on the bark of young seedlings, causing injury or death. Where Christmas trees are planted immediately after a partial cutting or where seedlings have been lined out in a recently cleared area, there is risk of infestation by these insects. The adults are attracted to freshly cut stumps of needle-type evergreens, where they breed. The adult insects feed on the tender bark of twigs of saplings, along the main stems and roots of seedlings. They feed mostly at night or below the litter during the day. The first evidence of attack is when the young seedlings wither, and it is too late for control measures.

Seedlings may be treated by dipping the tops in a solution of Aldrin (11 oz. of Aldrin (2 lbs./gal.) to one gallon of water). One gallon of the mixture will treat about 30,000 seedlings. Rubber gloves should be worn and care should be taken in dipping planting stock so that the material does not get on the roots of the seedlings.

Insecticides are poisonous. Store them in plainly labeled containers away from all food. Follow directions and heed precautions given by manufacturer.

Call or visit your county agent for further information.

Farm Forestry Facts

Forestry Extension Department N. C. State College, Raleigh, N. C. October, 1961

White Pine Weevil

The white pine weevils continue to increase in western North Carolina, causing considerable injury to white pine. These weevils also attack Scotch pine, the spruces and Douglas fir, making them of special interest to Christmas-tree growers.

The attack of these insects kills the leaders of the trees and is probably the most serious pest of white pine.

The adult weevils hibernate in the litter during the winter months. During the warm days of early spring they emerge from hibernation and start feeding on the tender bark of the branches. When daytime temperatures reach 75°F. or above, the female deposits her eggs in small punctures she makes in the leader. When this occurs, drops of resin appear.

The eggs hatch in about a week. The larvae tunnel under the bark and migrate downward as they develop. As much as three previous seasons' growth may be killed by the girdling effect. Mature larvae bore into the wood of the shoot and rest for about ten days (pupate). In July and August the adults emerge and feed until they hibernate for the winter. There is only one generation each year.

Fall and Winter Spraying Solutions:

From the middle of September through December spray the following solution:

Lindane 20% emulsifiable concentrate - 12.8 fl. oz.

Extender - Aroclor + xylene (#5460) - 3.4 fl. oz.

Water to make two gallons of emulsion

Spring Spraying Solution:

During March and April spray the following solution:

Lindane 20% emulsifiable concentrate - 6.4 fl. oz.

Extender - Aroclor + xylene (#5460) - 1.8 fl. oz.

Water to make two gallons of emulsion

DDT 25% emulsifiable concentrate - 20.4 fl. oz.
Water to make two gallons

Usually the butt log produces two-thirds of the board-foot volume and three-fourths of the lumber value in the tree. Therefore, it will be necessary to protect the trees until they are 18 feet in height. Three to five treatments should provide enough protection for them to obtain this height.

Selective Spraying

Spray only good trees (crop trees). In a plantation 5 feet to 8 feet in height 450 trees can be sprayed per gallon, 650 trees can be sprayed per hour.

Remove and burn weeviled leaders of untreated trees in July.

Very truly yours,

County Agricultural Agent

Prepared by:

F. E. Whitfield
Forest Management
Extension Specialist

Farm Forestry Facts

Forestry Extension Department N. C. State College, Raleigh, N. C. December, 1961

EVERGREEN TREES SUITABLE FOR CHRISTMAS TREE PRODUCTION IN NORTH CAROLINA

There are many evergreen trees that can be grown for Christmas trees in North Carolina. Your choice will depend primarily on the desirable characteristics the trees possess and their adaptability to your local climatic conditions.

There are several characteristics that determine a good Christmas tree:

1. Foliage - Dark-green to blue-green is best. Twigs should be stiff enough to hold ornaments, yet be soft enough to ship without breaking.
2. Needle retention - They should have the ability to hold needles well at room temperature. Trees should be able to hold needles from three to four weeks after cutting to insure a fresh, safe tree during the Christmas holidays.
3. Fragrance - Trees should have a pleasing odor.
4. Insect and disease resistance - Some species seem to have a greater number of natural enemies than others; yet none are completely free from insects.

Table I - Quality Characteristics of Christmas Tree Species

Species	Fragrance	Color	Stiffness of Twig	Shipping Qualities	Needle Retention	Freedom from Pest
Red cedar	Excellent	Poor to good	Fair	Poor	Poor	Poor
Arizona cypress	Fair	Good	Fair	Poor	Poor	Poor
Scotch pine	Good	Poor to good	Excellent	Good	Excellent	Poor
White pine	Good	Good	Good	Good	Good	Fair
Norway spruce	Good	Good	Good	Fair	Poor	Fair
White spruce	Good	Good	Good	Fair	Poor	Fair
Fraser fir	Excellent	Excellent	Excellent	Excellent	Excellent	Very good
Douglas fir	Very good	Excellent	Good	Excellent	Very good	Very good

All species listed in Table I can be grown successfully in North Carolina but are restricted to certain geographic locations with regard to climatic conditions and altitude.

(MORE)

Table II - Species Adapted to North Carolina Conditions by Geographic Location

Area	Species
Coastal Plain	Red cedar (<i>Juniperus virginiana</i>)
	Arizona cypress (<i>Cupressus arizonica</i>)
	Scotch pine (<i>Pinus sylvestris</i>)
Piedmont	Red cedar
	Arizona cypress
	Scotch pine
	White pine (<i>Pinus strobus</i>)) Upper Piedmont
	Norway spruce (<i>Picea abies</i>)) only
Mountain	White pine
	Norway spruce
	White spruce (<i>Picea glauca</i>)
	Blue spruce (<i>Picea pungens</i>)
	Douglas fir (<i>Pseudotsuga menziesii</i>)
	Fraser fir (<i>Abies fraseri</i>)
	White fir (<i>Abies concolor</i>)

For additional information on Christmas tree varieties to plant in North Carolina contact your county agricultural agent.

Very truly yours,

County Agricultural Agent

Prepared by:

John H. Gilliam

Forest Management Extension Specialist

Table I - Ornamental Christmas Tree Varieties

Species	Common Name	Family	Height	Color	Notes
<i>Juniperus virginiana</i>	Red cedar	Cupressaceae	10-20'	Green	Adapted to coastal plain
<i>Cupressus arizonica</i>	Arizona cypress	Cupressaceae	10-15'	Green	Adapted to coastal plain
<i>Pinus sylvestris</i>	Scotch pine	Pinaceae	10-15'	Green	Adapted to coastal plain
<i>Pinus strobus</i>	White pine	Pinaceae	10-15'	Green	Adapted to piedmont
<i>Picea abies</i>	Norway spruce	Pinaceae	10-15'	Green	Adapted to piedmont
<i>Picea glauca</i>	White spruce	Pinaceae	10-15'	Green	Adapted to mountain
<i>Picea pungens</i>	Blue spruce	Pinaceae	10-15'	Green	Adapted to mountain
<i>Pseudotsuga menziesii</i>	Douglas fir	Pinaceae	10-15'	Green	Adapted to mountain
<i>Abies fraseri</i>	Fraser fir	Pinaceae	10-15'	Green	Adapted to mountain
<i>Abies concolor</i>	White fir	Pinaceae	10-15'	Green	Adapted to mountain

All species listed in this bulletin are suitable for use as Christmas trees. Some species are more adapted to certain geographic areas than others.

GROWING
and
MARKETING

*Christmas
Trees*

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Prepared by

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THE NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

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June, 1962

Extension Circular No. 436

GROWING & MARKETING CHRISTMAS TREES

Excellent Fraser fir
plantation 6 years old.



North Carolina could be a major producer of Christmas trees. Climate, nearness to large metropolitan markets, and excellent transportation facilities should enable it to sell all the high-quality trees it can grow at competitive prices.

Local requirements are substantial. Each year approximately 1,000,000 Christmas trees are used in North Carolina. Currently, 80 per cent come in from Canada and Nova Scotia, with the remaining 20 per cent home grown. These home-grown trees are harvested mainly from pastures and farm woodlots, with only a relatively few trees from managed plantations.

The managed plantation is the key to growing high-quality Christmas trees. Recognizing this, North Carolina Christmas tree growers have organized a Christmas Tree Growers' Cooperative. The purpose of this organization is to increase interest in commercial Christmas tree plantations and to encourage production of top-quality trees.

On a national scale, the growing and marketing of Christmas trees is big business. In 1959, approximately 40,000,000 trees were marketed in the United States. Of this total, 10,000,000 were imported from Canada and Nova Scotia, with the balance harvested from farm woodlots and managed Christmas tree plantations in the United States. This represents an estimated \$60,000,000 retail business.

Demand for Christmas trees will increase as more family units come into being. According to the U. S. Census Bureau, the population will have increased approximately 12 per cent by 1975. This will mean a corresponding increase in the Christmas tree market.

North Carolina can obtain its share of the national and local market because we can produce a better product and supply it fresh to the markets.

This publication discusses the many problems involved in growing and marketing Christmas trees and outlines ways to cope with them.

Steps In Establishing A Christmas Tree Plantation

Christmas trees are a product of the land. When grown as a specific farm crop, they are often the results of a well-managed and planned enterprise.

A grower needs to consider many steps when planning his Christmas tree program.

Establishment of a Christmas tree plantation involves many important steps. The assumption is made here that production is based on seedlings set out in plantations which will be maintained and protected.

The product to be grown must have consumer appeal. Regardless of species, the average buyer wants a tree that has, as nearly as possible, the following characteristics:

1. **Symmetrical shape**
2. **Strong lateral branches**
3. **Good needle retention**
4. **Pleasing appearance**
5. **Pleasant odor**

Selecting the Proper Evergreen Species

Several species of evergreen trees can be grown in North Carolina for Christmas trees. Your choice will depend on several things:

1. **Consumer appeal**
2. **Soil characteristics of your land**
3. **Climatic requirements and elevation**
4. **Rate of growth**
5. **Availability of planting stock**
6. **Insect and disease hazards**

Most commercial species now being grown in North Carolina are: Redcedar in the Coastal Plains and Piedmont; Fraser fir and white pine at the higher elevations in the mountains.

Some growers are beginning to try other species, adapted to their locality, that have the distinctive characteristics which appeal to Christmas tree buyers. The newer species include: Scotch pine, Norway spruce, Colorado blue spruce, Douglas fir, and Arizona cypress.

Arizona cypress and Scotch pine will grow in the Coastal and Piedmont areas, while Colorado blue spruce, Norway spruce, and Douglas fir grow at higher elevations along the Appalachian Mountain range.

It is advisable to plant more than one species, since all buyers will not want the same kind of tree. Select trees native to your area; then add a few of the newer species on a trial basis.

Table 1. Species Adapted for Christmas Tree Production in North Carolina

Coastal Plains	Piedmont	Mountains
Redcedar (<i>Juniperus virginiana</i>)	Redcedar	Fraser fir (<i>Abies fraseri</i>)
Scotch pine (<i>Pinus sylvestris</i>)	White pine	White pine (<i>Pinus strobus</i>)
Arizona cypress (<i>Cupressus arizonica</i>)	Norway spruce	Norway spruce (<i>Picea abies</i>)
	Scotch pine	Douglas fir (<i>Pseudotsuga menziesii</i>)

To make a wise selection of Christmas tree species to plant, you need to recognize the characteristics the consumer looks for in choosing a tree and the good and poor characteristics in the evergreens adapted to your area.

Characteristics of some evergreen varieties

Fraser fir (*Abies fraseri*)—An outstanding tree from the standpoint of the consumer. It has excellent color and needle-holding ability, pleasing fragrance, and strong branches with a slight turn-up to give the tree a compact appearance. The tree is easy to handle and transport. It grows well at higher elevations on cool, moist sites. Its natural range occurs along the higher elevations of the Southern Appalachians. However, it can be grown successfully down to 2,000 feet if planted on north to northeast slopes in areas of high rainfall. It requires 6 to 8 years to reach salable size. Shearing and pruning are necessary to produce good trees.

Douglas fir (*Pseudotsuga menziesii*)—Very good color and appearance, with longer needles than Fraser fir. It has very good needle retention, and handles and transports well. Branches will not support heavy decorations quite as well as Fraser fir. It is subject to drought and late-frost damage, and requires a cool, well-drained site. Seedlings from the Colorado blue strain seed source show the best promise. It grows to 6 feet in 7 to 9 years.

Norway spruce—Fair color, but has very poor needle retention. The needles are short and sharp, but the tree has very attractive appearance. It grows best on cool, moist sites, and can be grown successfully at lower elevation than Fraser fir on carefully selected sites. It grows to 6 feet in 6 to 9 years on good sites.

White spruce (*Picea glauca*)—Characteristics similar to Norway spruce.

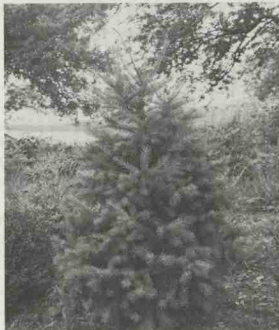
Colorado blue spruce—Exceptional color and pleasing appearance, but has short, sharp needles that make it hard to decorate. It is better as an ornamental than as a Christmas tree. It is similar to Norway spruce in growth habits, except it is a much slower grower. It takes from 8 to 12 years to grow into a 6-foot tree.

White pine (*Pinus strobus*)—Excellent color with good needle reten-

A premium grade Fraser fir Christmas tree.



Douglas fir.



Norway spruce. White spruce is very similar in appearance.





Colorado blue spruce.



White pine that has been sheared.



Scotch pine.

tion; has silver-green appearance and very soft foliage. This is a fast-growing tree on average to good sites, and requires heavy shearing to produce a compact, symmetrical tree. There is occasional heavy shedding of 2- and 3-year-old needles. It grows to 6 feet in 5 to 7 years.

Scotch pine (*Pinus sylvestris*)—Has excellent needle retention. The color ranges from good to poor, depending on the strain. It is subject to crooked stem and fast growth, requiring heavy shearing to produce a quality tree. This tree is very hardy and grows well on most sites. Strong branches and good fire resistance make it a good Christmas tree when managed properly. It grows 6 feet tall in 5 to 7 years and shows promise in North Carolina from the Coastal Plain through the mountain region.

Virginia pine (*Pinus virginiana*)—Fair color and needle retention; grows well on poor sites, but heavy needle shedding gives it an open appearance. It grows irregularly, with a crooked stem, and requires a medium amount of shearing. It is a good tree for spraying or flocking. More experimental work is required before growing of this tree extensively can be recommended.

Redcedar (*Juniperus virginiana*)—Good to poor color, depending on the severity of late-fall and early-winter weather. Has excellent fragrance. The tree has very poor needle retention and, after cutting dries out quickly, presenting a fire hazard unless treated or the base of the tree is placed in water immediately after cutting. It grows very compact and requires little shearing except on good sites where growth is rapid. This tree grows well from the Coastal Plain through the Piedmont. It grows to 6 feet in 5 to 7 years.

Typical planting site
in the mountains.



Table 2. Quality Characteristics of Some Christmas Tree Species That Can Be Grown in North Carolina

Species	Fragrance	Color	Stiffness of Twig	Shipping Qualities	Needle Retention	Expected Height in 6 to 8 yrs.	Freedom from Pests
Redcedar	Excellent	Fair to poor	Fair	Poor	Poor	6 feet	Poor
White pine	Good	Very good	Good	Good	Good	6 feet	Fair
Fraser fir	Excellent	Excellent	Excellent	Excellent	Excellent	5 feet	Excellent
Norway spruce	Good	Good	Good	Good	Fair	6 feet	Poor
Douglas fir	Very good	Excellent	Fair	Excellent	Very good	6 feet	Very good
Scotch pine	Good	Good to poor	Excellent	Good	Excellent	6 feet	Poor

Table 3. Site Requirements for Four Major Christmas Tree Species

Species	Elevation	Soil Type	Acidity	Exposure
Fraser fir	2000-4000 ft.	Deep, well-drained sandy loam soil	pH 3.5 to 5.5	North to northeast slopes ¹
	Above 4000 ft.	Shallow soils, well drained	pH 3.5 to 5.5	Any exposure except southwest to western ²
White pine	Upper Piedmont	Good, well-drained soils	Wide range	North-end east-facing slopes ¹
	Mountains ²	Does well on most soil types when well drained	Wide range	Any exposure
Norway spruce	Upper Piedmont Mountains	Well-drained, sandy loams	pH 6.0 to 7.0	Any exposure except southwest to western ¹
Eastern redcedar	Coastal Plains ³	Grows well on all soil types except deep sand	Neutral to alkaline soil	All exposures except western
	Piedmont		Above pH 6.5	

¹ Avoid all known frost-pocket areas.

² Above 3,000 feet, check for gooseberry and currant bushes to prevent blister rust disease. Clear 400-foot area around planting.

³ Do not plant redcedar in commercial apple-growing counties because of cedar-apple rust.

Selecting and Preparing the Planting Site

Many problems and difficulties can be avoided by wise selection. Soils and site, exposure and elevation, particularly in the mountains and upper Piedmont, must be carefully considered in relation to the species planted. *Frost* pockets must be avoided. Some species are sensitive to drying winter winds, severe drought and excess lime in old pastures and fields.

General site requirements for several species are given in table 3. Fraser fir is more exacting in its site requirements than other species; therefore, examine carefully all planned planting sites.

In preparing planting sites, study carefully species' growth habits and root structure. Fraser fir is a very shallow-rooted tree that requires much moisture; whereas white pine is more deeply rooted and can grow on drier sites.

Other factors to consider when selecting the site for your Christmas tree plantation are:

1. Accessibility to good roads
2. Topography
3. Present vegetative cover
4. Soil and climatic conditions
5. Value of the land

Locate Christmas tree plantation close to good roads: Adverse weather conditions at harvest time can completely curtail harvesting, especially in the mountains, unless plantation is near all-weather roads. Most harvesting will be done with mules, tractors, and by hand; but the central loading area must be located where large trucks can reach it in all kinds of weather to minimize delay in trees reaching their destination. Otherwise, the cost of harvesting and transportation will offset much of the profit from the Christmas trees sold. Theft may be a problem where plantations are located along main roads and away from home. Take precautions to insure against this.

Topography is important: Level to rolling land is best suited for Christmas trees. In the mountain areas, however, examine possible sites carefully. See if harvest roads and firebreaks can be built and maintained and if needed cultural practices, such as mowing or chemical spraying for weed control, can be carried out. If land is too steep, the cost of moving trees out of the plantation may be great.

Plantations should be broken down into small plots of 1 to 5 acres with firebreaks, used for both fire control and harvesting, around each plot.

Select cultivatable land: For best results plant Christmas trees on cultivatable land. If area has been out of crops for any length of time, it is probably covered with bushes and young trees. Such growth is difficult and costly to control. If there is a present heavy sod of fescue, clover, blue grass, or lespedeza, disk the area in the early fall before the winter and spring-planting season. If land is too steep for disking, make a 24-inch-diameter scalp and plant seedling in the center of the scalped spot. Freshly cut timberland should not be selected unless the cut stumps and undergrowth have been poisoned with 2,4,5-T to dis-

courage future sprouting. Generally, areas with little or no brush and very little competing weeds and grasses make the best sites for planting Christmas trees.

Soil and climatic conditions are important: Avoid wet, poorly drained soils, as well as heavy clay soils. Also avoid badly eroded areas. Trees, like other vegetative crops, do best on well-drained, loamy soils. The soil acidity is important. Some species do well on very acid soils, and others require a neutral or alkaline soil. Know the growth requirements of species to be planted and select the soil best suited.

Exposure is very important to certain species. Firs and spruces require northern to eastern exposures, while pines do well on southern and southwestern exposures. *Avoid frost pockets with all species.*

Elevation is a factor to consider. Fraser fir does best at elevations over 2,000 feet, while spruces can be grown down to 1,500 feet. Pines do well at lower elevations. A wider variety of Christmas tree evergreens grows better at the cooler, higher elevations of the state.

What can a grower pay for land? An exact value cannot be placed on land beyond which a grower ceases to make a return on his investment. Many factors have to be taken into consideration; such as, markets, species to plant, taxes, roads, etc. Christmas trees are now being planted on land valued from \$10 to \$200 per acre. With intensive management a grower could pay \$100 per acre for good land and still expect a fair return. Do not make the mistake of buying land unsuitable for Christmas tree production even though the price is cheap. Good land at a reasonable price is the best buy.

Diversify the plantation: Every grower should plant two or more species if his soil and climatic conditions permit. The buyer likes a choice of trees, and what appeals to one might not appeal to another. The saying, "Do not put all your eggs in one basket," holds true for the Christmas tree grower.

In determining the percentage of different species to grow, consider soil conditions, geographic location, and available seedling supply. For the three major geographic locations in North Carolina the breakdown might be as shown in the following table.

Table 4. Percent of Each Species to Plant

Geographic Location	Species	Percent to Plant
Coastal Plain	Redcedar	70
	Scotch pine	20
	Other pines	10
Piedmont	Redcedar	40
	Scotch pine	20
	White pine	30
	Other pines	10
Mountains	Fraser fir	60
	White pine	20
	Norway spruce	5
	Douglas fir	10
	Other firs and spruces	5

To determine the best species to plant on your particular site and soil conditions, contact your local county agricultural agent or forester.

Planting Your Christmas Trees

The success of your Christmas tree plantation will be determined largely by your choice of planting stock, care given the seedlings until planted, and how you plant them.

Choose the right type of planting stock: Choosing the right planting stock in terms of age, size, and quality is very important. The North Carolina Division of Forestry tree nurseries are now producing the following planting stock for sale:

Fraser fir, 2 - 0 and 2 - 1¹
 Douglas fir, 2 - 0
 White pine, 2 - 0
 Scotch pine, 1 - 0 and 2 - 0
 Virginia pine, 1 - 0
 Arizona cypress, 1 - 0
 Redcedar, 1 - 0

¹The planting stock is designated by numbers to show the age from seed and the number of years in transplant beds. 2 - 0 indicates the seedlings are 2 years in seedbed and 0 years in transplant bed. 2 - 1 means 2 years in seedbed and 1 year in transplant bed.

Transplants of Fraser fir are necessary because of slower growth. Information on other recommended fir and spruce transplants can be obtained from the Extension Forester, State College Station, Raleigh, North Carolina.

Plant during the right time of year: The exact planting dates will depend on your geographic location. Plant trees during the dormant season. Use the following table as a guide:

Table 5. Planting-Season Guide

Location	Planting Date
Coastal Plains	February through March
Piedmont	February through April
Mountains	March through April

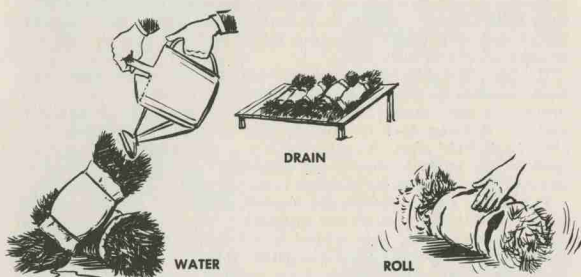
Note: Avoid planting in dry soil or when ground is sopping wet; also, never plant in freezing weather or when ground is frozen.

Planting cost: Cost of planting will vary according to site conditions, topography, and available labor. The following table indicates an average time per 1,000 seedlings under different conditions:

Table 6. Labor Requirements for Planting 1,000 Tree Seedlings

Equipment Used	Conditions	Man-Hours Required
Mattock	Rough, rocky land	26
Mattock or bar	Smooth—Piedmont, mountains	13
Bar	Light, easy-to-work land	7 to 10
Machine	Open, smooth land	3 to 6

Plant enough trees per acre and space them properly: Pine Christmas tree varieties tend to grow wider at the base than the firs and spruces. Thus they need wider spacing in the field to enable them to develop



fully into a quality Christmas tree without crowding. The following spacings are recommended for the various species of Christmas trees:

1. Fraser fir—4 by 4 feet
2. White pine—5 by 5 feet
3. Redcedar—5 by 5 feet
4. Virginia pine—5 by 5 feet
5. Arizona cypress—5 by 5 feet
6. Scotch pine—5 by 5 feet
7. Douglas fir—4 by 4 feet
8. Norway spruce—4 by 4 feet

Table 7. Number of Trees Required to Plant One Acre at Different Spacings

Spacing (Feet)	Number of Trees
4 x 4	2,722
5 x 5	1,742
6 x 6	1,210
7 x 7	889

Take care of seedlings upon arrival: If you are going to plant your seedlings within a 4-week period after they arrive, they can be safely held in the shipping package, provided you do the following:

1. When seedlings arrive, pour water into the open end of package. Roll package around on ground to wet all moss and roots thoroughly. (See drawing above.)
2. Store package in some cool building where there is no danger of freezing. Store off ground on racks. Raise one end of bundle to allow drainage.

3. Repeat watering and rolling process at least once each week.

Moving trees to planting site: From time trees arrive until they are finally set out, see that roots are not allowed to dry out. Failure to do this has been the main cause of unsuccessful planting.

Carry trees from package to planting site in a water bucket a third to half full of thin, creamy mud. A crumbly clay is ideal for mixing the mud. Be sure to remove trees from bucket one at a time as each hole is dug.

Use the right planting method: Several planting methods have been used successfully, depending on the particular planting site and topography. In the Coastal Plain and Piedmont regions, most open-field planting is being done by tree-planting machines. On cutover land and rough, hilly sites, the planting bar or dibble is most commonly used. In the upper Piedmont and mountains, the mattock and spade are still the most popular planting tools.

If planting site is suitable, the machine method of planting is more efficient. Some tree planters are equipped so that trees can be planted equal distances apart. This is ideal for Christmas tree planting where mowing will be used for weed and grass control.

On areas too rough for machine planting, the planting bar has proved to be the best and most efficient method of planting.

The following illustrations will show how the Christmas tree seedlings should be planted, using the different methods discussed.

Mowing for
weed control.



**PLANTING WITH
A MATTOCK**



Drive blade straight into ground. Raise up handle and pull dirt to edge of hole. Repeat until hole is deep enough so roots of seedling will not be crowded.



Take seedling from water bucket. Place against sharp side of hole so that tree is about as deep or a little deeper than it stood in the nursery bed. Exception—Longleaf pine should be planted so that base of terminal bud is just above ground line.



Partially fill in hole, packing the soil with your hands.



Finish filling hole and pack soil firmly with your feet.

**PLANTING WITH A SPADE-TYPE
TOOL OR BAR**



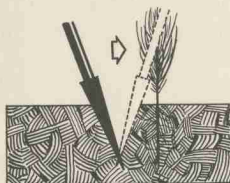
Drive blade straight into ground. Pull back on handle to open hole. Lift tool out of hole.



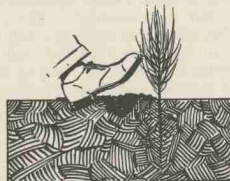
Let helper take seedling from bucket and place in hole. Have him hold it against sharp side of hole at correct depth.



Drive planting tool into ground about 3 inches behind planting hole. Pull back on the handle first. This closes the bottom of the planting hole.



Then shove forward on the handle, clamping the dirt tightly around the top of the tree.

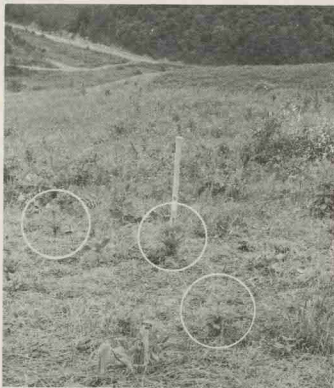


Stamp against side of hole with heel.

Protection

Protect young trees from excessive weed and grass growth: Protection of young Christmas trees from excessive weed and grass growth is probably one of the biggest problems facing growers today. Without an adequate control program, planting will result in poor survival, slowed growth, and irregularly shaped trees. On very fertile, moist sites, weeds, grasses, and briars will take their toll the first 2 to 3 years. On poor sites where fertilization is used, weed and grass growth will completely crowd out young trees.

Chemical weed
control plot.



The control method will depend on the topography of the site, available equipment, and labor. In the Coastal Plain and Piedmont areas, where the land is flat to moderately sloping, *mowing* is very effective. The number of mowings per year will depend on the weather and site. Usually, two to three mowings per year are adequate. Cultivation is not recommended. Even shallow cultivation close to the young Christmas tree seedlings will cause some damage to the roots.

In the upper Piedmont and mountains, planting sites are often too rough and steep for mowing equipment. Other methods of control will have to be used. Some Christmas tree growers are removing competing growth with hand tools. This method is slow and expensive. The cost will usually make it prohibitive.

Chemicals are gradually coming into use as a weed-and-grass killer. Several have been used, but simazine shows the best results. It can be applied in either 80W wettable powder or 4G granular form. Apply

simazine at the rate of 2 to 4 pounds of active ingredients per acre. Before broad recommendations can be made, more tests should be run. Growers should try it on small plots to test its effectiveness. Mow area to be treated, if possible, so that chemical can reach the root zone of the weeds and grasses. Apply in the fall or early spring. Contact your local county agricultural agent for information on how to mix and apply this chemical.

Protect plantation from woody-growth encroachment: Woody growth is difficult to control in a Christmas tree plantation. Cutting of such growth usually results in excessive sprouting from the stump, causing competition to become steadily worse.

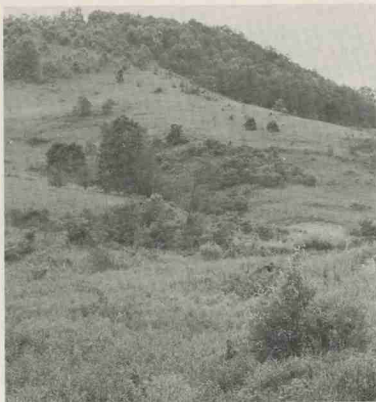
There are two methods of control:

1. The first is to pull out or grub the brush and trees and dispose of them. This method is costly and usually ineffective if plantation is adjacent to a woody growth seed source.

2. The second and most effective method is to poison the lower 6 to 12 inches of stem of unwanted brush with a solution of 2,4, 5-T mixed in fuel oil at the rate of 1 gallon of 4-pound active acid 2, 4, 5-T to 25 gallons of No. 2 fuel oil. This will not only kill the brush but will keep it from resprouting. This method will leave dead stems on the site which will soon decay and can be removed.

Regardless of the method you use, deaden all possible seed trees or remove them from surrounding areas or fence rows. If the seed source is not removed, you will have a constant battle to keep out the woody growth.

Hardwood growth here
must be removed before
planting Christmas trees.



Protect plantation from fire: Fire is a hazard to the Christmas tree plantation. Take steps to prevent fire outbreaks and to control them if started. Break up large plantations into smaller blocks and establish firebreaks around each block. The fire lanes can be used as harvest roads. These should be from 12 to 15 feet wide. Plowing or disking once or twice a year should keep them in good condition.

Keep on hand, at easily accessible points, fire-fighting equipment such as fire rakes, mattocks, and back-pack water pumps.

During dry periods, take precautionary measures to prevent employees or the public from starting fires through carelessness. If public hunting and fishing are allowed, post fire-prevention signs at easy-to-see places. In particularly dangerous dry periods, make spot checks each day.

Protect plantation from livestock and damaging rodents: When allowed to graze the plantation livestock will damage young trees excessively. They browse the young trees, brush against them and compact the soil, causing slower growth and poor quality. You can easily keep livestock out of the plantation. *Remember*, you cannot grow Christmas trees and livestock on the same area.

In some cases, extensive damage to pine trees by *pine mice* has been found. This condition is usually associated with areas of heavy grass growth. Control of the grass is usually sufficient to keep the pine-mouse population under control. Where this is not practical, put poison bait in the mouse tunnels or runways so that only mice can reach it. Contact your county agricultural agent for recommendations on bait and application.

Protect plantation from insect and disease pests: Insects are a particular hazard to any Christmas tree plantation. Different insects usually attack different species of trees, but in many cases the same insect will attack many different species. You will need to know about insects that attack evergreen trees. Diseases are less a hazard than insects, but certain diseases can cause damage to your young trees. Specific control recommendations for diseases and insects are covered in a separate bulletin. Check with your local county agricultural agent for detailed recommendations.

Fertilizing Your Christmas Trees For Faster Growth

Fertilization can stimulate Christmas tree growth. Redcedar is particularly responsive. Fertilizer promotes growth and helps to give trees a deep, richer color, which is important to the sale. Fertilize young trees when they start growing in the spring. Apply only what is needed, as over-application causes excessive weed growth.

Fertilize only where you plan a weed-and-grass-control program. Otherwise, the young seedlings will be choked out by excessive weed growth.

When using commercial fertilizer, apply it around the tree in a 1-to-2-foot radius. A balanced commercial fertilizer with an 8-8-8 or 6-12-12

Sheared tree. Note its
shape and compactness.



Unsheared Fraser fir.
Note open top and
general poor shape.



ratio applied at about 200 to 300 pounds per acre has given good results. When applying fertilizer to young seedlings, a 6-ounce frozen-juice can two-thirds full is sufficient. Increase the amount for larger trees.

Usually, two applications are enough—the first after the trees are planted and the second a year before the trees are ready to harvest. Fertilizer requirements will vary with different soils; therefore, check with your county agricultural agent.

Shearing For Better Quality

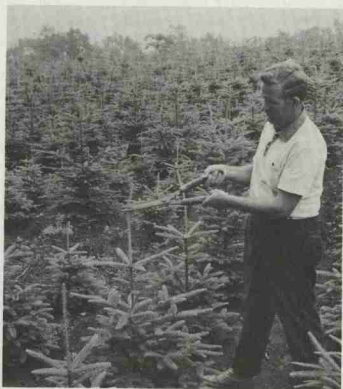
Shearing is the most important cultural practice a grower can use to develop a high-quality Christmas tree.

Experienced growers in other states have found that economic production of high-quality Christmas trees is impossible without shearing during development. Unless such work is done, a plantation may produce 50 to 70 percent spindly, low-quality trees.

The best time to shear: The timing of the shearing operation is important. For *white pine* and *cedar* the best time for shearing is from June 15 to July 15, or when the new spring growth is complete, and right before new buds are formed. Shearing should begin when the needles are about half-grown and begin to pull away from the stem. For *Fraser fir* and *Norway spruce*, shearing during the dormant season, usually between October and March, has brought good results.

Shear the trees properly: Hedge shearers with 8-inch blades generally are used for shearing. Both terminal and lateral stems of the new growth are cut back to increase compactness and symmetry in the tree. No cut-and-dried rules can be laid down. It requires good

Shearing terminal leader
to control compactness.



Shearing lateral branches to control shape and compactness.



judgment on the part of the worker. He should visualize the type of tree the consumer likes best and shear tree with that in mind.

A few important points to remember on shearing are:

1. Keep the terminal growth cut back to not over 10 to 12 inches height growth for 1 year.
2. Cut back the lateral branches enough so that the width of the tree will be in proportion to the height.
3. Start shearing when the tree is 2 to 3 feet high, or when the terminal shoot exceeds 12 inches in length.
4. Shear each year after starting until the year before the trees will be harvested.
5. Shear cedars and pines in early summer, usually from June 15 to July 15. Shear firs and spruces during dormant season.
6. When cutting 2- or 3-year-old wood on pine, cut back to the next lower whorl of branches or to a lateral bud on the twig.

Shearing stimulates bud formation on pine: Shearing the new wood of pines at proper time of year stimulates formation of terminal buds. Usually, the buds on a sheared twig are double the normal number. This increase in number of buds, which form new branches, will improve the compactness and density of the tree.

Shearing 2-or 3-year-old wood does not stimulate branching but tends to reduce total foliage on tree. This older wood does not produce buds and will die back to the next side branch.

Shearing cost: The cost of shearing is reported by Christmas tree growers to be from 1 to 3 cents per tree for each shearing.

Generally, three to five shearings are necessary to produce a high-quality Christmas tree. When shearing cost is compared to the increased value of sheared trees, the increased returns more than justify the cost.

Harvesting Methods

Since trees grow at a varying rate, harvesting a plantation will take from 1 to 3 years. Some trees will mature 1 to 2 years earlier than others within the plantation.

Three harvesting methods are generally used:

1. The grower cuts and markets the entire crop in 1 year. It is usually necessary to let trees grow an extra year or two to allow most of the trees to reach market size. Trees too small for marketing are either cut into boughs or destroyed. The advantages of this method are the low cost of harvesting and clearing the area for replanting the following spring.
2. The second method is to harvest the trees on an area as they reach merchantable size and replant as harvested. This involves cutting over an area 2 or 3 years before all trees are to be harvested. As trees are removed, young seedlings are planted in their places the following spring. This method produces a greater yield per acre, but increases in harvesting costs may well offset the increased yield.
3. Same as No. 2, but do no replanting until entire crop is harvested.

Cutting trees for harvest: Cut trees with a sharp saw at right angles to the stem to give them a flat base. Cutter should know market specifications such as height, straightness of stem, length of handle, symmetry, and fullness of foliage.

The trees are dragged by hand to a specified loading area. Loaded on wagons or sleds they are hauled to the nearest truck-loading point. It is a good idea to sort the trees as they are unloaded at the central out-loading point according to species, height, and quality. This will result in less handling of the trees when buyers want to pick their trees at the loading point.

When trees are cut in advance of shipping dates, be sure to protect them from drying or ice damage during the waiting period. A barn floor makes a good storage area.

Large growers may wish to hire additional labor at harvest time to enable them to cut and load out at the same time. This practice will lower handling costs but may cause delay to the truckers in waiting for the trees.

Marketing

Marketing methods will vary according to buyers' demands for quality and services. A grower should take special pains to grow a quality tree to meet consumer requirements. His trees should measure up to certain specifications so buyer can depend on getting satisfactory trees from him year after year without having to inspect the trees at the plantation. This will facilitate marketing and help keep satisfied customers.

United States Department of Agriculture standard grades for Christmas trees may be used as a guide in grading trees for sale. If both grower and buyer know these standard grades and accept them, they can make tree sales by phone or letter without "on the ground" inspection.

The grower should label the tree accurately according to species, height, and general quality in terms of color, density, and shape. This will build a good seller-buyer relationship.

It pays to advertise your product: A grower can increase his sales by making a brochure of his salable trees and sending it to all prospective buyers in his area. Brochure should include the species, size, quality, selling method (on the stump, at roadside, or delivered), and price expected. Some growers might want to include pictures of their over-all plantations and individual trees.

Do a good job selling your product: Sales may be made directly to consumers, either at the plantation or retail yards operated by the grower. More often, growers sell to wholesalers, retailers, or truckers.

Most growers do their own cutting and harvesting, but in some cases they may tag their trees and let the buyers do the cutting. It is usually better for grower to do his own cutting and harvesting to prevent highgrading and damage to the plantation.

At assembly points it is a good practice to separate the trees in piles according to species, size and grades. This will enable the buyer to make a quick selection of the size, number, and kind he wants.

When cutting a large number of trees for specific buyers, it would be advisable to have a performance contract signed by both the buyers and seller. Usual terms call for a one-third payment when the contract is signed and the balance when the trees are picked up.

Pricing: With the Christmas tree market becoming more competitive, growers should keep a complete record of production, harvesting, and marketing costs. North Carolina growers could very well price themselves out of business unless they establish a realistic pricing system. Efficient growers are due a fair return on their investment and should price their trees accordingly.

The large grower is inclined to sell his trees in large quantities to wholesalers or retailers. He is obliged to move thousands of trees each year and will make price concessions to do this. Usually, his production cost per tree will be less than that of the small grower; and he can afford to sell for less in large quantities and still make a fair profit.

The small grower, on the other hand, will market his trees in small lots direct to the local retailer, or retail his own trees. He will offer more services, such as letting a buyer select and cut his own trees or sell on consignment. Thus he takes part of the marketing risk. By offering these additional services, he can expect more per tree.

There is considerable risk in retailing Christmas trees. The retailer's margin need not be so high if the grower assumes part of the risk by absorbing all or a part of the loss on unsold Christmas trees and by

Three-year-old turn-up from old stump. Grows fast but requires more shearing.



delivering trees as the retailer needs them. This decreases the possibility of having large numbers of trees on hand after Christmas.

As in any other business, the small operator will eventually find himself in a price squeeze; and, consequently, will be forced to group with other small growers and sell on a volume basis. To realize a fair return when trying to compete with the larger growers' prices, he will have to increase the efficiency of his operations and improve the quality of his product by following recommended cultural practices.

The Second Crop

There are two methods of establishing the second crop: One is to *replant with seedlings*, and the other is to use *stump culture* or *turn-ups*.

Stump culture consists of leaving the lower live whorl of branches at the base of the tree when harvesting. As these limbs turn up during the next year, leave the most promising ones to grow into the next Christmas tree. This method is not too satisfactory, due to the extra work needed to develop a good-quality tree. Therefore, the extra cost involved may make it more expensive than replanting.

Conclusions and Summary

As a grower of Christmas trees you will need to consider the following facts in growing Christmas trees for a profit:

1. Christmas tree crops require intensive management to produce a quality product.
2. Selection and preparation of planting sites are very important from the standpoint of growing quality Christmas trees for market at a competitive price. In addition, such factors as accessibility to roads, topography, cost of the land, soil type, vegetative cover, fire risk, exposure, and elevation should be considered very carefully.
3. Selection of the right Christmas tree species for your site and its market appeal should be carefully considered.
4. Diversify your plantings. Do not plant all of one species. The consumer likes a choice.
5. Select good planting stock, take care of the seedlings, and plant properly to insure a good survival of healthy trees.
6. Control competing weeds, grasses, and brush to insure a fast-growing, well-formed tree.
7. Shear the tree properly at the right time to improve quality and increase profits.
8. Protection is a must. Keep livestock out of the plantation at all times. Carry out a good insect-and-disease-control program and keep out fire.
9. Use proper harvesting techniques that are adapted to your situation.
10. Know your markets, and sell wisely.
11. For more information regarding planting stock, planting procedures, cultural practices, and insect-and-disease control, contact your local County Agricultural Agent.

Cost and Return Work Sheet on Producing and Marketing Fraser Fir Christmas Trees in Western North Carolina¹

Expected net return per acre on Christmas trees from well-managed stands, based on seven-year rotation. Current costs are compounded annually at 4% carried through for the entire rotation.

Cost Table (Input)

	4% comp. \$
1. Interest on land investment—\$75.00 @ 4%	23.70
2. Property tax—25¢ per acre per year	2.06
3. Land preparation—\$10.00 per acre (First year preceding planting)	13.16
4. Seedlings (Fraser fir 2 - 1 stock) 1960-61 \$40.50/M, planting 2700 per acre	143.90
5. Planting cost—\$15.00 per thousand (estimate)	53.30
6. Shearing 3-4-5-6 yr. 2160 trees (survival—based on 80%)—2½¢ per tree	284.26
7. Weed control—½¢ per tree per year	88.85
8. Insect and disease control (3¢ per tree—estimate) 1 application during rotation	75.82
9. Administration and inspection @ ½¢ per tree per year	88.85
10. Harvesting (1750/A) based on 65% @ 25¢ per tree	438.00
11. Sales expense—1½¢ per tree	26.25
12. Maintaining harvest roads and fire lanes \$10.00 per acre per year	81.05
Total estimated cost	\$1,319.20²

Return Table (Output)

1750 Fraser fir per acre @ \$1.50/tree	\$2,625.00
Less cost	1,319.20
Net return per acre	1,305.80
Net return per acre per year	186.54

¹ Based on 1959 dollars.

² \$1,060.56 of this total is for labor.

To Be A Successful Christmas Tree Grower...

1. Select the proper species
2. Control weeds and grass in your plantation
3. Shear to produce quality tree
4. Market wisely



VOCATIONAL AGRICULTURE TEACHERS'
FORESTRY WORKSHOPSeagrove, North Carolina
July 10, 1962Suggested Outline of Lesson Topics in Management of Forest Tree CropsI. General background (two lesson periods)

- A. First class period (indoors)
1. Development of major forest areas and industries
 - a. In the United States
 - b. In North Carolina
 2. Anticipated trends in forest product demand, forest land use and timber growing methods
 3. Forestry enterprise opportunities for individual landowners in North Carolina
 - a. Potential profits
 - b. Tax advantages
 - c. Forestry in a farming operation
- B. Second class period (indoors)
1. Basic physiology of forest trees - reproduction, growth, fruiting, environmental requirements for major species
 2. Classification of identifying characteristics

II. Managing forest tree crops - The 7 "S's" for success (8 class periods)

- A. Species (third class period - outdoors) - Field trip to identify species of major occurrence in the area. (Identification field quiz)
- B. Site (fourth class period - outdoors) - Field trip to show effect of soil characteristics on growth
- C. Stocking (fifth class period - indoors) - Effect of stocking on yields. Optimum stocking at different periods during the crop rotation. Control of stocking and spacing through planting, scarification, thinnings.
- D. Sunlight (sixth class period - outdoors) - Effect of suppression. Release methods. Thinning exercise in the field.
- E. Safeguards (seventh class period - indoors or outdoors) - Effect of fire and livestock on major species at different stages in stand development. Major forest insects and diseases and their prevention at different stages of stand development.

(Over)

F. Sales

1. (Eighth class period - outdoors)
Visit at least two major product markets to observe procurement, harvesting and transportation methods and become familiar with price levels and product specifications.
2. (Ninth class period - indoors)
Stumpage sales vs. raw product harvesting by owner. Preparing an area for a timber sale. Sales procedure - available markets, invitations to bid, negotiations, sales contracts.

G. Sources of assistance in managing forest crops (tenth class period - indoors)

THE STORY OF
G
THE CIRCLE "G"

25 ACRES LAST YEAR
PLANTED FEB 1961





BEFORE WE BEGIN

This is a true story. It is written to illustrate the opportunities for investment offered by thousands of acres of cut-over forest land in the sandhills area of North Carolina. It is an example of the operations, sources of assistance and service, costs, probable returns and payout period involved in developing such land for timber production.

This is not a technical bulletin written for professional foresters. It is an individual case history written primarily for landowners or potential investors who are:

1. Interested in building estate values or sources of income for the future,
2. Willing to consider a relatively long payout period and
3. Attracted by rates of return in the 6% to 10% range with the added incentive that such earnings might continue to be subject to long-term capital-gain rates under Federal income tax law.

The people involved in this story are identified by their real names. This is done to add human interest and realism - not to publicize the individuals as such.

Thus Voit Gilmore, the investor and landowner, should be thought of as representing other potential investors with similar situations and motives. John Gray, the Extension forester, is only one of a number of state and local government-employed professional foresters able to provide factual data and initial technical guidance needed to make decisions. There is a county agent like Fleet Allen and a soil conservationist like Willard Keller in other North Carolina counties. A. T. (Sandy) Davison is one of forty-five consulting foresters in North Carolina selling professional services to landowners. There are other industry foresters like Joe Matthews of Riegel Paper Corporation and other conservation contractors like J. M. (Knock) Long of Rockingham and Perry Long of Ellerbe.

If there were not, the story of the Circle G could not be duplicated on a substantial scale by others and there would be little point in telling it.

WHAT IS THE CIRCLE G?

Physically, the Circle G is a 450-acre forest property. It is located in McNeill Township, Moore County, North Carolina, between the towns of Southern Pines and Pinehurst.

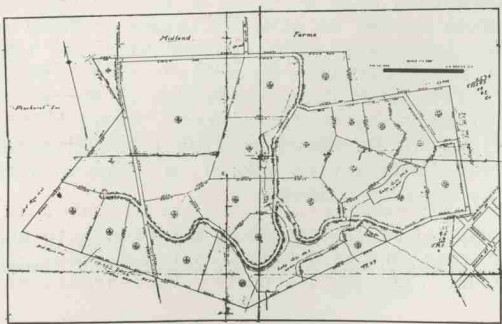
Voit Gilmore of Southern Pines bought this tract in the summer of 1960. At that time it consisted of 100 acres of slash and longleaf pines planted in 1950 by a former owner and 350 acres recently cut over by a lumber company. The 350 acres supported a heavy ground cover of wiregrass, scrub oaks and scattered longleaf pines of pulpwood size and smaller. This condition is typical of thousands of acres of former longleaf pine forest in the sandhills region of the two Carolinas.

This particular property was formerly known as "Springhill Farms." Gilmore renamed it the "Circle G Tree Farm" and immediately set out to make it live up to the tree-farm designation. In 1962, his efforts were officially recognized as successful when the North Carolina Tree Farm Committee decided that his property met the standards for certification and designated him as North Carolina's 1000th "Tree Farmer."

The story of the Circle G is the story of why Gilmore undertook such a venture, how he is carrying it out and what he expects from it. Like all ventures, this one started as an idea and a desire in the mind and heart of a man.

Let's begin the story by looking at the man himself.

Below: Boundary map of the Circle G





THE MAN BEHIND THE CIRCLE G

Like many successful modern Americans, Voigt Gilmore has more lives than the proverbial cat.

Currently, he devotes five days (and nights) a week to public service as Director of the newly organized U. S. Travel Service in the Department of Commerce, Washington, D. C. Public service is not new to him. In the past, he has served as mayor of his home town, Southern Pines, has been a member of the North Carolina Board of Conservation and Development and functioned as former Governor Luther H. Hodges' right-hand man in organizing tours of North Carolina industrialists to western Europe.

On week ends in Southern Pines, Gilmore is involved in business affairs as part owner and president of the W. M. Storey Lumber Company, a wholesale firm, and as an active partner in three large restaurant-motor lodge establishments.

His attractive family, consisting of his wife, Kathryn Gilmore, his daughters Katy, Gerry and Susan and his son Peter, live in Southern Pines, which continues to be his home.

Underlying these interests and responsibilities are two unique characteristics - an adventurous spirit and a love of the outdoors. Gilmore exhibits these traits in unusual ways. A Phi Beta Kappa graduate in journalism from the University of North Carolina, he has served as an observer and working correspondent on one U. S. Air Force Arctic expedition and on three to the South Pole with the Navy. He is currently preparing for a fourth trip to the South Pole.

An experienced woodsman, he has participated in one American Forestry Association-sponsored trail ride into a high mountain wilderness area in the Western United States and served as leader of a second. He is an honorary vice-president of this organization.

This is the man who decided to invest in the Circle G in the early summer of 1960.

DECISION TO BECOME A TREE FARMER

Why did Voit Gilmore buy forest land in 1960?

Basically, he did so because certain features of a tree-farming investment fitted his personal situation and estate portfolio needs as follows:

1. Cash on hand - Out of retained earnings from other enterprises, he had accumulated funds for additional investment.
2. "Growth"-type enterprise practical - His personal financial position permitted him to consider a deferred-returns type of investment. His regular income from partnerships and dividends on securities was sufficient to cover family living expenses. He had a reserve in savings accounts for emergencies and for the education of his children. He considered his insurance coverage adequate.
3. Tax advantages - His income-tax bracket indicated he should look for an enterprise where all appreciation (through growth and price increases) might qualify for long-term capital-gains treatment in federal income-tax reporting. The maximum tax rate under this provision is currently 25%. Properly set up, gains on sales of either timber or land can qualify for such treatment.
4. 6% rate of return expected - As a result of contacts with foresters and forest landowners in the sandhills, Gilmore felt that returns of 6% or better might be possible from tree farming. This was as good a rate as that offered by other possibilities of comparable risk at that time.
5. Strong future market outlook - Gilmore had read popular-style articles on future timber demand. These indicated an expanding market for southern pine. In addition, pulp and paper companies were buying and developing large tracts in the sandhills. As a result, Gilmore felt there would be at least a strong future market for pulpwood even if other products did not follow predicted trends.
6. Flexibility in scheduling sales and development operations - Gilmore was aware that after trees reached

commercial size the owner had considerable freedom of choice in timing sales. He felt this offered an opportunity in the future to hedge against off years in partnership income and to balance out his income-tax load.

7. Spare-time supervision possible - There was a good possibility that development operations could be carried out through contractors, and sales supervision through consulting or industry foresters. As a result, Gilmore felt that he could plan and manage a tree-farming operation without having to buy a lot of expensive equipment, hire labor and spend a lot of time as a "foreman" in direct supervision.

8. An out-of-doors opportunity for the family - Gilmore felt that a tree-farm enterprise would be one in which the entire family could participate on a part-time basis. Although he expected to carry out the greater part of the development operations through contractors, he wanted his children to have the opportunity to clear land and plant trees. He felt they would thus learn some conservation lessons they would never forget and would have the chance to develop that love for the out-of-doors which had so greatly enriched his own life.

With these objectives in mind, Gilmore began looking for a tract of cutover forest land in or near his home county. From conversations with forest-owning friends and foresters, he had decided he could afford to pay up to \$35 to \$40 an acre for such land. This meant that he expected earnings from tree farming to cover land-clearing and tree-planting costs plus 6% interest, recurring costs such as land taxes plus interest and, in addition, return 6% interest on a \$35 to \$40 per acre land investment.

THE CIRCLE G PROPERTY

The price asked for the future Circle G was well above that Gilmore felt he should pay for cutover land for tree-farming purposes alone. There were other features, however, which added to its value.

Although it was an interior tract with no paved-road frontage, it was located about four miles from the center of Southern Pines. It was high rolling land. For these reasons, there was a strong possibility that its value for residential development or commercial recreation might rise sharply over time. The development of a forest crop would add to its attractiveness for such uses.

It was close enough to home to offer a convenient source of week-end recreation for the Gilmore family and their friends. Gilmore felt that a beaver-dammed stream could be turned into an attractive lake for swimming and canoeing - both favorite family sports.

There were certain plus features from the tree-farming standpoint. One hundred acres were already planted and would require no further development cost. A past abortive attempt at residential development had left behind a network of passable sand roads which provided access and could be used for firebreaks. The property was within three miles of a state forest lookout tower and ranger station. There was some scattered remnant longleaf pine which might be sold for pulpwood.

No professional forester or land appraiser put values on the individual features. In his own judgment Gilmore decided they added up to a good buy. Furthermore, the total purchase price was within his means; and he felt he would have enough left over to pay for the cost of developing the property for timber production.

Immediately after he bought the land, he called in Moore County Agricultural Agent Fleet Allen and John Gray, Extension forester at North Carolina State College in Raleigh, to help think through and lay out a tree-farm development plan.



DECISION TO DEVELOP - Step No. 1

ESTIMATING THE PER ACRE COSTS OF TREE-FARM DEVELOPMENT

Gilmore conducted Allen and Gray on a thorough tour of the Circle G land. They then headed back to Gilmore's office in Southern Pines for coffee and a conference. They learned that Gilmore's ground rules for the tree-farm enterprise were as follows:

He expected at least a 6% return on money invested because he felt he could do equally well in other lines, such as stocks in a mutual fund.

He was planning to develop the property and leave it to his children. However, he expected timber values to be developed at the end of 20 to 25 years which would cover his investment plus deferred interest at 6%.

He felt he could budget \$2,000 a year for tree-farm development until the initial job of bringing the cutover land into production was completed.

He was willing to place a value of \$35 an acre on the land for tree-farm development purposes. He expected rising land values for other uses to more than justify the remainder of the purchase price.

He expected to contract all development operations.

During the initial tour of the Circle G, Gray had made mental notes on the operations which would be required to establish a new crop of pines on the cutover land. From past experience and research records, Allen and Gray had an idea of local contractor rates and costs of materials required for land in similar condition.

Applying 6% compound interest to the cost-per-acre estimates, Gray came up with the following cost-plus-interest figures for the cutover land at various intervals after planting:

DECISION TO DEVELOP - Step No. 1

ESTIMATING PER ACRE COSTS (Continued)

Cutover Land Only

Per acre cost item	Cost item accumulated at 6% compound interest after		
	10 years	15 years	20 years
Costs of holding land:			
Interest on \$35 per acre land cost allocated to tree-farming operation	\$ 27.69	\$ 48.88	\$ 77.25
Yearly land taxes - 50¢	\$ 6.59	\$ 11.64	\$ 18.39
Soil site mapping - 50¢ (first year only)	\$.90	\$ 1.20	\$ 1.60
Costs of establishing and maintaining a tree crop:			
Burning off and disking land - \$15.00	\$ 26.86	\$ 35.95	\$ 48.11
Buying 680 slash pine seedlings plus pretreat- ment and planting - \$16.00	\$ 28.65	\$ 38.35	\$ 51.31
Yearly road and plantation maintenance - 50¢	\$ 6.59	\$ 11.64	\$ 18.40
Subtotals	\$ 97.27	\$147.66	\$215.06
Plus kill back resprouting oaks 3 years after plant- ing if necessary - \$9.00	\$ 13.53	\$ 18.11	\$ 24.23
Totals	\$110.80	\$165.77	\$239.29

DECISION TO DEVELOP - Step No. 1

ESTIMATING PER ACRE COSTS (Concluded)

Gray discussed these per acre figures for the cutover land with Gilmore.

"Voit, there are two groups of costs here. First, there's the cost of just holding the cutover land without putting a pine crop on it. I'm assuming that if you don't replant it, there will be no salable timber on it 10 to 20 years from now.

"In setting up this holding-cost group, I've charged 6% interest on the \$35 per acre of the purchase price which you paid for timber-growing purposes. I gathered that when you went into this deal, you expected to make 6% on all money invested in it; so let's look at it from that standpoint.

"Of course, as long as you hold on to it you'll have to pay taxes each year whether you tree farm it or not. So I've charged the taxes plus interest.

"Before you can make an intelligent decision about developing it further, we'll need a soil site map. I'll explain this later on, but for now I've estimated this will cost 50 cents an acre and charged this in with interest.

"Now let's look at the tree-farming development costs. I've estimated \$15.00 to prepare the land, \$16.00 to buy planting stock and plant it, and \$9.00 to release the planted pines from oak re-establishment costs add up to a possible \$40 an acre. If you can put \$2,000 a year into tree-farm development, you can tackle about 50 acres of cutover land a year. In addition, I've budgeted an average of 50 cents per planted acre per year to keep the roads passable for fire fighters and for minor maintenance operations which the planted crop might require.

"The question at this point is - Should you go ahead and develop this cutover land?"



DECISION TO DEVELOP - Step No. 2

ESTIMATING FUTURE PER ACRE VALUE OF PINE PLANTINGS

"What do you mean, Should I go ahead?" asked Gilmore. I've already bought the land."

"That's right, but you were guessing that it would produce timber values in 20 to 25 years which would repay costs plus 6%," Gray replied. "What would you do now if we found that this tract couldn't repay more than costs plus 2% or 3%?"

"I'd wait a little while, sell it, get my money out and put it in something else."

"All right then," said Gray, "Before you throw an additional \$14,000 or \$15,000 into tree-farm development, let's get a clearer idea of what the land might produce. Actually, when you decided you were definitely interested in this property, before buying it, you should have hired a consulting forester to appraise its value for growing timber. Anyhow, let's find out now."

"First, let's make a rough check to see if there's a possibility that returns per acre will cover these estimated costs plus 6%."

Gray then referred to a yield table. This particular table listed cords of pulpwood per acre at 10, 15 and 20 years after planting for slash pine. The figures were broken down by various common initial spacings and by land site quality ratings. Site quality is a measure of a soil's timber productivity (the higher the rating, the greater the growth and yield for any selected pine crop rotation).

This particular table was based on measurements taken by research foresters of the Southeastern Forest Experiment Station on 308 plots in older slash pine plantations in the Carolina sandhills and middle Georgia coastal plain.

Gray applied present-day prices paid per cord on a clear-cutting basis for standing pulpwood timber to the yield figures. He then prepared a table of future per acre timber values based on these prices and predicted yields. He entered estimated development costs and carrying charges plus 6% interest for comparison. Results were as follows:

DECISION TO DEVELOP - Step No. 2

ESTIMATING FUTURE PER ACRE VALUE OF PINE PLANTINGS (Continued)

Land site quality rating for slash pine	Pulpwood standing timber value per acre		
	at		
	10 years after planting	15 years after planting	20 years after planting
40	--	--	\$ 28
50	--	\$ 48	\$105
60	\$ 20	\$102	\$231
70	\$ 35	\$156	\$350
Estimated total costs per acre accumulated at 6% compound interest	\$111	\$166	\$239
Estimated total costs per acre less cost of third-year sprout re- lease accumulated at 6% compound interest	\$ 97	\$148	\$215

Gray straightened up, "Now, Voit, here's the rough picture. The timber values we expect won't cover costs plus 6% on a 10-year or 15-year basis. At 20 years, site quality 70 land yield value (\$350) is well above estimated costs plus interest (\$239) and site quality 60 timber value (\$231) is close.

"Of course, if we don't have a brush-resprouting problem after planting, then we've got a 15-year payout-period possibility on site quality 70 land. But to be on the safe side, we'd better not count on this.

"To meet your costs plus 6% rate of return, we're confined to a 20-year rotation as a minimum and to site quality 60 and better land.

"Before you can make an intelligent decision we need to know how your land rates in site quality."

Identifying and mapping site quality of land for timber production is a job for a professional specialist. Gray recommended

DECISION TO DEVELOP - Step No. 2

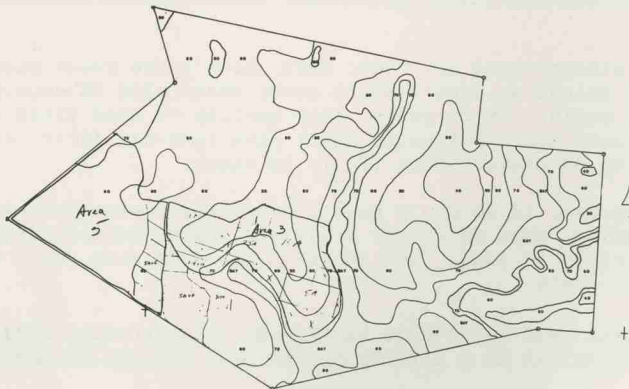
ESTIMATING FUTURE PER ACRE VALUE OF PINE PLANTINGS (Concluded)

two qualified private consulting foresters in this field; and Gilmore hired A. T. Davison of Hillsboro, N. C., for the job.

Davison spent about a week taking soil samples over the 452 acres and measuring soil characteristics used to determine site quality. He prepared a map showing the locations of each soil site quality and a summary of total acres in each, as follows:

<u>Site quality</u>	<u>Total acres</u>
70	61
60	235
50	77
40	9
Bay land (poorly drained)	54
Roads, etc.	16

Below: Davison's soil site quality map



	ACRES
SITE INDEX 70	61
60	235
50	77
40	9
BAY	54
TOTAL	452

SITE INDEX MAP

SCALE: 1" = 200'

DECISION TO DEVELOP - Step No. 3

COMPARING TOTAL COSTS PLUS INTEREST WITH TOTAL RETURNS

Gray combined predicted yields per acre with Davison's site-quality breakdown and used the per acre cost estimates to come up with estimated total costs plus interest and total predicted timber value figures for the entire property.

This brought the existing 100 acres of pine plantings into the picture. Gray used yield tables to predict timber values from this area in the future. These were added to predicted future values from the cutover land.

In estimating costs associated with the 100 acres already planted, Gray charged off "Costs of holding land" at the same rates as for the cutover land. The crop was already on the land. However, he assumed that Gilmore had a choice of selling the pulpwood-size trees in this planting now and investing the proceeds elsewhere, or holding them. He estimated (from yield tables and site-quality ratings) that there was an average \$17.00 worth of salable pulpwood per acre on this 100-acre planting. This was carried with accumulated interest as a cost of holding the present 10-year-old plantings.

In total costs plus interest, total timber value figures were developed for each of five management options (or courses of action) open to Gilmore. They were projected over 10-year, 15-year and 20-year payout periods.

The results are shown on the following page.

After studying these figures, Gilmore and Gray came to the following conclusions:

1. (1970 figure) - None of the five options would return costs plus 6% interest within 10 years. For this payout period, however, option #1 promised the smallest loss (-\$5463).
2. (1975 figures) - Losses were even worse on a 15-year basis. Again option #1 showed the smallest loss (-\$10,796).
3. (1980 figures) - Over 20 years, the picture changed. Option #2 proved the most profitable with timber values

TOTAL COSTS PLUS 6% INTEREST AND TOTAL TIMBER VALUES
FOR VARIOUS OPTIONS

	PROJECTED FOR THREE DIFFERENT PAYOUT PERIODS					
	1970		1975		1980	
	Costs accumu- lated at 6%	Standing timber value	Costs accumu- lated at 6%	Standing timber value	Costs accumu- lated at 6%	Standing timber value
Management option						
#1 No additional planting. Hold 100 acres of 10-year-old planted pine to end of period. Then sell on clear-cutting basis.	\$19,183	\$13,720	\$32,396	\$21,600	\$50,081	\$30,135
#2 Clear and replant 50 acres of site quality 60 and better, cut-over land each year until completed. No serious hardwood re-sprouting anticipated. Hold all plantings to end of period. Then sell on clear-cutting basis.	\$34,362	\$15,220	\$54,428	\$40,866	\$80,562	\$80,836
#3 Same as #2, except kill back hardwood resprouts in third year following each planting operation.	\$37,520	\$15,220	\$58,607	\$40,866	\$86,217	\$80,836
#4 Clear and replant 50 acres of site quality 50 and better, cut-over land each year until completed. No serious hardwood re-sprouting anticipated. Hold all plantings to end of period. Then sell on clear-cutting basis.	\$35,620	\$15,220	\$56,154	\$40,956	\$82,916	\$82,369
#5 Same as #4, except kill back hardwood resprouts in third year following each planting operation.	\$39,070	\$15,220	\$60,725	\$40,956	\$89,095	\$82,369

DECISION TO DEVELOP - Step No. 3

COMPARING TOTAL COSTS PLUS INTEREST WITH TOTAL RETURNS (Continued)

expected to be slightly greater than costs plus 6%. Option #4 was a close second. Both are based on the assumption that the \$9.00 per acre third-year sprout control operation will not be required.

Options 3 and 5 include the \$9.00 per acre allowance for sprout control. Comparing these two and option #1, option #3 showed the smallest losses (-\$5381) for the 20-year period. Thus, if Gilmore decided to keep the property, this was his least costly option.

Gilmore felt that the estimates indicated there was a good chance to come close to a 6% rate of return. He decided to go ahead for one year at least. He would develop 50 to 60 acres of site quality 60 and better cutover land and see how actual costs compared with estimated costs.

Below: Gray and Davison discuss costs



COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS

Step No. 1 - BOUNDARIES RETRACED AND TREES ALONG BOUNDARIES MARKED WITH YELLOW PAINT

This was a preliminary requirement for operations to follow. Gilmore himself did this job.

Step No. 2 - INITIAL TIMBER VALUE APPRAISED AND SEPARATED FROM TOTAL PURCHASE PRICE

Gray advised Gilmore that, as a tree farmer, he would be selling timber separate from the land itself. To establish a cost basis for deductions in reporting such sales on income-tax returns, it was advisable to split the purchase price of forest property into separate timber and land accounts.

Since all of the initial timber on the property was of pulpwood size and smaller, Gilmore hired an experienced local pulpwood buyer to give him a written appraisal of the value of the scattered timber on the cutover land and the value of pulpwood-size trees in the 100-acre, 10-year-old plantation. These were set up separately since the timber on the two condition areas would not be sold in the same year.

A separate set of cost and income records for the entire operation was also established at this time.

Step No. 3 - LOCAL COUNTY FOREST RANGER CONTACTED

Early in the development operation, Gilmore contacted Travis Wicker of Southern Pines, a veteran in the art of forest fire detection and control. Wicker is jointly employed as Moore County forest ranger by the county and the North Carolina Division of Forestry.

Gilmore took Wicker on a tour of the Circle G to familiarize him with the location of boundaries, interior roads, the existing plantation and with Gilmore's development plans. He gave Wicker a copy of his property map showing the boundaries and existing roads. He also gave him an extra key to gates erected across the entrance roads so that Wicker and his men would have quick access in event of a wildfire on the property.

Step No. 4 - AREA OF CUTOVER LAND SELECTED FOR FIRST-YEAR DEVELOPMENT

The total cost-and-return estimates indicated that in

COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS

Step No. 4 - AREA OF CUTOVER LAND SELECTED FOR FIRST-YEAR DEVELOPMENT (Continued)

developing the cutover land, Gilmore should stick to site quality 60 and better. The location of areas meeting this standard was shown on Sandy Davison's map.

From the profit angle, the best sequence would have been to develop the 71 acres of site quality 70 land first; then start on the site quality 60 land. This proved impractical since the site quality 70 land was scattered all over the eastern two thirds of the property. It lay in long narrow streaks on both sides of low bays and tributary drainages.

Gilmore and Gray began locating the larger blocks of site quality 60 land in cutover condition. From these, Gilmore selected two blocks along his east boundary and a third block along his north entrance road. The three blocks added up to about 65 acres and included some site quality 70 land as well.

Below: Scrub oak after prescribed fire



COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Continued)

Step No. 5 - SCATTERED LONGLEAF PINE ON CUTOVER AREAS SOLD

Longleaf pines left on the cutover areas were remnants from a recent sawtimber clear-cutting operation. They were scattered, yet there were enough to have a serious suppressing effect on the growth of the new pine crops planned.

Gilmore sold all residual longleaf that could be logged for pulpwood through Joe Matthews, industry forester for Riegel Paper Corporation. The logging crew removed nearly all of this material except for areas where individual trees were widely scattered.

Step No. 6 - CUTOVER AREA FOR FIRST-YEAR DEVELOPMENT BURNED OFF IN AUGUST

Gray and Davison recommended that this be done to reduce a heavy cover of wiregrass on the three areas and to eliminate as much of the scrub-oak cover as possible before the land was disked. They felt that the ground would not settle thoroughly after disking if the tough wiregrass was turned under.

They recommended that the burning be planned to produce as hot a fire as possible consistent with safety.

Gilmore contacted Travis Wicker, the county forest ranger. Wicker agreed to plow firebreaks around the areas to be burned and to supervise a burning crew to be hired by Gilmore. Gilmore was required to light off the fire personally so as to relieve the county and state of liability in case of an accident.

The smoke could be seen for miles! However, no breakover occurred and the operation was a complete success.

Actual costs under this set of conditions - \$1.00 per acre.

- 20 -

Upper right: Plowing fire line
along boundary
Lower right: Prescribed burning



COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Continued)

Step No. 7 - SCRUB OAK DISKED OUT WITH HEAVY EQUIPMENT

Gray and Davison recommended that the areas be lap disked with heavy crawler tractor-drawn equipment to eliminate the thick stand of persistent turkey oak and blackjack oak. This type of cover offers critical competition for sunlight and for the limited moisture available in the root zone of sandy soils.

Gray and Davison recommended that the job be done as soon after the August burning operation as possible so that the ground would have plenty of time to settle before planting trees.

Gray gave Gilmore a list of contractors experienced in this type of operation. Gilmore engaged J. M. Long of Rockingham, North Carolina. Long used a 3½-ton tandem harrow pulled by a tractor in the 85 drawbar horsepower-size class. Although the machine was equipped with a bulldozer blade, this was kept high simply to push the trees over. The harrow did the rooting out.

Actual cost under these particular conditions - \$12.00 per acre.

Step No. 8 - SLASH PINE SEEDLINGS ORDERED IN FALL

Gray and Davison agreed that all available evidence indicated that slash pine was the best pine to plant under Gilmore's combination of conditions and objectives.

They were certain that Gilmore's land was too droughty for loblolly pine. This left a choice between longleaf pine and slash pine. Either would grow on the site quality 60 and 70 land. Longleaf is more resistant to wildfire damage and insect attack and thus a better risk from these angles, but there were cost-and-return features to consider.

No planted-stand yield tables were available to compare longleaf timber values with slash for a given rotation length. However, all available evidence indicated that slash would produce timber values over 10-to-20-year payout periods well above those which could be expected from longleaf.

In addition, longleaf is a slow starter compared to slash. Gray and Davison were convinced that hardwood resprouts would

COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Continued)

have to be controlled once and possibly twice before the planted longleaf would hold its own in the race for sunlight. This would increase establishment costs.

The planting operation was scheduled for late February and March. However, Gilmore filled out and sent in an order for 680 slash pine seedlings per acre (a total of 44,000) to the North Carolina Division of Forestry in October so that these would be reserved for him. He decided to pick them up at the Little River State Forest Nursery, Goldsboro, just prior to planting.

He specified grade 2 and better trees since he was shooting for a minimum first-year survival rate of 70%. Research indicated that this could not normally be expected from seedlings below grade 2 in size and vigor.

On this basis, actual cost of planting stock was \$3.05 per acre.

Below: Disking with tandem harrow



COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Continued)

Step No. 9 - SLASH PINES PRETREATED BEFORE FEBRUARY PLANTING

Gray and Davison recommended that the seedlings be given the following treatments just prior to planting:

1. Dip the tops down to the root collar in a 2% solution of Aldrin in water. (An emulsifiable concentrate form of Aldrin was recommended.) This inexpensive operation reduces damage to young trees from reproduction weevils which breed in fresh pine stumps.
2. Dip the roots in a clay-and-water mud. This prevents feeder roots from drying out as seedlings are handled in the planting operation.

Actual cost of both treatments combined - \$0.95 per acre.

Step No. 10 - SLASH PINES HAND PLANTED TO 8'-x-8' SPACING IN LATE FEBRUARY

Gray gave Gilmore a list of several tree planting contractors in the sandhills, and Gilmore also consulted with Joe Matthews of Riegel Paper Corporation.

Gilmore contracted the operation to Perry Long of Ellerbe. Long brought over a crew of twenty Lumbee Indians for the job. Planting bars were used in the operation.

Actual cost under these particular conditions - \$8.00 per acre.

Late February and early March were recommended as planting dates because there is generally considerable moisture in the ground at this time. In addition, there is less chance of damage from ice storms or crusted snow than there is with early-winter plantings.

Selection of an 8'-x-8' spacing was a matter of judgment rather than fact. Closer spacings will produce more pulpwood per acre over short rotations. Gray had the following possibilities in mind, however:

COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Continued)

1. The 8'-x-8' spacing was equivalent to spacings being used on pulp-company lands in the area. The development of specialized harvesting equipment in the future might make it desirable for Gilmore's timber to develop to sizes and volumes equivalent to that on pulp-company land.
2. Early research on a root-rot organism indicated that thinning operations might be questionable, particularly in planted slash pine. Should Gilmore decide later to hold the plantations beyond 20 years of age, the wider spacings would tend to produce larger trees than a close spacing without a thinning program. Thus, some trees might have a better chance to reach size standards for higher-priced products such as small utility poles.

Below: Dipping seedling roots in mud at planting site



COMMERCIAL TREE FARM DEVELOPMENT OPERATIONS (Concluded)

RESULTS AND FOLLOW-UP

Gilmore wrote Gray reporting that the 44,000 pines were in the ground and asking, "What do I do next?"

Gray wrote back, "The seedlings are now in the hands of God. My best technical recommendation is to pray for a reasonable amount of rain through June (the critical part of the first growing season)."

Gilmore got it, and at the end of the first growing season over 90% of the planted pines were alive and growing. The first year's operation was a success.

Gilmore's actual costs of developing the initial 65 acres were as follows on a per acre basis:

Burning off -----	\$ 1.00
Disking -----	\$12.00
Planting stock -----	\$ 3.05
Pretreating plant-	
ing stock -----	\$ 0.95
Planting -----	\$ 8.00
Car expenses, etc. --	\$ 0.50
Total -----	\$25.50 per acre

This was \$5.50 per acre less than the \$31.00 allotted for these operations in the initial estimate of costs by Gray and Davison.

Encouraged by these initial results, Gilmore followed the same sequence and timing of development steps on an additional 65 acres starting in the summer of 1961. Actual costs per acre again totaled \$25.50. At the end of June, 1962, 86% of trees planted in this second operation were alive and growing. This was excellent performance in the face of a severe seven-weeks drought in May and early June.

As of the fall of 1962, hardwood resprouting was negligible on the 1961 planting. Nearly 95% of the surviving trees were still free of overhead shading by resprouts. This indicated that on some of the areas at least, the estimated \$9.00 cost of third-year control of resprouts might not be required.

By the fall of 1962, Gilmore had burned off and disked his third 65 acres. At this rate he will finish up the site quality 60 and 70 land by the spring of 1964.



RECREATIONAL AND WILDLIFE DEVELOPMENT ON THE CIRCLE G

Voit Gilmore made a success of the commercial timber development phase of the Circle G. He also set out to make it fulfill other objectives in mind at the time of purchase.

Under Moore County Work Unit Conservationist Willard Keller's technical guidance and assistance, he graded out and dammed up a six-acre lake near the center of the property. The entire Gilmore family worked many week ends clearing out undergrowth around the edge of the lake. They planted yellow poplar seedlings and cypress for beautification. They cleared out and grassed the approach to their beach on the lakeside and constructed a small bathhouse and picnic benches.

To encourage the quail population, Voit Gilmore under County Agent Fleet Allen's guidance seeded five 1/5-acre patches of bicolor and sericea lespedeza to provide feed and cover.

HOW DOES VOIT GILMORE FEEL AFTER TWO YEARS AS OWNER AND DEVELOPER OF A TREE FARM?

In his own words, "As a businessman I am convinced that the development of a commercial timber-growing enterprise is a sound investment capable of producing an attractive return on capital and time required.

"Beyond this, the Circle G has had a tremendous therapeutic effect on my family. My children are wiser, healthier and happier for their part in it. The Circle G has given us an opportunity to work together and to develop a common interest.

"I am now beginning to look for another 450 acres of forest land to develop as a tree farm when I wind up initial operations on this property in 1964."

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Upper right: 1/5-acre wildlife
food patch
Lower right: Gilmore views results
with satisfaction



Farm Forestry Facts

Extension Forestry Department N. C. State College, Raleigh, N. C. June, 1962

CAN I CUT PINE TIMBER IN THE SUMMER WITHOUT SERIOUS BARK-BEETLE DAMAGE TO RESERVED PINES?

The answer is "Yes, if rainfall is normal or better and certain precautions
are taken to avoid creating conditions favorable for pine bark beetle attack.

Precautions to take are as follows:

1. Cut stumps as low as possible, and, in any event, not higher than 12 inches from the ground.
2. Trunk sections 4 inches in diameter and larger should be cut into logs or pulpwood and moved out. Limbs 4 inches in diameter and larger should, if possible, be piled and burned, or sprayed with 1/4% gamma BHC in fuel oil, or cut into firewood.
3. Logs and pulpwood should be moved out of the woods immediately or at least within one week after cutting.
4. Trees severely damaged or lodged in logging should be harvested. Bruised trees should have the trunk sprayed with 1/4% gamma BHC in fuel oil to the height of the bruise or 18 inches from the ground, whichever is higher.
5. Once the cutting operation is begun, it should be carried on through to completion without interruption except for rainy weather, weekends, and other normal shutdowns.
6. Do not start cutting operations in warm weather during drought periods.
7. When a sawmill to cut pine logs is set up in or near a pine stand, green slabs with bark on them should be moved out, burned, or the bark surface sprayed with 1/4% gamma BHC in fuel oil within one to two weeks after manufacture.

(MORE)

- After a warm-weather cutting job is completed, check the area every two weeks for about a two-month period. During this time, if you see pitch tubes developing on pine trunks or the tops of live pines turning yellow, call in a forester or trained agricultural worker for control recommendations.

Explanation - The 1/4% gamma BHC formulation is recommended above to be applied before infestation as a preventive spray for all bark beetles. Where trees or stumps are already infested with bark beetles, use 1/4% gamma BHC to control Ips beetles and southern pine beetles; use 1% gamma, BHC in fuel oil to control turpentine beetles.

The following table shows you how to prepare these sprays:

Strength spray desired	Amount of concentrate of BHC or Lindane required to make 1 gallon of spray using #2 fuel oil as diluent	
	1 1/4% gamma BHC (1 lb. gamma BHC per gal. of concentrate)	Lindane - 20% gamma BHC (1.4 lbs. gamma BHC per gal. of concentrate)
1/4%	5 tablespoons	3 tablespoons
1%	20 tablespoons	12 tablespoons

Pine logging operations are carried on all over the South during spring and summer months. Contrary to widespread opinion, little or no insect killing of standing trees results when a clean logging job is done and weather conditions are normal.

Where the above precautions or conditions cannot be met, you may want to check with a competent forester for individual-situation analysis and advice.

Very truly yours,

County Agricultural Agent

Prepared by:

Dr. M. H. Farrier
Entomology Department
N. C. State College

Fred E. Whitfield
Forest Management Extension Specialist
N. C. State College

Farm Forestry Facts

Forestry Extension Department N. C. State College, Raleigh, N. C. May, 1962

Diseases of Christmas Trees

Diseases can be an important factor in growing Christmas trees in North Carolina, and this fact sheet has been prepared to help acquaint you with some of the more important diseases you may encounter. You will find the diseases listed under the species of trees they attack.

Douglas fir (*Pseudotsuga menziesii* (Mirb. Franco))

This species is well out of its natural range. It is not possible, therefore, to determine which pests will become most important in North Carolina.

Fraser fir (*Abies fraseri* (Pursh) Poir.)

Norway spruce (*Picea abies* (L.) Karst.)

There are no serious diseases at present that affect these trees in North Carolina.

Redcedar (*Juniperus virginiana* L.)

Cercospora needle blight (*Cercospora sequoiae* var. *juniperi* Ell. & Ev.) causes a destructive leaf disease of redcedar in which needles turn grayish-tan or ash-brown in color. The disease causes shedding of the needles, particularly on lower branches. Eventually, only needles at the tips of branches remain green. Damage from this disease has been very destructive in some plantations, greatly reducing the value for sale as Christmas trees.

Preliminary tests have shown that this disease can be controlled with certain fungicidal sprays, but costs at present are too high to be practical.

Phomopsis blight (*Phomopsis juniperovora* Hahn) is primarily a disease of seedlings. The disease is first noticed when the tips of branches die because of girdling of the branches. The needles show a bright reddish-tan color, and the

MORE

entire upper portion of the tree may die. The disease is favored by moist seasons, and sometimes in nurseries entire seedbeds may be affected. Before planting seedlings from the nursery, all infected seedlings should be destroyed since the possibility is small that an infected seedling will develop into an acceptable Christmas tree. The presence of even one infected branch will often result in a stunted or deformed tree. Although there is no evidence that the spread of the fungus from infected to healthy seedlings occurs in plantations to any great extent, some spread does occur and could result in additional losses.

Cedar-apple rust (*Gymnosporangium* spp.) is a disease of redcedar and apple trees. The fungus causes brown galls to form on redcedar, which vary from a fraction of an inch to over an inch in diameter. After rainy periods in the spring, orange-colored jelly-like horns are formed from these galls. Tiny spores formed on these horns are carried by the wind and infect leaves and fruit of nearby apple trees. The rust does very little damage to redcedar, but it is one of the most destructive diseases affecting apple trees in this area. It is advisable not to establish plantings of redcedar within three miles of commercial apple orchards.

Arizona cypress (*Cupressus arizonica* G.)

Arizona cypress is subject to diseases which cause symptoms similar to those found on redcedar.

Scotch pine (*Pinus sylvestris* L.)

Needle rust (*Coleosporium* spp.) attacks Scotch pine (and other pines) and produces orange or yellow blisters on the needles in the spring. These diseases rarely cause severe damage to the trees, but they may reduce their value as Christmas trees. Infection of pines originates from spores formed on goldenrod, aster, and certain other weeds, the alternate hosts. This disease requires favorable weather conditions and does not occur every year.

Needle cast (*Lophodermium* spp. and *Hypoderma* spp.) is the name of several diseases that cause dieback of pine needles, often followed by early shedding or "casting." These diseases usually do not kill but will reduce values as Christmas trees. From a distance, affected trees have a scorched appearance. The symptoms are most evident in the spring. These fungus diseases can be controlled by spraying with an organic mercury at the rate of 1 teaspoon per gallon of water or Ferbam at the rate of 2 teaspoons per gallon of water. Apply spray at two-week intervals until the end of June, starting when new needles begin to emerge in the spring.

Pine-stem rusts (*Cronartium* spp.) cause round swellings on the limbs or trunks. In the early spring these swellings produce orange blisters. Branches bearing cankers should be pruned before the disease reaches the trunk, or the tree may die. The best time to prune these cankers is when the stand is between three and five years old so that the trees may recover their form before harvest. Oak trees are the alternate hosts for the stem rust of southern pine.

White pine (Pinus strobus L.)

Needle blights cause white pine needles to become reddish-brown at the tips and give the tree a scorched appearance. The diseases usually do not kill the tree but would reduce its value as a Christmas tree. Some trees seem to blight every year, others occasionally. No control is known. These diseases are not caused by a parasitic organism.

White pine blister rust (Cronartium ribicola Fischer) is caused by a fungus that also forms certain of its spore stages on currant or gooseberry (Ribes spp.). The fungus enters the needles and grows into the inner bark of branches, where it causes spindle-shaped cankers to form. Three to four years following infection, yellowish blisters form in the bark producing tremendous numbers of spores. The spores cannot infect the five-needles pines but may infect currant or gooseberry bushes. Thus, it is possible to control this disease by eliminating currant (Ribes) plants to a distance of at least 400 feet from the pines. The spore stage that infects the white pine is produced on the alternate host. It is a very delicate spore and does not travel far from the point of origin. This disease is nearly impossible to detect until the tree has been infected for at least two years.

Very truly yours,

County Agricultural Agent

Prepared by:

Fred E. Whitfield
Forest Management Extension Specialist

Farm Forestry Facts

Extension Forestry Department N. C. State College, Raleigh, N. C. April, 1962

Some Insects That Attack Christmas Trees

Christmas trees, like any other farm crop, are subject to injury or death by insects. Some insects will attack several different kinds of trees, while others are more specific and attack only one kind of tree. Therefore, a knowledge of major insects that attack evergreen trees is important.

1. Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco)

This species is well out of its natural range. It is not possible, therefore, to determine which pests will become most important in North Carolina.

2. Fraser fir (*Abies fraseri* (Pursh) Poir.)

Balsam woolly aphid (*Chermes piceae* (Ratz.)) is a tiny European insect imported to United States about 1908. This insect has moved into many areas of the United States and Canada where it attacks and kills many of the true firs. It is very difficult to detect at first, but it later causes white woolly patches on the trunks and twigs. This insect sucks sap through the bark and if allowed to continue without controls, the tree will die within two or three years. It has caused the death of many Fraser firs in natural stands in western North Carolina during the past few years.

This insect has not been a serious problem in Christmas tree plantations to date. Christmas tree growers should examine plantings of fir carefully to determine if the trees have been attacked. If your trees have been attacked, the insect can be controlled by spraying the entire tree with a solution of BHC 11% emulsifiable concentrate at the rate of 5 tablespoons per gallon of water as a late dormant spray during the last half of May.

Information on costs of spraying may be obtained from your county agent's office.

Balsam gall midge (*Cecidomyia balsamicola* (Lint.)) lays its eggs in the

(MORE)

Balsam gall midge (*Cecidomyia balsamicola* (Lint.)) lays its eggs in the needles of balsam fir and Fraser fir. Galls become noticeable (yellowish oval swellings) near needle bases on new growth about midsummer. Trees heavily infested are not killed but may lose many of their needles before or after trees have been cut for use at Christmas. No satisfactory chemical control is known.

3. Norway spruce (*Picea abies* (L.) Karst.)

Spruce spider mite or red spider (*Oligonychus ununguis* (Jac.)) is the name most often applied to this species of web-spinning mites. These pests cause pale-brownish speckling which may later cover the needles of the entire tree and a web sometimes so dense as to be plainly visible on the leaves. During hot, dry weather an infestation will damage spruces because these pests suck juices from leaves. They can be controlled by spring with Malathion or Aramite if properly applied. Two or three applications at seven- to ten-day intervals usually will be necessary. (See Rev. Extension Folder No. 164, "Spider Mite Control on Ornamentals.")

Sawflies (See White pine)

White pine weevil (See White pine)

4. White pine (*Pinus strobus* L.)

Pine bark aphid (*Pineous strobi* Htg.) attacks white pine, causing unsightly white woolly patches on the trunk and twigs. They suck sap through the bark and weaken the tree. To control, spray on a warm, sunny day with 1 1/2 teaspoons 40% nicotine sulfate to one gallon of water to which one ounce of soap has been added. Use pressure to penetrate waxy mass.

White pine weevil (*Pissodes strobi* (Peck)) (See "Farm Forestry Facts" sheet.)

Sawflies (*Neodiprion* spp.) are yellowish to greenish-looking larvae that feed in clusters on needles. Unless controlled, they may devour all the needles of the tree, but usually the tree will recover. They can be easily controlled by applying DDT 25% emulsifiable concentrate at the rate of 2 teaspoons per gallon of water or DDT 50% wettable powder at the rate of 2 tablespoons per gallon of water. Apply when larvae are first noticed.

Pine tip moths (*Rhyacionia* spp.) kill the buds and twigs of pines. They also feed on the outside of new shoots, causing a distorted shoot. Severe repeated attacks may result in stunted, deformed trees. These insects are very difficult to control, and treated areas usually become reinfested.

Spray with DDT 25% emulsifiable concentrate at the rate of 8 tablespoons per gallon of water when new shoots start growing and again at the end of their growth period or in June. Shearing, when properly done, also helps to control these pests. To further help control these pests, pick and burn the infested shoots.

Pine leaf aphid (Pineus pinefoliae) (Fitch) attacks white pine and spruce. This insect overwinters on white pine and sometimes kills the tips of branches. This injury may not be noticed until late summer or early fall. In early spring the insects may move from white pine to the past year's needles on spruce. The new growth of spruce is attacked, causing the tree to form cone-like galls. When the galls mature and turn brown, the insects are released and they fly to white pine where they attach themselves to the past year's needles. The exact time of these flights cannot be predicted because the rate of development of this insect is controlled by the weather. The time of migration to white pine must be determined by frequent examination of last year's needles during June. The adults are very similar to winged plant lice.

To control this insect, thoroughly wet the branch tips when the adults are attached to the needles with a spray of Malathion emulsifiable concentrate (5 lbs. /gal.) at the rate of 4 teaspoons to a gallon of water.

Pales weevils (Hylobius pales) feed on the bark of young seedlings, causing injury or death. Where Christmas trees are planted immediately after a partial cutting or where seedlings have been lined out in a recently cleared area, there is risk of infestation by these insects. The adults are attracted to freshly cut stumps of needle-type evergreens, where they breed. The adult insects feed on the tender bark of twigs of saplings, along the main stems and roots of seedlings. They feed mostly at night or below the litter during the day. The first evidence of attack is when the young seedlings wither, and it is too late for control measures.

Seedlings may be treated by dipping the tops in a solution of Aldrin (11 oz. of Aldrin (2 lbs./gal.) to one gallon of water). One gallon of the mixture will treat about 30,000 seedlings. Rubber gloves should be worn and care should be taken in dipping planting stock so that the material does not get on the roots of the seedlings.

Insecticides are poisonous. Store them in plainly labeled containers away from all food. Follow directions and heed precautions given by manufacturer.

Call or visit your county agricultural agent for further information.

Very truly yours,

County Agricultural Agent

Prepared by:

Fred E. Whitfield
Forest Management Extension Specialist

Exhibit B

THE EXTENSION PROGRAM IN FORESTRY, 1962 TO 1967 - COMPLETE REPORT

I. Logging and Wood ProcessingA. Importance of the industry to the state's economy

1. As of 1960, North Carolina ranked first nationally in the manufacture of nonupholstered and upholstered wooden furniture and hardwood plywood. The state ranked fourth in the nation in total lumber production.

When compared with 11 other Southern states, North Carolina ranked first in lumber production, fifth in roundwood pulpwood production, both pine and hardwood, sixth in pulping capacity, second in number of plants with facilities for producing pulp chips from waste, and third in volume of chips produced from sawmill and veneer mill waste.

Within the state there are some 3,200 wood products manufacturing plants. Together they represent 45% of the total number of industrial establishments. Their annual value of output of \$1,074,000,000 comprises 12% of the state's total. They employ 90,000 persons in manufacturing - 20% of the state's industrial labor force, with average weekly earnings (excluding pulp and paper) of \$59.00.

This manufacturing phase of the state's forest economy represents a wide variety of establishments, as follows (figures are approximate):

2,683 sawmills and planing mills
 400 furniture plants
 63 veneer and/or plywood plants
 5 pulp and paper mills
 7 cooperage mills
 9 tannin extract plants
 25 handle mills
 23 shuttle block mills
 15 miscellaneous wood-using plants

In addition, there are an estimated 3,000 logging operations and 2,000 wood-cutting operations in the state.

Annual production of raw wood products totals 2,145,000,000 board feet of logs of sawtimber size for all purposes and approximately 3,000,000 cords of pulpwood-size material for pulpwood, poles, piling, fuelwood, posts and miscellaneous use. In addition, 386,000 cords of pulp chips are produced annually from manufacturing waste by 147 sawmills and veneer plants.

B. Recent development, expected trends and problems

1. Pulp and paper - Although only one new pulp mill was built in

The state during this 1950-60 period, pulping capacity of in-state mills more than doubled, rising from 1,708 tons to 4,130 tons per 24-hour day. In 1950, the state ranked eighth in the South in manufacturing capacity; in 1960, sixth.

As of 1948, there were 4 mills in surrounding states that were important consumers of North Carolina-produced pulpwood and owned and operated forest land in this state. In 1960, the number had risen to 6.

The 24-hour pulping capacity of mills buying North Carolina pulpwood rose from 4,054 tons in 1949 to 9,786 tons in 1960. Consumption of North Carolina round pulpwood increased from 926,000 cords in 1948 to 1,888,000 cords in 1960. In 1948, 27% of total roundwood consumed was hardwood, including dead chestnut. By 1960, chestnut was out of the picture and hardwoods made up 21% of total consumption.

In 1956, as a result of pulp mill encouragement, sawmills and veneer mills began establishing equipment to manufacture pulp chips from mill waste. Chip production and consumption in that year was 80,000 cords; by 1960, it had risen to 386,000 cords.

In the 1950's the industry began establishing both company- and dealer-operated truck wood-buying yards throughout the state to make it possible to buy small boundaries of timber. Most of these involved hand loading of rail cars at first, but with the development of suitable equipment and open rack cars, a large proportion of these yards mechanized their loading operations. As of 1960, there were 62 mechanized buying yards in the state.

Another improvement of recent origin has been the development of weight-scaling and slasher saw facilities at two eastern mills to permit buying wood in 10' to 20' lengths instead of the customary 5'-bolt length. Other mills in the eastern area are expected to follow suit. This development will lead to much more efficient loading and hauling and make integrated harvesting and logging of eastern timberlands economically much more feasible than at present.

North Carolina's pulp mills are at present estimated to be operating at 60% of capacity. Long-time forecasts made in the early and mid 1950's indicate that the period 1952-1975 is to be one of continued expansion in the southern pulp and paper industry. Although no new mill facilities may be built or existing facilities expanded in the state in the next five years, continuing upward trend is likely in total pulpwood and chip consumption and with a higher proportion of hardwood used by 1967. Total consumption may well approximate 2 3/4 million cords annually, with 30% of this hardwood roundwood and hardwood waste.

Intensified wood procurement in the long wood truck-hauling radii of 100 miles around coastal and Piedmont mills is anticipated. In addition, increased competition for stumpage will develop in the Piedmont due to the recent completion of a major pulp mill near Rock Hill, South Carolina.

Logging efficiency will receive major attention by the industry. It will improve through expansion in long wood operations and in mechanizing truck loading in short wood rail haul operations.

Over the period 1945 to 1960, delivered-to-mill prices for pine rose from \$9.15 to \$17.20 per cord; for hardwoods, \$8.55 to \$14.05 per cord. By 1967, pine prices are likely to rise further to \$19.00 to \$20.00 per cord, with perhaps 50% to 60% of this passed back to the grower in increased stumpage prices. Little change is expected in hardwood stumpage prices although there may be a \$1.00 to \$1.50 increase in delivered-to-mill prices to cover increases in logging costs.

2. Wood processing other than pulp and paper - Over the period 1950-60, the number of active manufacturing plants rose to a peak of 4,200 during the Korean War period and has since dropped to about 2,600, excluding furniture plants. The fluctuation was mainly in the lumber and veneer segments of the industry. The marked decrease was due to several factors:

An increase in stumpage prices due to buyer competition and increasing landowner awareness of timber values

Smaller increases since 1947 in the wholesale timber-products price index than for competing construction materials

A 75% increase in wage costs

Increasing competition from Western lumber and plywood mills in Northern, Midwestern and Southern markets

Increasing competition from Japanese plywood

A profit advantage given larger mills by the installation of debarking and chipping equipment. This was reflected in larger mills outbidding small operators in buying timber

Although the number of plants decreased, employment rose from 78,000 in 1950 to over 90,000 in 1960. Annual value of product shipped, excluding pulp and paper output, increased from \$470,000,000 in 1950 to \$700,000,000 in 1959.

These trends are expected to continue. By 1967, employment is expected to increase by 12,000, about 15%. Gross wages as a result of increased employment only, are expected to increase

by \$39,000,000, about 35%. Average weekly earnings should reach \$64.00. The number of active plants will continue to decrease, falling to about 2,500 by 1967.

In spite of competition from competing materials and wood products from other regions, a gradual rise in new residential construction, plus a sharp increase over the next five years in demand for construction materials for remodeling and repair of residences, should result by 1967 in an increase of \$200,000,000 in the value of timber products shipped annually by North Carolina plants. Annual value of product shipped (excluding pulp and paper) may well total \$900,000,000 by 1967, subject to the effect of any major changes in international markets.

Stumpage prices for pine sawtimber have risen over the past fifteen years from an average of \$15 to approximately \$30 per thousand board feet. Hardwood sawtimber stumpage has risen from \$8 to \$10 to \$15.

Most of the "fat" has been squeezed out of pine stumpage prices. The margin between delivered-log and standing-timber prices has declined about as far as present logging costs will permit, particularly in the case of pine and average-size and quality hardwood. No marked increase other than that due to ordinary inflation is expected, except in the case of large, high-quality hardwoods suitable for making interior wall panels and high-grade flooring. Here an increase is likely, particularly in the eastern part of the state where hardwood use is expanding.

3. Deterioration of wood products and wood in service - In the post-war period, wood products used in home construction have suffered a loss in reputation and a decreased volume use per dwelling due to improper seasoning, lack of pretreatment with preservatives, and slipshod construction methods.

Although individual state figures are not available, for the South as a whole losses due to stains and decay are conservatively estimated at \$50,000,000 per year. To these direct losses must be added indirect costs due to downgrading of quality of wood products in process of manufacture and costs of replacing decayed members in service. The latter are generally higher than costs of initial installation.

Without proper lumber and soil pretreatment coupled with correct construction methods and annual inspections, all houses built on newly cleared land in North Carolina generally suffer an infestation of eastern subterranean termites in seven years.

A considerable proportion of this damage from stains, decay and termites is preventable. New buildings can be termite proofed for less than 1/2 of 1% of the total construction cost. Savings to homeowners in North Carolina alone from the effect of such pretreatment in reducing termite damage and control costs would

exceed \$500,000 per year.

Technology is already developed in the area of stain, decay and termite prevention. Manufacturers must be challenged to adopt this technology in order to improve product quality and serviceability, regain some of the lost market and hold existing markets. Lending agencies must be influenced to require properly seasoned and treated wood products in construction which they finance as a collateral protection measure. Consumers must be sold on the long-run economies of paying the modest additional cost of properly pretreated wood products.

C. Problem areas to receive Extension emphasis and results expected, 1962-1967

1. Past Extension efforts with wood processors - Prior to 1955, no personnel with training or extensive experience in wood processing were employed. Through the forest management phase of the program, assistance had been given to the industry mainly in procurement, through publicizing existence of market outlets and the establishment of new markets, and in marketing, through consumer education of farmers in the advantages of using treated wood products.

In 1955, one man with an extensive background in the lumber industry was employed. In 1957, a second man with graduate training in wood technology was hired. He was replaced in 1960 by a man with extensive experience in dimension-stock manufacture and operations analysis. Also in 1959, a Federal contract to develop an Extension program with wood processors was awarded to North Carolina State College. This resulted in a third man with graduate training in wood technology and a wood processing economist on a quarter-time basis being employed on Federal funds to carry out the contract.

Initial effort has been directed primarily to individual-case work, teaching plant owners and managers to recognize, analyze and come up with solutions to critical problems in improving efficiency in existing plants and plant modernization. Initially, efforts are being concentrated on lumber, veneer and dimension manufacturers. There are very few competent private consultants and no other public Extension-type programs in these phases of processing, and response to Extension efforts has been excellent. The individual-case approach has been used as the most effective way to develop industry confidence in the ability of the program and personnel employed to come to grips with real, present-day problems. In this early stage, each specialist annually can directly account for approximately \$750,000 in reduced annual direct costs or increased value of products shipped by clientele influenced to make changes.

The individual case approach will continue to be emphasized until about mid 1963. By that time, the reputation of the program and

the confidence of the industry in it is expected to be firmly established and more economical group contact and teaching methods can be followed successfully.

2. Problem areas to receive Extension emphasis, 1962-1967 - Over this period, Extension will focus its major efforts on the lumber, veneer and plywood, dimension manufacturing and logging segments of the industry. These segments have generally been the slowest to adopt modern technology and business methods and to hire professionally trained persons and trained technicians. By contrast, the pulp and paper and, to a lesser extent, the furniture segments are in a much stronger position with regard to managerial ability, productive work forces, plant modernization, and efficiency in production, marketing methods and financing.

With these four segments, Extension will conduct an educational program stressing proven methods and the latest technology to help the industry reduce operating costs and/or increase the gross value of products shipped. The five major areas to receive emphasis and estimated dollar impact of Extension influence are:

- a. Production efficiency - Emphasis will be placed on improving plant layout and equipment, improving materials handling, product flow, work assignment and supervision, and reducing down time through systematic maintenance programs.

Expected cost reduction, increase in value of products shipped, or both -- \$40,000,000 per year by 1967

- b. Product improvement - Emphasis here will be placed on improving uniformity of product through adoption of statistical quality control techniques and stress grading of construction lumber; improving dimensional stability through better drying techniques; improving utility through pre-priming of lumber; and preventing stain, decay and termite damage through proper seasoning and preservative treatment. The major purpose of this phase of the program is to help the industry hold its own in competition with substitutes and wood products from other states and regions. In addition to maintaining existing positions in the market, this phase should result in an increase in value of products shipped of ----- \$15,000,000 per year by 1967

- c. Product development - Extension will assist the industry to analyze opportunities for further profitable utilization of waste, for developing complementary product lines, for secondary processing of semi-finished products and processing of new products. Extent of program impact here will depend largely on whether research develops major new product opportunities.

Expected increase in value of products shipped ----- \$ 2,000,000 per year by 1967

- d. Consumer education and market promotion - Extension will analyze comparative advantages of wood versus metal and masonry products for public agencies purchasing for public use where North Carolina wood products may be used to equal or greater advantage than those currently purchased. Extension will provide technical evidence needed to encourage government agencies which insure home loans to raise their specifications so as to require use of properly manufactured and treated wood in home construction.

Extension will provide information on technical and economic advantages of using North Carolina wood products to existing state and local trade associations conducting market promotion and development programs. Extension will also make an effort to catalyze a cooperative program involving state and southern regional trade associations to promote use of southern wood products in specific market areas and, for some products, nationally where southern products have advantages over competing products from the consumers' angle.

Expected increase in value of products shipped ----- \$10,000,000 per year by 1967

- e. Business and marketing methods - Extension will stress the understanding and adoption of process cost records for efficient cost analysis and control, more

efficient inventory and billing systems, attractive packaging and efficient routing of products to customers, sources and procedures for securing modernization and expansion capital as well as operating capital and opportunities and procedures for developing new and expanded markets.

Expected cost reduction, increase in value of products shipped, or both -- \$10,000,000 per year
by 1967

Total estimated savings in costs, increases in value of products shipped, or both, as a result of Extension's wood products program ----- \$77,000,000 per year
by 1967

3. Additional Extension resources needed - At present there are two technical wood processing specialists, and one secretary organized as the Wood Products Section in the Extension Forestry Department.

A minimum of four wood processing specialists, plus one specialist with training or experience in the economics of logging and wood products manufacturing, is needed if the program is to have the estimated dollar impact listed above.

One existing specialist and an economist quarter time are now supported altogether by Federal funds under a special contract. This is expected to terminate in November, 1962. At this time, state matching support or full support of these positions will be needed, depending on whether or not cooperatively financed A. M. A. projects can be secured.

In total, supporting funds then are needed for two specialists now employed on Federal funds and one additional specialist in this program field.

II. Forest Management for Timber and Other Products

- A. Importance in the state's economy - The last complete forest survey of North Carolina was published in 1955. At that time slightly in excess of 20,000,000 acres were forested - 62% of the state's land area. Of this total, 92% was in private ownership.

There are no precise figures listing annual gross cash income from the sale of timber and raw forest products from North Carolina's forest area. About 69% of the private forest acreage is held by farm owners and operators. In 1959, the cooperative Federal-State Crop Reporting Service listed \$43,407,000 as gross cash farm receipts from sales of forest products, plus the value of products produced for home consumption. In that same year, county agents estimated that farm income from

the sale of forest products and ornamental plants totalled \$80,000,000.

Gross standing-timber value of the annual harvest estimated by placing conservative prices on annual consumption by industries indicates a \$70,000,000 to \$80,000,000 total for all landowners, public and private.

In addition, there are many unpriced services and values involved. Some 680,000 hunting and fishing licenses, totalling \$1,500,000 in license fees, are sold annually. Watershed protection values may well exceed the value of the annual timber harvest although no accurate estimate has been placed on this contribution from the state's forest lands. The scenic attraction of extensive forest areas plus camping, hiking and other forest recreational pursuits are additional examples of unpriced forest values.

B. Recent developments, expected trends and problems

1. In timber supply and forest area - Over the period 1938-1955 substantial increases in timber growth rates rectified a growth deficit in relation to drain which had existed for many years. Two surveys conducted in the early 1950's indicated that state-wide growth exceeded drain for all major species and all size classes, although in the Piedmont and mountain areas softwood saw-timber drain still exceeded growth to a slight degree.

As of 1955, an annual softwood surplus of 1,794,000 cords and hardwood surplus of 4,329,000 cords was developing. This indicates, in general, room for expansion in wood processing, particularly for industries which can utilize low- and medium-grade hardwoods.

Over the period 1938 to 1955, there was a decided shift in product composition of the annual harvest. In terms of proportion of volume of the total annual harvest, the following shifts occurred in raw-product output:

	<u>1938</u>	<u>1955</u>
Sawlogs	52%	57%
Fuelwood	36%	13%
Pulpwood	4%	19%
Veneer	4%	6%
Other	5%	5%

From the standpoint of forest owners, these shifts in demand and supply intensified the problem of what to do with large amounts of surplus hardwood timber of low to medium grade and the need to restock cutover lands, where hardwood was left behind, to the more profitable pines.

Over the 1938-1955 period the forest area of the state increased by 1.2 million acres, about 7%. Much of this increase was due to

farm land abandonment. While there was an increase in total forest area, cutting practices along with natural ecological trends resulted in a 1.6 million-acre drop in forest land supporting pine and oak-pine type timber and a 2.8 million-acre increase in hardwood types.

Over the next five years, there may well be a continued net increase in forest area due to the fact that small farmers are currently getting out of agriculture. This trend is likely to accelerate, if further mechanization of tobacco harvesting develops. The hardwood surplus problem will accelerate regardless of any foreseeable developments in hardwood processing. Landowners will continue to face the problem of dealing with land covered with low-grade oak and other species for which there is little demand.

In addition, the pine sellers' market which has been a feature of the post World War II period will shift to a more nearly equal bargaining power between buyer and seller.

High-grade hardwood timber of veneer quality should face an expanding market, particularly in the eastern part of the state where there has been a steady build up in hardwood-using industries in recent years.

Surpluses of growth over drain from a gross volume standpoint are expected to continue over the next five-year period provided:

- a. That no break-throughs occur in manufacturing or new product technology which result in a major expansion in wood use.
- b. That annual losses from diseases, fire and insects do not increase. With improved forest fire prevention, detection and control, the period 1945-1960 saw diseases and insects move well ahead of fire as destructive agencies causing economic loss to forest owners. Annual growth loss due to diseases in North Carolina is estimated at \$6,000,000 to \$8,000,000. Out-right mortality loss due to insects exceeded \$750,000 in 1952.

Although these losses can be reduced to some extent through utilizing existing information and establishing facilities and procedures for salvaging timber killed in disease and insect epidemics and damaged by storms, the major need is to expand research in forest pathology and entomology. For example, recent preliminary surveys in North Carolina have revealed the presence of annosus root rot in a high percentage of thinned plantations and even in certain unthinned plantations. In isolated areas, serious mortality has already occurred.

All evidence indicates that the presence of this disease in North Carolina will affect not only present management practices, but also future planting operations in the lower Piedmont and coastal plain regions of the state.

At present no effective control for this disease is known.

In entomology, reliable methods of predicting serious insect outbreaks and effective control measures economical under forest conditions have yet to be developed for many insect species which cause serious losses in North Carolina. As of 1962, four serious outbreaks existed in the state; and prospects for early control were not bright.

2. In forest ownership - Data are not available to show exactly shifts which occurred in the ownership of forest land in the state. However, some trends are evident.

In 1955, 91.6% of the state's 19.3 million acres of commercial forest land were in private ownership. The remaining 8.4% was in public, primarily Federal, hands.

State-wide, percentages of total area held by various types of owners were as follows:

Federal -----	6.9%
State -----	1.3%
County and municipal -	0.2%
Farm -----	68.6%
Other private -----	23.0%

In 1953, a resources review by the Federal Government established a size of forest-holding breakdown of private forest land as follows:

<u>Size of holding</u>	<u>Number of ownerships</u>	<u>Percent of total private forest area held</u>
Less than 100 acres	231,500	41%
100 to 1000 acres	35,300	43%
Over 1000 acres	1,400	16%

The 1959 U.S.D.A. Census of Agriculture shows that farm ownership of forest resources may be declining. There was a drop of 1.4 million acres in farm woodland area from 1954 to 1959. Farm forest resources may also be moving into the hands of larger owners. In 1945, 23.1% of total farm acreage was held in connection with farms of 220 acres and larger. In 1959, 36% of the farm area of the state was in this farm-size category.

From the ownership standpoint certain trends over the past fifteen years which are likely to continue are apparent.

Nearly 60% of the private forest area of the state is in the hands of a relatively small number of owners - 36,700. The remaining 40% is highly fragmented among 231,500 ownerships.

Although comparable statistics for different time periods do not exist, it is our opinion that the private forest lands of the state are gradually moving into the hands of individuals and companies with larger amounts of capital and other resources at their command. No figures exist to show the increase in pulp company forest ownership over 1945-1960, but this period was a major one of land acquisition in the history of this industry.

Consolidation of private forest land into larger holdings is likely to continue due to the changes which are taking place in farm tenure and the increasing favor with which the purchase and development of forest land is being regarded as a long-term "growth type" investment, which provides a hedge against inflation and enjoys a favorable tax climate for building estate values.

3. In forest management for the production and sale of forest products - The period 1945-1960 might be termed that of the "great awakening" of forest owners in the Southern states to income opportunities from timber growing.

This awakening was stimulated by the following:

A sharp rise in stumpage prices following World War II

An expanding opportunity to market pulpwood at comparatively early stages in the growth cycle of a timber crop

The development of planting machines, forest land clearing equipment, herbicides and contractual services which made practical widespread tree planting and the conversion of cutover areas to pine

The example set by large land-owning pulp companies in building up the timber productivity of their holdings

The stimulus of the cost-sharing and rental payments under the Conservation Reserve phase of the Soil Bank program

Expansion in public and private educational and service programs directed at private individual forest owners

The optimism with regard to long-range timber demand generated by two comprehensive national forecasts made in the early 1950's

In North Carolina, this combination of factors led to the following:

An increase in tree planting on private land from 7,300 acres per year in 1950 to a high of 83,500 acres in 1959 to 70,000 acres in 1960. North Carolina moved from 14th to 7th nationally in private acreage planted per year during this period.

Extensive clearing of non-stocked cutover land and replanting on pulp and paper company lands. On individual holdings, efforts were more modest. Under the A.C.P. program beginning in 1955, participation had built up to 8,600 acres per year by 1959.

An increase in farm forest cash receipts and value of material harvested from home use from \$8,000,000 in 1945 to \$43,000,000 in 1959, according to Federal-State Crop Reporting Service figures.

A much higher proportion of timber harvested under supervision of professional foresters.

Over the next five years we predict:

A drop in tree planting activity on non-industrial private lands. This will occur as a result of the discontinuance of the Conservation Reserve phase of the Soil Bank program. In addition, North Carolina, in the mid 1950's had less land needing and suitable for planting trees than any other Southern state except eastern Oklahoma and eastern Texas. At that time it was estimated that 970,000 acres (642,000 acres open land plus 328,000 acres of forest land) was suitable for planting. Since that time, 315,000 acres of this has been planted.

We estimate that total private planting will stabilize at about the 50,000-acre per year level over the next five-year period. Of this, roughly 25,000 acres per year will be planted on industry lands and 25,000 on non-industry holdings.

An increase by 1967, in non-industry landowner gross income from timber sales due primarily to expanded pulpwood consumption.

An increase in site preparation and replanting and stand release activities to approximately 15,000 acres per year by 1967.

The planting of 350 acres of land per year to Fraser fir-type Christmas trees by 1967, and, starting in 1966, gross income of \$500,000 per year from the sale of trees planted in recent years.

These trends are those expected to occur with no change in level of impact of Extension's program.

4. In Extension's forest management program and allied groups and agencies

Up until 1955, Extension's program in forestry was oriented

primarily to reach and influence farm forest owners and to a large extent, those in the small-size class of forest holdings of less than 100 acres.

From 1945 to 1948, major efforts were devoted to providing timber marking and estimating service to such landowners. In 1948, this phase was turned over to the North Carolina Division of Forestry. Extension was reorganized on an Extension district general forestry specialist basis with initial emphasis on 4-H training, forest planting, thinning and marketing of pulpwood, and the development of forest management plans on Unit Test Demonstration farms in the Tennessee Valley watershed counties.

Considerable progress was made in all four program phases. No statistics are available on results in the pulpwood thinning and marketing phase, but work plans were developed for nearly all of the unit test demonstration farms and many of these remain today as outstanding examples of successful small forest management.

In 4-H forestry training the following trend figures indicate levels of activity and participation:

<u>Year</u>	<u>Number 4-H Club members receiving forestry training</u>	<u>Number 4-H Club members forestry project completions</u>
1946	2,000	448
1950	23,345	1,638
1955	35,000	3,557
1960	10,258	4,657

This program received a great boost in 1955, when the Southern Bell Telephone and Telegraph Company began sponsoring a complete awards program and underwriting the expenses of an annual 4-H forestry leader training camp.

The 4-H forestry program and the tree planting promotion effort were carried out largely through and by county Extension personnel with training and guidance by the specialist staff. Agent participation in promoting tree planting is evidenced by the following:

<u>Year</u>	<u>Number of seedlings ordered through county agents' offices</u>
1950	4,200,000
1955	5,500,000
1960	14,300,000

In 1955, the program began to broaden. In that year, the specialist staff began to focus attention on the use of chemicals and

heavy mechanical equipment for controlling undesirable trees and converting cutover hardwood and brushlands back to pine and to train and encourage contractors to offer custom service in these practices. A considerable number of result demonstrations were set up, and specialists began working with certain landowners selected to serve as long-time forest management demonstrators.

In 1955, Extension appraisal of market and profit potential plus the experience of individual growers indicated that a large-scale Christmas tree enterprise based on the production and marketing of high-quality Fraser fir should be developed in the mountain area. Following a series of meetings with county agents and growers, Extension helped organize a North Carolina Christmas Tree Growers Association. This group was instrumental in getting the North Carolina Division of Forestry to allocate the Hendersonville Nursery to the production of Fraser fir planting stock. It also sponsored a series of demonstrations and schools at which Extension discussed and demonstrated grading procedure, shearing and weed control practices.

As a result, landowners in the north-mountain area are now planting 300,000 to 500,000 Fraser fir seedlings per year. The Association, with a current membership of 67, is providing marketing information to growers and is working to set up a grading and custom marketing service.

Analysis of market potential indicates that 5,000,000 cut Christmas trees per year can be sold through major wholesale channels in the five southeastern states of Virginia, North and South Carolina, Georgia and Florida. North Carolina firs, by virtue of freshness, quality and lower transport rates, can drive Canadian trees out of the market and develop a monopoly of their own.

Extension's objective is to promote expansion of Fraser fir planting to 9,000,000 trees per year with a total of 30,000 acres in various age classes.

As of 1960, approximately 1,000 to 1,200 acres had been planted.

In 1957 and 1958, due to the inauguration of the wood processing Extension staff, much closer relationships were established with the School of Forestry. Extension was asked to broaden its concept of its clientele to include all major groups with interests in the School's research and teaching programs.

In 1958, the Extension Forestry Department received a \$18,000 fellowship grant from the Richardson Foundation to finance specialized graduate training for its forest management staff. Under this grant a total of eight specialists were to be trained in each of the following fields to prepare them to serve a broader clientele with a higher level of managerial and professional skill, and problems of a more technical nature:

Forest entomology - completed
Forest soils and reforestation problems - completed
Forestry program administration - completed
Forestry economics - completed
Bottomland hardwood management - completed
Christmas tree production and marketing - in training
Watershed management - in training
Forest recreation development - scheduled for
1962-63

These are representative of the major competencies needed over the next fifteen years for full development of the state's forest land economy.

As each specialist has completed advanced training, he has been moved from the field into Raleigh. He has been given state-wide responsibility for his subject-matter specialty combined with an area assignment for general forest management activities.

This program will be completed by 1963. It will give the present staff a combination of professional knowledge and skill which, when combined with those represented in Wood Products Extension and the School's research and teaching staff, will make it possible for Extension to help the people of the state take advantage of almost any opportunity for strengthening and expanding the forest-based economy.

From 1945-1950, public agencies were almost alone in the forest management educational and technical service field. Since 1950, the development by the pulp and paper industry of an industry-sponsored conservation education and service program, plus the hiring of large numbers of professional foresters by industry for land management and raw material procurement duties and an expansion in the number of private consulting foresters practicing in the state from 8 to 46, has greatly increased contact between landowners and foresters and at the same time broken up the public-agency monopoly of leadership and influence.

In addition, the Soil Conservation Service has embarked on a more aggressive program of woodland planning and the North Carolina Division of Forestry has greatly expanded the number of management service personnel working with landowners.

This is a desirable development. Yet it has brought new problems. While Extension enjoys cordial relations with most of the industrial forestry groups, the consulting foresters, the Soil Conservation Service and the North Carolina Division of Forestry, these various efforts to improve the forest land economy of the state are not well coordinated. Each group, as is natural, is working for its own interest and looking to strengthen its own position. There are some differences in technical recommendations. Landowners are beginning to raise questions about the ethics of certain consulting foresters and their affiliations with wood processors. There is no

public or self-regulating board to look into landowner complaints of misdealing.

Professional assistance and guidance given to forest owners by both public and private foresters is often mediocre, uninspired and narrow in viewpoint. There is a dearth of aggressive, well-informed leadership in the non-industry landowning segment itself able and willing to speak out and exert influence in conflicts of interest which inevitably arise.

While Extension's monopoly in educational leadership in non-industrial forest land management no longer exists and while it is questionable that Extension workers alone can lead all the forest land owners of the state for whom timber growing is feasible to develop their opportunities fully, Extension's responsibility is clear. It must lead in upgrading the technical and communicative skills and broadening the vision of public and private foresters working with private landowners in the state and in developing much stronger cooperation between these various professional groups. Extension must also seek to strengthen lay landowner leadership to an awareness of the dynamics of the forest economy and the need for adjustments in certain practices and relationships to strengthen the individual landowner segment.

In addition to improving coordination at the local and state level, a clarification of relationships and responsibilities between Federal and state agencies is needed. For example, Extension specialists in requesting cooperation from certain specialists employed by the U. S. Forest Service's Regional Office in Atlanta, Georgia, have sometimes been directed to forward such a request through the State Forester's office in Raleigh. All programs originating with the U. S. Forest Service which require Federal-state cooperation are generally developed with the State Forester regardless of their nature. While closer cooperation exists between Extension and the research branch of the U. S. Forest Service, federal surveys of insect and disease problems within the state are developed and conducted autonomously with no particular effort to inform or coordinate with research and Extension personnel of North Carolina State College.

In the wood processing field, there are at present 9.7 men employed in Extension-type activities in the five southeastern states. Some are Extension personnel; some are employed by state forest services on cooperative funds from the U. S. Forest Service; some are employed and supervised directly by the U. S. Forest Service's Southeastern Forest Experiment Station. Granted that there is a great need for expansion in industry improvement programs, such a heterogeneity of support and direction does not appear to improve the overall effectiveness of the total effort.

C. Problem areas to receive Extension program emphasis, 1962-1967, and estimated benefits

1. An economic approach to individual forest land ownership and management concentrated on larger individual forest owners - A large number of surveys conducted in recent years strongly indicate that timber growing because of the relatively long waiting periods involved, modest rates of return and capital-intensive nature, is not a good enterprise choice for the small landowner or farmer in a low-income bracket with a limited supply of capital and land. This has been confirmed by Extension experience in North Carolina over the past ten years.

Accordingly, Extension will concentrate on reaching and influencing the approximately 36,000 owners of 100 acres or more of forest land. This will include owners and operators of farms 220 acres and larger, as well as non-farm individual owners.

Initially, in cooperation with county agents, county-by-county mailing lists of forest and farm owners in these size class categories will be prepared. The agent will be asked to delete those owners who by virtue of illness, age or other characteristics are not likely to find timber growing a desirable enterprise.

Publications based on individual case histories of successful business management of forest properties will be prepared. Other examples of subject matter to be featured are long-range demand outlook for forest products, tax provisions and advantages, sources of professional and contractual assistance in forestry and modification of forest practice to include optimum conditions for hunting.

Economic guides and procedures for analyzing profitability of clearing and replanting cutover and brush land will be prepared. These will include methods and custom services available. This practice will be featured at many of the tours held for this ownership-size category.

Using the 106 long-time demonstrators' properties as teaching sites, a minimum of 20 tours per year will be held, with special efforts made to get owners on this mailing list to attend.

Extension will take the lead in developing cooperation with selected foresters of the North Carolina Division of Forestry and certain industry conservation foresters to make initial follow-up contact with each such owner who attends a tour. Extension, in cooperation with the School of Forestry, will organize and hold short courses in investment planning, tax provisions and cost-and-return analysis for foresters cooperating in the follow-up phase of this program.

Expected increase in gross stumpage sales,
value of timber growth, or both ----- \$5,000,000 per year
by 1967

2. Bottomland hardwood development - A program emphasizing the development of high-quality hardwood timber initially in the Roanoke River Valley will be carried forward over the next five years. It will involve intensive specialist assistance initially to owners of tracts 5,000 acres and up, most of whom are wood-using industries. Training of industrial and consulting foresters in this area in bottomland hardwood technology and marketing opportunities will be featured. A strong effort will be made to develop support for a research program at North Carolina State College in this field.

Expected increase in annual gross stumpage sales, value of timber growth, or both -----

\$1,000,000 per year
by 1967

3. Hardwood marketing - As of 1960, 55% of the 307,000,000 board feet of domestic hardwood lumber used by North Carolina furniture plants was shipped in from other states. In cooperation with the Wood Products Extension staff and the Furniture, Plywood and Veneer Council of the North Carolina Forestry Association, a strong effort will be made to encourage in-state mills to supply a larger percentage of furniture-plant requirements and to acquaint landowners with existing markets for hardwood, marketing methods and relative values of timber for different hardwood products. Hardwood marketing guides will be prepared for specific areas and products and marketing tours featured.

Expected increase in annual gross stumpage sales -----

\$2,500,000 per year
by 1967

4. Christmas tree production and marketing - In cooperation with the existing growers' association, at least four private nurserymen will be encouraged to produce Fraser fir planting stock for sale at the rate of 1,000,000 transplants per nursery per year. By 1967, landowner planting will be expanded to the 3,000,000-tree per year level. Expansion to the 9,000,000-tree per year planting level is justified and will be pushed in subsequent years as sources of planting stock are developed. A market information and cooperative

marketing service on a graded-tree basis will be developed through the growers' association.

The full impact of this program will not be felt until 1972 to 1975.

Expected increase in gross sales of Christmas trees ----- \$ 500,000 per year
by 1967

Total estimated increase in gross stumpage income, value of annual growth, or both, as result of Extension program in forest management ----- \$9,000,000 per year
by 1967

5. A forest disaster salvage program - In cooperation with other agencies, the North Carolina Forestry Association and private industry, Extension will help set up a system for leasing of water-storage facilities and for rapid harvesting of timber damaged or killed by hurricanes or insect or disease outbreaks of epidemic proportions. No estimate of savings through this program can be made at present.
6. 4-H forestry - This program will be conducted at two levels:
 - a. For clubs made up largely of members not likely to become commercial farmers or landowners, teaching materials and methods will be developed to create in them an awareness of the importance of forestry to their state and in their individual lives and an understanding of forest conservation dynamics.
 - b. For clubs made up largely of potential farmers and forest owners, present teaching materials and methods emphasizing timber-growing procedures through the project approach will be broadened and improved.
7. Coordination of public and private forest management programs - Extension, in cooperation with the North Carolina Forestry Council, the School of Forestry, and the Farm Policy Institute, will organize a series of policy forums for key people representing public agencies, private industry and consulting foresters concerned with educating and serving non-industrial private forest owners in North Carolina. Each interest group will be given an opportunity to discuss its role, its plans for the future, its problems, its relationships and its views on the possibilities of a more unified leadership and coordinated effort to stimulate sound forestry development in the state. Outside discussion leaders may be invited in order to inject a new viewpoint.

Initial purpose of this program will be to stimulate key leaders to think about the future of private forest management development

in the state and how much development is desirable, develop an agreement on major opportunities and objectives to be reached and understand the contributions each can make.

Once this purpose has been reached, plans for coordination and upgrading the quality of service and educational programs may well be worked out.

- D. Additional Extension resources needed - When the present graduate-training program is completed, the Extension forest management specialist staff will with one exception be well equipped to handle this five-year program except in 4-H forestry. An additional specialist at the state level will be needed to lead in the development and operation of a hardwood marketing program for landowners state-wide.

Respectfully submitted,

Forestry Sub-Committee of Campus
Interdisciplinary Committee
on Extension Program:

George Cummings, Agronomy
Peter J. Dyson, Agricultural Economics
M. H. Farrier, Entomology
L. H. Hobbs, Wood Products Section,
Extension Forestry
Arthur Kelman, Plant Pathology
John Gray, Extension Forestry,
Chairman

- 1 -

NORTHWEST NORTH CAROLINA DEVELOPMENT ASSOCIATION - MAY 18, 1962
Atwell Alexander Farm

F O R E W O R D

The information presented below concerning conversion costs and site index applies only to these specific cases. The same figures cannot be applied to any other area of land unless the site index and conversion costs are the same. Costs and return figures must be calculated for each area based on site index, establishment costs, length of rotation, and land values.

Site index is the total height to which the better trees in a stand of a given species on a given soil will grow at 50 years of age.

Establishment costs may include such expenses as mechanical and/or chemical hardwood control, planting and any other cost of establishing the desired species of trees.

Operating costs include taxes, supervision and protection.

Return for use of the land may be considered as the amount of interest the value of the land would yield during the rotation period if invested otherwise.

Four per cent interest compounded annually was used for all these calculations.

Area No. I (K-G Blade Area)

This was an area of cut over woods occupied by low grade hardwoods. Pines could not become re-established by natural reseeding because of shading and root competition by the hardwoods. For these same reasons it would be wasted effort and expense to plant pines without first doing something to drastically reduce this competition for light and water.

A K-G blade was used to clear off and pile the undesirable trees. Also a heavy disc was used on the area. Normally for forestry purposes the material cut down by a K-G operation is left where it falls. Thus the costs are considerably reduced. Cost reduction is very important in forestry because most costs occur at the beginning of the rotation. When these costs are carried at current compound interest rates for long rotations they grow into such large amounts that the tree growing enterprise may cease to be profitable.

Site Index for Loblolly Pine is 80

Returns per acre:

Value of wood sold in thinnings and standig timber at 40 yrs. of age.	\$642.00
<u>Costs per acre of growing the tree crop for 40 yrs.</u>	
Return on land value of \$50. @ 4%	\$190.05
K-G blade operation & piling \$25. @ 4%	120.03
(If cut by K-G only and not piled \$15. @ 4%)	(72.02)
Planting (seedlings & labor) \$15. @ 4%	72.02
(This area has not been planted, but this cost is included for purposes of analysis)	
Annual operating costs \$1.00/acre/yr. for 40 yrs. @ 4%	<u>95.03</u>
Total costs if brush is piled	\$477.13
Total costs if brush is cut only	\$429.12
<u>Profit over & above costs & interest</u>	
Returns at 40 years of age	\$642.00
Total costs if brush cut by K-G operation is piled	<u>477.13</u>
Profit above costs & interest	\$164.87
Returns at 40 years of age	\$642.00
Total cost if brush not piled	<u>429.12</u>
Profit above costs & interest	\$212.88

Area No. II

This area of undesirable hardwoods was chemically treated to reduce root competition and shading so that pines could be established.

Site Index for Loblolly Pine is 80

Assumed land value \$50.00/acre.

Costs per acre of growing the crop for a 40 year rotation.

Return on land value (\$50. @ 4% 40 years earns)	\$190.05
Planting costs (seedlings & labor)	\$20.00
Chemical control	\$20.00
Total establishment costs	\$40.00
\$40.00 at 4% annually compounded interest for 40 years	\$192.04
Annual operating costs \$1.00/acre/yr. (40 yrs. @ 4%)	95.03
Total Costs	\$477.12

Returns per acre

Value of wood sold in thinnings and standing timber at 40 years of age.	\$642.00
Profit over and above costs plus 4% interest compounded annually.	\$164.88

Area No. III

This was a mixed stand of Shortleaf pine, Virginia pine, and low-grade hardwoods. The area was harvested leaving undesirable hardwoods. Last summer these hardwoods were chemically treated. During the past winter some of the hardwoods were cut for pulpwood. The maximum effect of the chemicals in reducing sprouting will not be realized because of extremely dry weather last fall and inadequate time between the application of the chemicals and the cutting of the hardwoods.

The area has considerable variability in site index ranging from about 40 on the hill to about 65 in the bottom. (1" to 6" topsoil).

Costs per acre of growing crop for a 40 year rotation (Costs same as previous location)	\$477.12
--	----------

Returns per acre based on site index of 60*	<u>\$256.00</u>
Total costs in excess of returns	\$221.12

*This area has an average site index below 60. Returns for site index 60 are used here because this is the lowest index for which we have figures.

WAKE COUNTY FORESTRY FIELD DAY

Rolesville-Wendell Area

Wake County

January 25, 1962

Cooperating Sponsors:

Halifax Paper Company
N. C. Agricultural Extension
Service

PROGRAM

- 10:00 Alton Woodlief Farm, Rolesville
 Welcoming remarks and introduction of guests
 Paul Dew, Assistant County Agricultural Agent,
 Wake County
- 10:10 The crop rotation in growing pine
 H. J. Andersen, Halifax Paper Company
- 10:30 Present and future values of the pine crop on the Wood-
 lief tract
 J. L. Gray, North Carolina State College
- 11:00 Combination thinning, a new concept
 R. J. Hare, Halifax Paper Company
- 11:30 Lee Jones Tract
 Principles of thinning
 Growth comparisons of individual trees
 H. J. Andersen, Halifax Paper Company
- 11:50 Tree selection in thinning
 William Stoffregen, North Carolina Division of
 Forestry
- 12:00 Pulpwood marketing
 R. J. Hare, Halifax Paper Company
- 12:15 Travel to Hilliard's Restaurant, Wendell By-pass
 Dinner courtesy of Halifax Paper Company
- 1:15 Forestry assistance to woodland owners
 J. L. Gray, N. C. State College
 William Stoffregen, N. C. Division of Forestry
 H. J. Andersen, Halifax Paper Company
 Fred Nash, Carolina Timber Management Company
- 1:35 Tree Farm Award to W. I. Proctor
 J. L. Gray, N. C. State College
- 1:45 Farm of W. I. Proctor et al.
 Tour of operations
 Fred Nash, Carolina Timber Management Company
 J. L. Gray, N. C. State College
- 2:45 Concluding remarks
 Paul Dew, Assistant County Agricultural Agent
 Wake County

Stop #1 - Alton Woodlief Farm

I. Kind of timber - Loblolly pine plus scattered shortleaf pine

II. Age - 48 years

III. Total height of best trees - 75 to 80 feet. This height growth indicates that this land is above average in timber-growing productivity under coastal plain conditions. It is slightly above average under piedmont conditions.

IV. Past history - This is a volunteer stand which seeded in 1913. Carlyle and Billy Woodlief thinned it out in 1951 and 1952 as a 4-H forestry project.

V. Present timber volume and standing-timber value per acre - Volumes are based on measurement of every tree on the demonstration $\frac{1}{8}$ acre. These were then converted to a full acre basis.

On a clearcutting basis, the following standing timber prices were assumed in coming up with 1961 values:

Pulpwood - \$6.00 per 128 cubic-foot cord
Sawtimber - \$35.00 per thousand board feet by
Scribner log rule

A. Value if all trees cut and sold for pulpwood

40.64 cords @ \$6.00 per cord = \$243.84

B. Value if all trees cut with trees 10 to 11 inches across the stump sold for sawtimber and smaller trees sold for pulpwood

17,154 board feet @ \$35.00 per thousand = \$600.39
2.7 cords @ \$6.00 per cord = \$16.20
No lap wood figured

Total = \$616.59

C. Total value to date

Value of 1951-52 harvest =
Value of present crop = \$616.59
Total

Average value developed per year =

VI. If you owned this timber, what would you do with it?

Let's assume that you want to manage the money represented by the timber on this land so as to have it earn as much as possible by 1972 either through investing it in a 4% savings and loan account or in a timber-growing enterprise or a combination of the two.

Let's look at some obvious choices the Woodliefs have with respect to this timber. Remember it has a present value of roughly \$617 an acre.

Stop #1 (continued)

A. Leave 208 trees without thinning until 1972

By 1972, the crop volume and value per acre with no thinning should be as follows:

22,690 board feet @ \$40.00 per thousand = \$907.60
 2.17 cords of pulpwood @ \$6.00 per cord = 13.02
Total value in 1972 \$920.62

B. Thin 94 trees as marked, invest the thinning proceeds in a 4% savings and loan account and hold 114 unmarked trees until 1972

Thinning income:
 3194 board feet @ \$30.00 per thousand = \$104.82
 2.6 cords pulpwood @ \$6.00 per cord = 15.60
Total thinning sale 120.42
 Plus: 4% compound interest
 for 10 years 57.80
 Total revenue from thinning plus interest = \$178.22
 Plus value of reserved timber in 1972 = 824.00
Total value in 1972 \$1002.22

C. Clearcut and put all the money in a savings and loan account

Timber harvest:
 17,154 board feet @ \$35 per thousand = \$600.39
 2.7 cords pulp @ \$6 per cord = 16.20
Value \$616.59
 Plus 4% compound interest for
 10 years 295.96
Total value in 1972 \$912.55

D. Clearcut, spent \$27 to burn, replant and mist-blow release the planted stand and put the remaining cash in a savings and loan account

Timber harvest = \$616.59
 Less: = 27.00
 Cash to savings and loan \$589.59
 Plus 4% compound interest
 for 10 years = \$283.00

Plus value of 10-year old
 planted stand
 (Present worth of 25-year
 old planting in 1972 @ 5%
 interest) 115.56
Total value in 1972 \$988.15

Stop #2 - Lee Jones Farm

I. Kind of timber - Loblolly and shortleaf pine

II. Age - Varies between 35 and 58 years

III. Volume and value of entire crop before thinning - Based on measurements on $\frac{1}{2}$ acre blown up to 1 acre.

A. All trees figured as pulpwood only:

35.9 cords @ \$5.50 per cord = \$197.45

B. Trees 10 to 11 inches across the stump for sawtimber. Smaller trees for pulpwood:

11,150 board feet Scribner rule @ \$30 per thousand = \$334.50

10.8 cords pulpwood @ \$5.50 per cord = 59.40

Total value per acre \$393.90

IV. The thinning harvest

9.8 cords pulpwood @ \$5.50 per cord = \$53.90

126 trees reserved for growth

Stop #4 - W. I. Proctor and others' farm

This 623-acre farm with roughly 500 acres in woodland has been in the Proctor family since 1812. It was formerly known as the "Marriott Land" or "Aspen Grove". It is presently owned by five members of the Proctor family.

Mr. W. I. Proctor has managed this property for all the owners since 1924. At that time the farm supported extensive stands of old-growth pine timber as a result of the special interest which Mr. Proctor's father had in preserving and protecting the trees on the property.

Since 1924, Mr. Proctor has managed the property through a major depression, two wars and a damaging hurricane. In all timber operations he has sought and used the services of experienced people in the timber business. Since about 1940 he has been guided and helped by professional foresters, public and private, but has himself actively managed and supervised operation. In recent years he has turned supervision of operations over to a firm of consulting foresters - Carolina Timber Management Co. He still actively manages the property, making the decisions as to what is to be done.

Mr. Proctor's major problems in handling the woodland on this farm have been as follows:

Stop #4, (Continued)

- A. In the early years he had to sell some of the timber to best advantage to raise money to fix up the farm and keep it going.
- B. Beginning about 1947, a large proportion of the timber was ripe or over ripe. Losses from lightning, insect and disease damage began to exceed growth. His main concern has been to sell the timber to the best advantage and at the same time see that the cut areas were restocked to young pine.
- C. In 1954, Hurricane Hazel blew down approximately a half-million board feet of his timber and damaged a large number of standing trees. Mr. Proctor had the problem of moving the down material without sacrificing any more on price than he could help.
- D. He has also been involved in maintaining the growth and improving the quality of young to middle-aged stands through a series of pulpwood thinning operations.

In all, Mr. Proctor has conducted 15 timber sales in the past 38 years. In all cases the timber has been measured or estimated prior to sale. In 10 of the 15 sales, the trees to be cut or trees to be left have been selected and marked by foresters. In the 5 most recent harvest cutting-type sales, disking, burning, poisoning and, in some cases, replanting or combinations of these operations have been carried out to help restock the cut areas.

Operations visited on this property will depend on road conditions.



STATE OF NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

HARGROVE BOWLES, JR., DIRECTOR
ROY WILDER, JR., ASSISTANT DIRECTOR
RALEIGH

April 4, 1962

Mr. L. R. Harrill
4-H Club Leader
N. C. State College
Raleigh, North Carolina

Dear L. R.:

The Board of Conservation and Development has authorized the Forestry Division to make available forest tree seedlings to FFA and 4-H Chapter members free of charge.

Species available under this authorization are loblolly and slash pines.

Loblolly pine may be secured from the State Nurseries near Clayton and Morganton, N. C., slash and loblolly from the State Nursery near Goldsboro, N. C. No seedlings, under this free distribution, will be delivered. They must be picked up at the nurseries.

A minimum of 500 and a maximum of 2,000 will be available to each chapter member.

When calling for these trees, an application for each member receiving the trees must be filled out. This can be done at the nursery at the time the trees are received.

Because of the limited time left to plant, this offer is in effect immediately and will end April 20.

The State Nurseries are open each week day, Monday through Friday, during the hours of 7:30 A.M. to 3:30 P.M.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Fred Claridge", with a large flourish at the end.

F. H. Claridge
State Forester

CC: Little River Nursery
Clayton Nursery
Ralph Edwards Nursery

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

STATE OF NORTH CAROLINA

NORTH CAROLINA STATE COLLEGE OF
AGRICULTURE AND ENGINEERING,
NORTH CAROLINA COUNTIES AND
UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

"TO MAKE THE



BEST BETTER"

EXTENSION SERVICE
BOYS AND GIRLS 4-H CLUB WORK
OFFICE OF STATE LEADER
STATE COLLEGE STATION
RALEIGH, NORTH CAROLINA

April 6, 1962

TO: County Agricultural and Assistant Agents
Doing 4-H Club Work

FROM: L. R. Harrill, State 4-H Club Leader
John Gray, State Extension Forester

RE: Free Loblolly and Slash Pine Seedlings for
4-H Club Members

Enclosed is a letter from F. H. Claridge, State Forester, which is self-explanatory. Please read it carefully.

In checking with State Forest Service officials, we learned that these seedlings are now in cold storage or are being put in cold storage. Special points to keep in mind when dealing with cold storage planting stock are as follows:

1. In hauling such trees from the nursery, pack bales in single layers with strips or tobacco sticks separating each layer for good air circulation.
2. Plant the trees as soon as possible after they are removed from cold storage - preferably within two days. At the planting site, leave the bales in the shade until they are needed.
3. On droughty land, plant when the ground is fairly moist. This shouldn't be too difficult this spring.

If these rules are observed, cold stored trees can be planted up to early May with good chances for success.

:cw

Enclosure