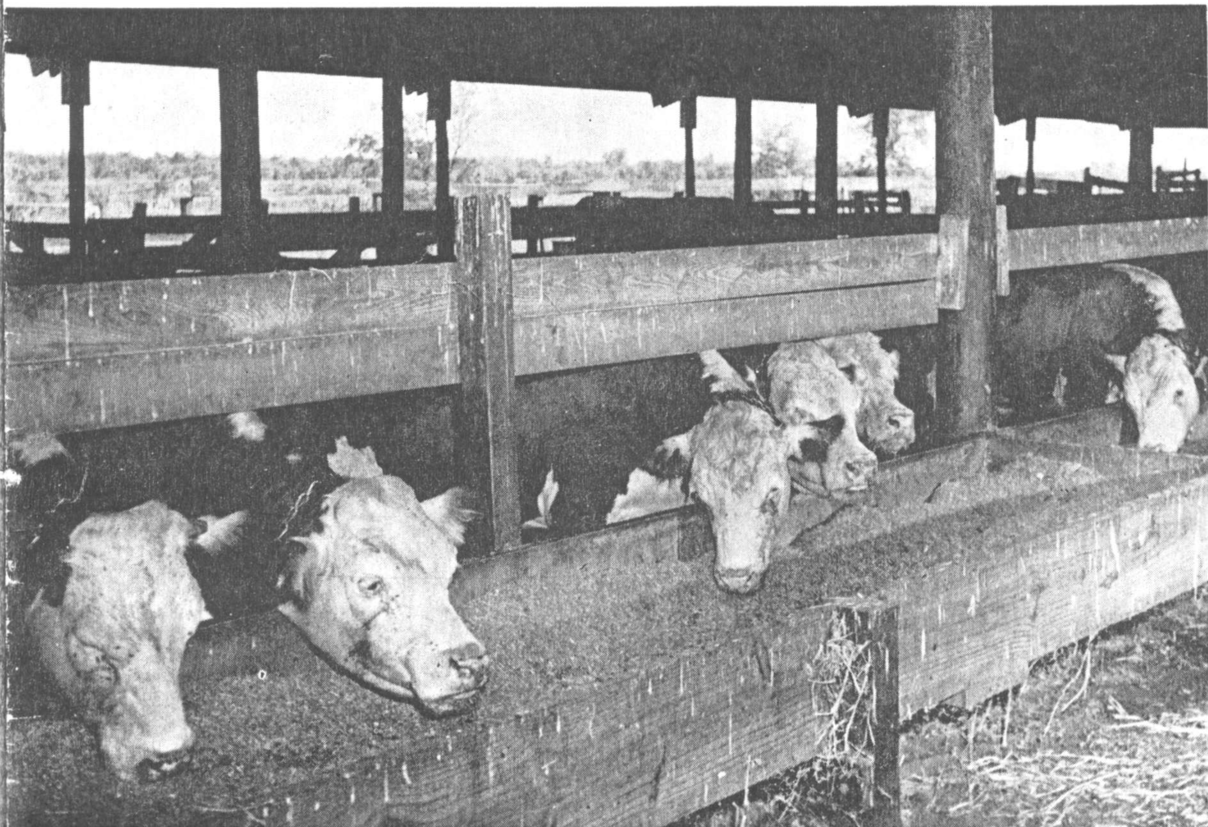
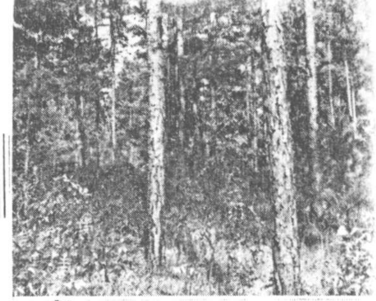
WINTER 1959

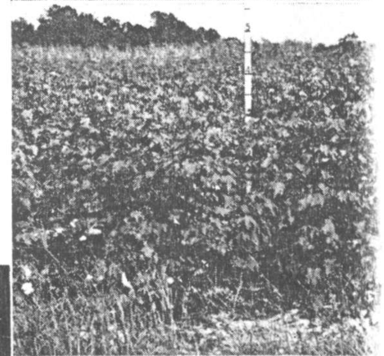
HIGHLIGHTS

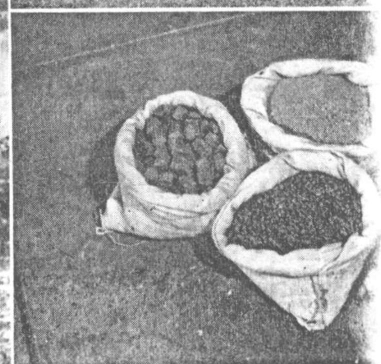
of

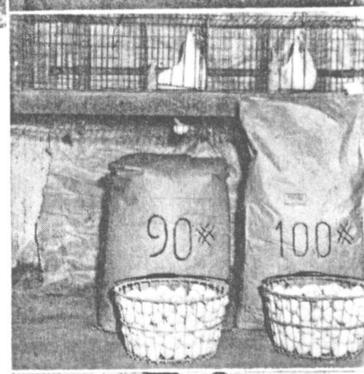
AGRICULTURAL RESEARCH

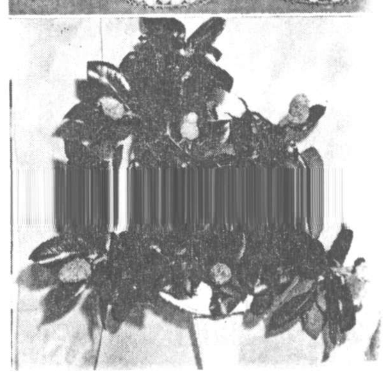












AGRICULTURAL EXPERIMENT STATION SYSTEM
of the
ALABAMA POLYTECHNIC INSTITUTE

A Quarterly Report of Research Serving All of Alabama

HIGHLIGHTS of Agricultural Research

VOLUME 6, No. 4 WINTER, 1959

In this issue . . .

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AGRICULTURAL EXPERIMENT STATION of the ALABAMA POLYTECHNIC INSTITUTE
Auburn, Alabama

New and Timely PUBLICATIONS

Listed here are timely and new publications reporting research by the Agricultural Experiment Station.

Bul. 316. Agricultural Drought in Alabama presents an estimate of drought occurence in Alabama based on climate records of the 1930-54 period.

Bul. 317. Southern Table Peas reviews top varieties for table use, including some strains developed by API Experiment Station.

Bul. 318. Nutritive Qualities of Sericea Forage reveals feed value of lespedeza sericea as a forage for dairy animals.

Cir. 135. Independent vs. Contract Egg Production and Marketing reports information gained in a study of Sand Mountain table egg producers.

Prog. Rept. 75. Grinding and Molassifying Hay for Dairy Cows covers advantages and disadvantages of this practice.

Prog. Rept. 76. Roughages for Dairy Cows points out comparative values of different roughages as feed for milking cows.

Free copies may be obtained from your County Agent or by writing the API Agricultural Experiment Station, Auburn, Ala.

Good management ensures
WOODLOT HARVESTS

H. E. CHRISTEN, *Forester*

Unmanaged stand comprised of low-grade hardwoods and one age class of pine, right, and managed stand resulting from removal of undesirable trees, below.

HARVEST CAN be made in farm woodlots at frequent intervals provided the owner has a simple basic plan for managing the stands.

In 1951 a woodlot of approximately 15 acres, a part of the API Agricultural Experiment Station, was placed under intensive forest management. The area was divided into 5 sub-areas averaging 3 acres each; a 100% cruise was made of the volume on each sub-area. It was found that the sawtimber averaged 5½ M b.m. (thousand ft. board measure) International ¼ in. rule. In addition there were 5 cords of merchantable pulpwood per acre. Few trees were over 18 in. in diameter and most of these were of poor quality. At present-day stumpage and land prices, an area such as this would be valued at $125 per acre.

Yields Recorded

Since 1951, one of the 5 sub-areas has been cut each year. Harvests have averaged 1,500 bd. ft. of sawtimber and 3 cords of pine pulpwood from each acre. At current stumpage prices this would amount to a gross income of $6 per acre per year.

The area has now been under management for a period of 9 years and subsequent inventories have indicated that the volume present on the area today still averages 5½ M b.m. per acre. This volume is of much higher quality than originally, and stumpage value of future cuts can be expected to increase.

To assure regular cuts at fairly short intervals, a 5-year system of all-aged forest management was adopted. An attempt was made to keep trees of different sizes on the area at all times to ensure various size cuts each year. A stand averaging 5½ M b.m. per acre had relatively few large trees in comparison to small ones. Results show that a stand of 5½ M b.m. per acre might need only five 18-in. trees and fifteen 12-in. trees, but the same area would need thirty 8-in. trees and fifty 5-in. trees to be fully stocked. Diameters between the ones cited would have to include a proportionate number of trees. Indications are that the average acre should support 150 to 250 trees between 5 in. and 18 in. d.b.h. if it is to carry 5 to 6 M b.m., and sustain a per acre cut every 5 years of 1,500 bd. ft. of sawtimber plus an additional volume of pulpwood.

By making cuts at frequent intervals, in this case every 5 years, losses from suppression, insect and disease attack, and other causes were kept to a minimum. Most of the mortality encountered on the area occurred in size classes not in the merchantable category. Therefore, losses did not affect the merchantable volume or growth.

Investment Need

It is not sufficient for the landowner just to make frequent periodic cuts. He must also provide for reproduction in openings that he creates in his stand. It takes a great many small trees on the area to eventually produce the final crop of large trees. In order to get reproduction in openings made by the harvest cut, it is usually necessary for the landowner to invest part of his income in site preparation, and removal of large trees of no merchantable value. Usually this investment, on a farm woodlot, will not exceed $1 per acre at time of harvest. It may include girdling or poisoning unmerchantable trees, or preparation of a suitable seedbed. Too often the practice on farm woodlots is to remove a volume equal to the growth and expect the stand to continue growing at the same rate as before with no help from the landowner.

A farmer can make a sustained income from his woodlot by following these practices:

(1) Harvest frequently to remove trees of poor quality, low vigor, or inferior species, and keep mortality losses to a minimum.

(2) Limit cuts to a portion of woodlot to ensure higher stumpage value.

FINENESS *of* LIME
—*a key to quality*

FRED ADAMS, *Associate Soil Chemist*

FINE LIME is several times more effective than coarse limestone, yet both cost the same!

The use of quality liming material is highly important, in addition to spreading the right amount (based on soil tests) evenly over the land at the right time, and mixing it thoroughly with the soil.

Although lime may affect soil several ways, its chief purpose is to neutralize soil acidity. Lime quality is measured by how effectively it neutralizes soil acidity. This is determined largely by (1) its neutralizing value and (2) size of particles.

The neutralizing value of lime is expressed as equivalent calcium carbonate content. It is a measure of how much of the material can react with the soil to neutralize acidity under ideal conditions. Limestone should have a neutralizing value of at least 90%. This minimum neutralizing value is easily met by the many deposits of high grade limestone in Alabama.

Research on Quality

Even though the neutralizing value of lime may be satisfactory, it will not neutralize soil acidity unless the limestone is finely ground. The influence of size of lime particles on soil acidity has been well established by research at the API Agricultural Experiment Station.

An experiment was conducted using limestone that was screened to separate the particles into groups of known size. Equal amounts of lime from the different size particles were added to different areas of a Norfolk loamy sand. Sudangrass and crimson clover were grown in rotation on the soil for several years. The amount of vegetative growth produced by each crop was measured. The soil acidity was determined at regular intervals.

Results from this experiment are summarized in Figure 1. The crop yields and soil data covered 4 years, during which time the coarse material exerted its maximum beneficial effect. The very fine material (100- to 200-mesh) was superior to all others for the first year or two. However, the fine material (60- to 100-mesh) was just as good by the third year. The medium size particles (20- to 60-mesh) were definitely inferior to finer particles. The coarse material was not effective in neutralizing acidity at any time during the experiment.

A second experiment was made to determine the influence of initial soil pH on the amount of soil acidity neutralized by various sizes of lime particles. The effects on soil acidity are shown in Figure 2 for sandy loam soils of pH 5.7 and 4.7. The fine lime was superior in neutralizing acidity regardless of soil pH. Although the effectiveness of medium size particles (20- to 60-mesh) was greater in the more acid soil, there was no such effect for material larger than 20-mesh. Thus, it becomes apparent that coarse lime particles are not effective in neutralizing soil acidity even in more acid soils. **There is no place for coarse lime in a good liming program.**

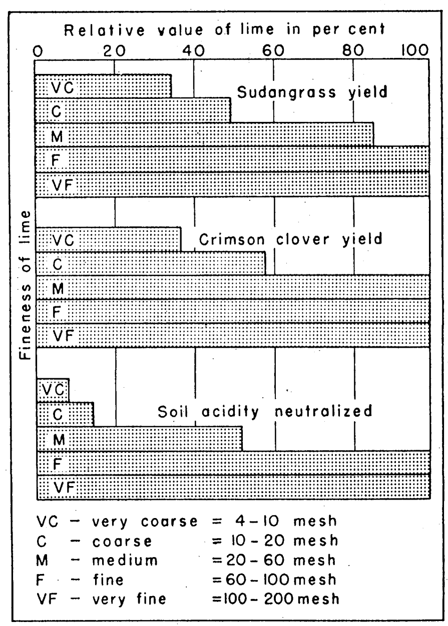


FIG. 1. Comparison of fineness of limestone on plant growth and soil acidity.

Limestone Surface

Lime particles remain where they are placed. Likewise soil acidity does not move, since it is attached to the soil particles. Therefore, they must be adjacent to each other for lime particles to react with soil acidity. The reaction between soil acidity and lime occurs at or very near the surface of the lime particle. The more limestone surface that is in contact with the soil particles, the more soil acidity that will be neutrailzed. When sufficient lime has dissolved to neutralize the soil acidity in the immediate vicinity of the lime particle, any further reaction will be extremely slow.

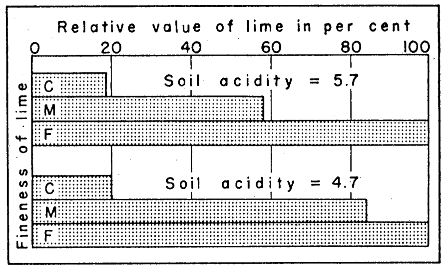


FIG. 2. Comparison of fineness of lime on soil acidity at two soil pH values.

Since soil acidity is neutralized largely at the surface of the lime particle, it becomes apparent that the amount of surface available for reaction is important. The surface area of a ton of lime will depend upon the size of the particles. For example, lime passing a 60-mesh screen will have about 8 times the surface area as that passing a 10-mesh screen. Thus, it becomes apparent why 60-mesh lime is much more effective than 10-mesh.

The research results reported here show that limestone coarser than 10- or 20-mesh is of practically no value, even after several years. Lime must be fine enough to pass about a 60-mesh screen to be effective in neutralizing acidity. The Alabama Station recommends that at least 90% of the limestone passes a 10-mesh screen and at least 50% passes a 60-mesh screen. **In summary, you get the lime you pay for only if it is fine.**

REJUVENATING WORN-OUT SOILS

J. T. COPE, JR., *Agronomist*

With proper fertilization, cropped-out soils like that shown at left can be returned to production like well fertilized companion plot at right.

THE BEST WAY to be sure soils are in condition to produce satisfactory yields is to fertilize them right every year. However, you may wonder if soils that have been cropped without fertilizer for a long period can be brought back into satisfactory production.

The answer is "yes," even for soils that have been cropped continuously without fertilizer and are producing extremely low yields. Their "worn-out" condition can be corrected rapidly with proper fertilization. This has been demonstrated on many soils having good physical properties and moisture relationships. It takes several years for soils to completely recover, although most nutrient deficiencies can be corrected the first year.

Research Shows Recovery

Experiments have been conducted at many locations in Alabama to determine how rapidly unfertilized soils can be returned to production. Many longtime tests have included check plots that received no fertilizer or fertilizers without either nitrogen, phosphorus, or potash. Yields on these plots dropped to very low levels. Presented in the table are results of several of these experiments with cotton where fertilizer has been added in recent years.

The top section in the table shows cotton yields at 5 locations in a fertilizer experiment on a 2-year cotton-vetch-corn rotation. Yields from treatment 5, which received no fertilizer for 19 years, averaged only 591 lb. of seed cotton, and were even lower near end of the period. Beginning in 1949, these plots received a good rate of a complete fertilizer and yields increased markedly the first year. Average for the first 4 years after fertilization was 1,306 lb. Treatment 4 was fertilized for the entire 23 years. It averaged 1,342 lb. for the first 19 years and 1,457 during the next 4 years. This is only 151 lb. per acre more than that produced by the previously unfertilized plots for the last 4 years.

The middle section of the table shows recovery from one application of potash and nitrogen on plots that had received only phosphorus for 28 years. Average yield during 1949-57 was 818 lb. In 1958 the plots received 120 lb. of nitrogen and enough potash to correct the deficiency in one application, as shown by soil test. Yield was increased to 2,017 lb. – 1,199 lb. above the previous average. Yield at Prattville was increased about 2,000 lb. Treatment 5 averaged 214 lb. more than treatment 2, showing again that complete recovery was not obtained the first year.

SEED COTTON YIELDS SHOWING EFFECT OF FERTILIZATION ON RECOVERY OF WORN-OUT SOILS AS COMPARED WITH WELL-FERTILIZED SOILS

Treatment No.	Treatment $N-P_2O_5-K_2O$	Period of test	Alexandria	Brewton	Monroeville	Prattville	Sand Mt. Substation	Average
Two-year cotton-vetch-corn rotation								
5	0-0-0	1930-48	530	271	546	832	775	591
5	64-72-30	1949-52	1,236	1,092	1,336	1,440	1,425	1,306
4	16-54-23	1930-48	1,204	1,139	1,220	1,397	1,750	1,342
4	32-72-30	1949-52	1,352	1,276	1,465	1,612	1,579	1,457
Two-year cotton-vetch-corn rotation								
2	0-54-0	1949-57	1,197	484	802	934	674	818
2	120-60-60[1]	1958	1,512	1,869	2,308	2,923	1,473	2,017
5	64-72-30	1949-57	1,246	1,450	1,518	1,544	1,571	1,466
5	120-60-60	1958	1,560	2,439	2,457	2,952	1,749	2,231
Continuous cotton								
2	0-60-24	1938-43	483	451	226	353	633	429
2	72-60-40	1944-46	1,299	1,386	1,306	1,842	1,842	1,535
5	36-60-24	1938-43	1,186	1,167	824	1,177	1,636	1,198
5	72-60-40	1944-46	1,081	1,350	1,641	1,870	1,880	1,564

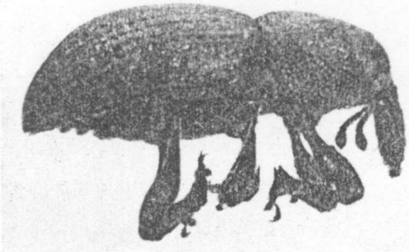
[1] Additional potash based on soil tests applied to these plots in 1958.

Nitrogen Effect

The bottom section of the table shows effect of adding nitrogen in another experiment after 15 years of continuous cotton with only phosphate and potash added. Yield was raised from a 6-year average of 429 lb. to 1,535 lb. for the next 3 years. Treatment 5 produced only 29 lb. more than the previously unfertilized plots during 1944-46.

Similar effects on yields have been obtained on corn and winter legumes. Striking results were obtained in a Main Station experiment. One treatment was 600 lb. superphosphate and 100 lb. muriate of potash but no nitrogen for 23 years. Yield averaged 6.3 bu. of corn. With 80 lb. nitrogen added in 1948, yield was 50.6 bu. For 5 years (1948-52) this plot averaged 45.8 bu. and companion plots that had been well fertilized throughout the period produced 48.5 bu.

INSECTS—



factors in

Pine Reforestation

LACY L. HYCHE
Assistant Entomologist

ALABAMA'S FORESTS are a major crop – a crop to be harvested and one to be planted or re-established!

Gone are the days of harvesting timber from a seemingly unlimited supply without thought of future needs. During the 1958-59 tree-planting season, over 200 million seedlings were distributed in Alabama for reforestation purposes.

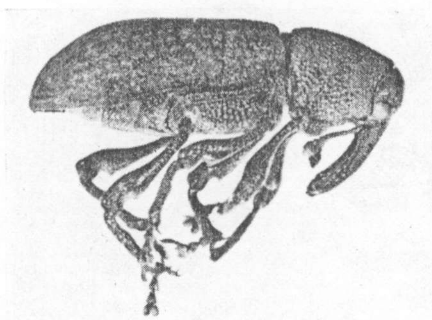
Today reforestation methods, once thought impractical, are being used to maintain forests necessary to supply needs of a large and growing industry. Understocked and unproductive areas are being cleared and replanted with suitable stock. In some cases entire pine stands are being harvested, the remaining slash, stumps, and underbrush cleared by machinery, the soil harrowed, and seedlings planted by machine.

In past years it has often been a general practice to allow a period of 2 to 3 years to elapse between the time of clear-cutting pine and replanting the area with pine seedlings. Such a practice keeps land idle and unproductive during that time. It also allows undesirable plant species to become well established. One of several reasons for this delay between cutting and replanting was to avoid damage by pine reproduction weevils.

Importance of Weevils

The pales weevil, *Hylobius pales* (Hbst.), and pine pitch-eating weevil, *Pachylobius picivorus* Germ., are commonly referred to as pine reproduction weevils because of their habit of feeding on young pine reproduction or seedlings. The weevils, very similar in appearance, are reddish-brown to black snout beetles, ranging in size from about ¼ to ½ in. long. The adults are readily attracted to freshly cut pine. They lay their eggs in stumps and roots where the larvae feed and develop.

Damage to young pine plantations is the result of adult feeding. The weevil adults feed chiefly on the tender bark of 1- and 2-year-old seedlings, girdling and killing them. Seedlings are sometimes completely stripped of bark and needles. Damage is most severe when seedlings are planted too soon following clear-cutting operations. In experimental areas seedling stands have been reduced by nearly 50% as a result of their attack.



Illustrated in title is the pine pitch-eating weevil and above is the pales weevil. Both attack pine seedlings, often seriously reducing stands in newly established plantations.

Relative Abundance

Many past references to the reproduction weevils have named the pales weevil as the more important of the two in the South. Results of research conducted by the API Agricultural Experiment Station indicate that this might not be true in Alabama. In trapping experiments conducted in Baldwin County during 1957-58, over 90% of all weevils collected was the pine pitch-eating weevil. The pales weevil made up less than 10% of the collection.

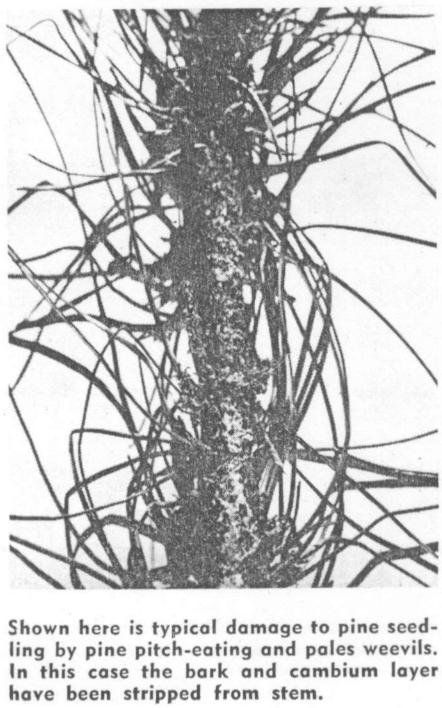
Control

Results of weevil control research begun in 1957 indicate that damage by reproduction weevils may be avoided by allowing a period of 1 year to elapse between date of clear-cutting and time of planting seedlings.

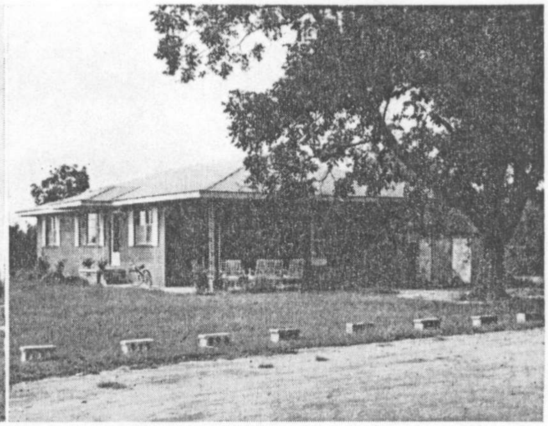
In slash pine seedling plots established in February 1957 only 4 months after clear-cutting a dense stand of longleaf, 46% of the stand was destroyed by weevils and about 60% of the surviving seedlings was damaged to some degree.

In plots established in the same area 1 year later no mortality of seedlings occurred as a result of weevil attack. Only 3% of the stand showed evidence of weevil damage.

In chemical control experiments one application of 2% emulsion spray of aldrin, dieldrin, endrin, Guthion, or heptachlor applied to seedlings immediately after planting was highly effective in reducing the loss of the seedling stand. Loss of seedlings resulting from weevil attack in treated plots ranged from 6 to 8%, whereas loss in untreated plots was 46%. Dipping seedling tops in 2% emulsion of aldrin or heptachlor prior to planting appeared equally as effective as sprays.



Shown here is typical damage to pine seedling by pine pitch-eating and pales weevils. In this case the bark and cambium layer have been stripped from stem.

These houses illustrate problems and progress being made in Southern rural housing. There are still many dilapidated houses like the one at left. Home at right shows how many farmers are providing good housing for their families.

Rural HOUSING NEEDS

BOYD B. ROSE, JAMES R. HURST, *and* J. H. YEAGER
Department of Agricultural Economics

MAN HAS always been concerned with providing good housing for himself and his family. This is true of both farm and city dwellers.

Better housing is needed today in both rural and urban areas. This need is more acute in certain sections of the nation. The 1950 Census revealed that, in the Cotton Belt, 72% of farm houses built since 1940 were dilapidated or had no facilities like running water and plumbing. Of those built before 1940, 80% were dilapidated or had no modern facilities. Corresponding figures for the United States as a whole were 54 and 57%.

Lack of suitable financing is often thought to be a major obstacle to improved rural housing. Financing is often not readily available in rural areas and restrictive or prohibitive limitations are often imposed in making loans for home construction and improvement.

Needs Studied

A study was begun in 1958 to determine the situation and need for housing in rural areas, to explore various methods of financing rural homes, and to make recommendations for improvements. The study is being financed by grants from the Housing and Home Finance Agency pursuant to authority of Section 603 of the Housing Act of 1957. The API Agricultural Experiment Station is conducting a major portion of the research.

A large part of the study is being carried out in Alabama, Mississippi, Georgia, and South Carolina. For comparison purposes, similar data are being obtained in the Corn Belt Area of Missouri and the Dry Land Wheat Area of Eastern Colorado.

In each of the three areas, a sample of rural residents has been interviewed. Also, information is being obtained from lending agencies.

Findings

In the 4 Southeastern States, 665 rural residents were interviewed. Information was obtained about their houses, including dates built or acquired, size, condition, facilities, and reasons for building or buying; financing if funds were borrowed; remodeling and financing of remodeling since January 1, 1951; future housing plans; housing and non-housing needs as recognized by head of the household; security and income; and other facts related to housing.

Preliminary findings reveal that 10% of the 3,570 houses in the sample segment areas in the Southeast were vacant. One of every three vacant houses was classified by enumerators as unsuitable for occupancy. Of the 665 interviewed, 57% owned their home and 43% rented. Slightly over a third of the houses were built before 1930, as shown below:

Year built	*Pct. of houses*
Since 1954	12.7
1950-54	10.2
1940-49	16.3
1930-39	10.2
1929 or earlier	35.7
Unknown	14.9

Among the rural residents interviewed, 43% had lived in their present house less than 5 years, 18% for 5-9 years, and 39% for 10 years or more; 11% had lived in the presently-occupied house less than 1 year.

Among the owners, 12% inherited their house, 22% bought with a farm, 25% bought without a farm, and 41% built.

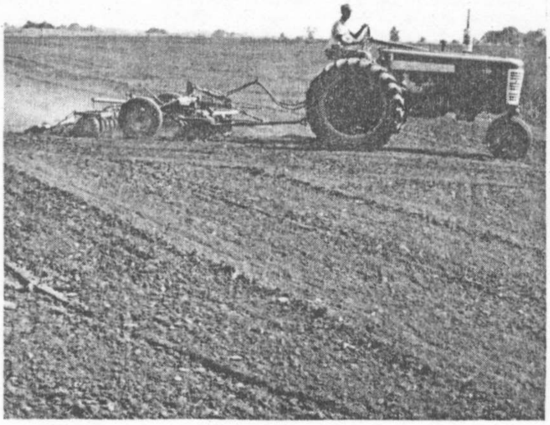
Almost 96% of the houses had electricity. Only 43% had hot and cold piped running water inside the house, 14% had cold water piped in, and 40% had no running water in the house; 3% had piped cold water outside the house, and 45% had a flush toilet. Electric, gas, or mechanical refrigerators were owned by 87%.

The most serious housing deficiencies reported concerned the exterior of the house, an inadequate bathroom, and insufficient sleeping space. Inadequate clothing storage space was next in importance.

Of the respondents, 70% were satisfied with their present houses. Only 9% indicated they planned to build a new house and 2% planned to buy. Remodeling or improvements in present homes were planned by 27%. Of those who planned to buy or build, 71% desired to do so in a rural area or open country; 12% planned to buy or build in a town of less than 2,500 population, and 14% in a 2,500-50,000 population city. The remaining 3% were undecided.

The TENNESSEE VALLEY SUBSTATION—*an account of the Valley's farm progress*

R. E. STEVENSON, *Assistant Editor*
JOHN K. BOSECK, *Superintendent*
W. B. WEBSTER, *Assistant Superintendent*



Proper land preparation proved essential for success with crops like crimson clover and alfalfa.

GOOD LAND but poor crops!

That was the situation in Alabama's Tennessee Valley 32 years ago when the Tennessee Valley Substation was established. Cotton provided almost all farm income and most farm families had to get by with little cash.

A look at the Valley today shows what has happened. Cotton is only one of many important farm enterprises. Beef and dairy cattle and hogs are now "big business." Good corn is being grown and pastures are green in summer and winter. Homes, machinery, and buildings indicate prosperity.

This progress did not come about by chance. With increasing needs for cash in the 1920's, Valley farmers called for help from Auburn. To obtain the requested information, the Tennessee Valley Substation was established by the 1927 Alabama Legislature on 240 acres near Belle Mina in Limestone County. By 1929, full-scale work was underway.

Row Crop Studies

Early work quickly revealed that fertilization was limiting cotton and corn yields and showed the value of using a legume in crop rotations. In addition, time of planting cotton was found to be all important. April 10-15 plantings yielded considerably higher than cotton planted in May.

Value of the research information is shown by 5-year average yields for the Valley. When the Station was established, cotton yielded about 175 lb. lint per acre. For the 5 years ending in 1932, the average was 205 lb. This was followed by averages of 241, 293, and 358 lb. per acre during the succeeding 5-year periods. Today it is about a bale per acre.

A cotton-vetch-corn rotation test begun in 1930 is still in progress. This work has shown that legumes following cotton provide the needed nitrogen for a following corn crop. During the past 5 years, cotton yield in the rotation has been 1,211 lb. of seed cotton and corn has produced an average of 41 bu. Included in these averages are 1954 figures, when dry weather cut production to 574 lb. seed cotton and 5 bu. of corn.

Close spacing, hybrid varieties, and adequate nitrogen were found to be the key to improving corn production. Average yields for the area have jumped from less than 20 bu. per acre in the 1920's to about 50 bu. now.

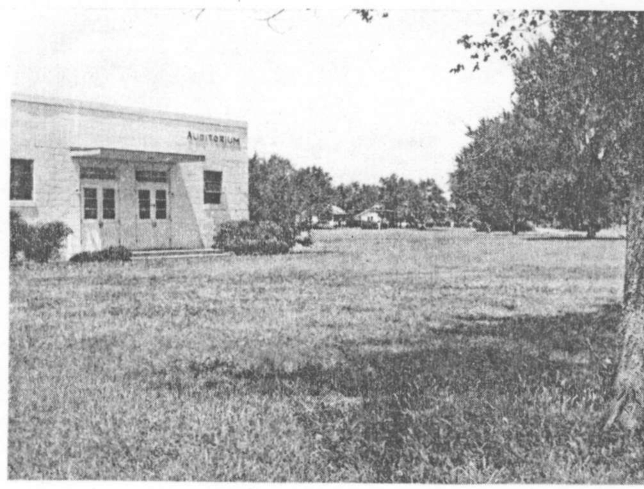
Work Expanded

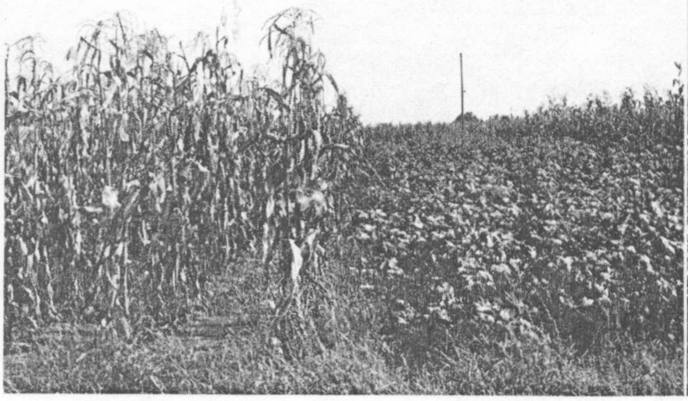
What to do with idle land became a problem when acreage controls came on the scene. Producing feed for livestock was the logical solution, but there were many problems in this direction. Oats consistently "froze out" and no other winter crop was available. Crimson clover had been tried as a soil builder in cotton middles and written off as hopeless.

Superintendent Fred Stewart was convinced that crimson clover had a place in the area, despite its many failures. He discovered that planting early on prepared seedbed was the solution to this problem. Because of his persistence, crimson clover has been one of Alabama's most profitable winter grazing crops. The same kind of approach proved that small grain could be grown to provide winter grazing and produce good grain yields.

Grain sorghum appeared a good possibility to follow winter crops and research was undertaken to fit this crop into a feed program. The tall varieties were unsatisfactory, but dwarf types came along that showed promise. The early dwarfs proved unsuccessful, but Martins Combine became available and filled the need. Variety testing was

The auditorium shown at left is used for many meetings held at the Substation. Houses and other buildings are shown in background. Bottom defoliation of cotton (right) is being tested in a new furrow irrigation project that was carried out for the first time in 1959.





Cotton-vetch-corn rotation (left) showed value of legume rotation with row crops. Grain sorghum (right) is typical of the area as result of Substation work.

carried out and grain sorghums were worked into successful rotations.

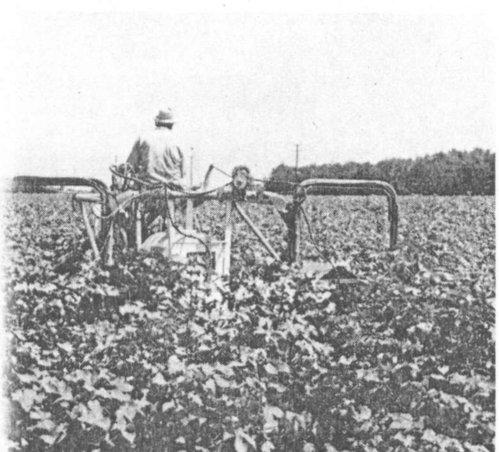
Alabama's first work with permanent pastures was at the Tennessee Valley Station. Orchardgrass, bluegrass, Dallisgrass, white clover, hop clover, and lespedeza made up the first mixtures grown. Fertilizer and lime requirements were learned in a cooperative study with TVA. Information gained on adaptable crops, seeding rates, and fertility requirements made high quality pastures possible.

Popularity of alfalfa as a hay and forage crop resulted from studies at the Substation showing how this crop can be successfully grown. In a test begun in 1930, 5-year average yield of about 3 tons of hay per acre was grown. Later work confirmed the value of this crop.

Lespedeza sericea, an important Alabama pasture and hay crop for many years, was first grown at the Tennessee Valley Station.

Dairy and Beef Work

A dairy unit was set up in 1940 to use the know-how on pasture and hay production in a farm-type operation. The unit was designed to produce milk as cheap as possible from grazing. Thus, major production was during the spring flush of pasture growth, with cows dry in the winter.



It was learned that crimson-ryegrass or small grain could pasture a cow per acre during winter. This permitted fall freshening and year-round production. Tests revealed that cows with 6,000-lb. production ability could produce at this level on pasture supplemented with alfalfa hay and needed no concentrate.

It was soon learned that July and August were problem grazing months, rather than cold weather periods. Sudangrass was fitted into the program to supply temporary hot weather grazing. When disease became a problem, Starr millet replaced Sudan.

Livestock work of the Substation was expanded in 1946 when additional land was purchased to bring total acreage to 760. This expansion was necessary to provide information for using surplus grain production and to utilize non-row crop acreage.

Initial projects involved buying steers in the fall, fattening on clovers and grasses, and selling on the local market the following spring. Average sales from the 182-acre unit were $25,039 for the period ending in 1951. An average of $5,331 was left to cover labor, taxes, insurance, and depreciation. One man handled the unit in less than half his time.

Present research with beef cattle goes much farther. Results reported in Experiment Station Progress Report 67 show how winter grazing followed by dry lot feeding can be profitable. Calves weighing an average of 381 lb. were placed on oat grazing in November, followed by feeding out the following summer. Average market weight was 935 lb. – an average daily gain of 1.81 lb. for the 10 months on the farm. Returns above cost of feed and pasture were $72 per head.

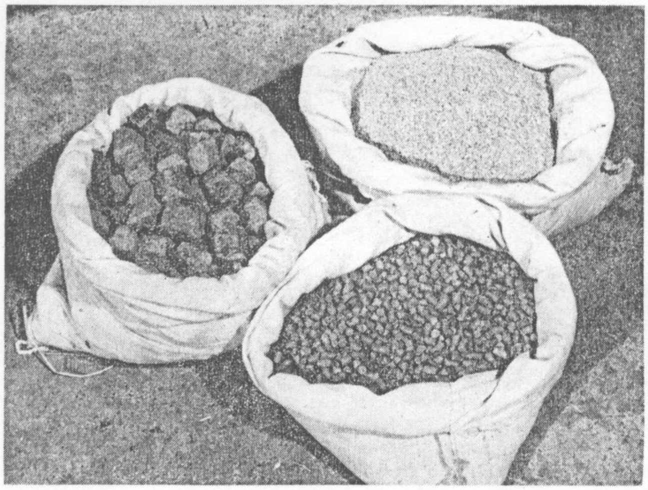
Beef cattle studies now include work on (1) learning which pasture crops are best, (2) value of irrigation for beef pastures, (3) methods of feeding out after grazing, (4) wintering rations, and (5) production systems for most economical gain per acre.

Cotton Mechanization

Although cotton acreage in the Valley has declined, available labor force has decreased faster. This makes it necessary that cotton be produced and harvested with less labor. Substation work on mechanized production and harvest has led to a high degree of mechanization, which is solving the labor problem.

Mechanization research has been aimed at learning best varieties for pickers, effects of spacing, defoliation, seedbed preparation, and use of chemicals for weed control. A new furrow irrigation study is designed to discover problems associated with irrigated cotton.

New projects at the Tennessee Valley Substation are being started regularly to keep pace with the times. As conditions change, new information is vital for Alabama farmers to compete with other regions. Research at the Substation is done cooperatively with Main Station researchers to obtain the most possible useful information. The Tennessee Valley area will continue to profit from such a program. Already it has changed from a region of good land and poor crops to one of better land and excellent farming.



Forms of concentrate used in the tests are shown in the photo. Two sizes of pellets—3/16 and 3/4 in. in diameter were compared with the same feed mix in meal form.

PELLETED *concentrates for dairy cows*

G. E. HAWKINS, *Associate Dairy Husbandman*

FEEDING PELLETED concentrates is adapted to automation!

Cows eat pelleted concentrate faster than they do the same feed mixture in meal form. This fast eating is desirable where cows are milked in parlors and eating time is limited.

An undesirable feature associated with feeding pellets is a drop in butterfat percentage. The heating of starchy ingredients of the ration by use of steam and pressure in pelleting may be one cause of the drop in butterfat. On the other hand, ingredients used in the pelleted mixture and quality and quantity of roughage fed could have an important effect.

Pellet-Meal Comparison

Eating time and effect on butterfat were parts of the information learned in an Auburn study[1] comparing a concentrate mixture as (1) meal, (2) 3/16-in. pellets, and (3) ¾-in. pellets. Six Jersey cows that had been fed a standard ration were used in the 84-day test. The study was designed so that each cow would be fed each type of concentrate during one period. Rate of feeding was 1 lb. concentrate per 3 lb. 4% FCM (fat corrected milk). The cows were fed all the hay they would eat – half got alfalfa and half Coastal Bermudagrass.

Digestibility and chemical composition of the pellets and meal are given in the table. Increases in cold water-soluble nutrients in the pellets probably resulted from a partial breakdown of starch and possibly cellulose to sugars and dextrin. Further study is needed to explain the apparent changes in ash and crude protein.

Response from Pellets

Faster eating of the ¾-in. pellets is recorded in the table, along with milk production, butterfat percentage, and weight gain from pellets and meal. Average milk production (4% FCM), butterfat percentage, and weight gain were similar for cows fed meal and those fed both sizes of pellets. The hays did not affect responses to the concentrates.

Results of the Auburn study were different from those at other stations, where pelleted concentrates caused a drop in butterfat percentage. Since concentrate ingredients were different from rations used at other stations, a supplementary test was made comparing a commercial pellet containing about 40% corn with the Auburn mixture. Fourteen cows that were standardized on the herd mix were used, with 7 assigned to each concentrate. Each cow was fed 16 to 20 lb. of concentrate daily to ensure a critical test of the pellets.

Daily 4% FCM production averaged almost the same for cows on the herd mix and the commercial pellets. During the second week, butterfat percentage was 4.13% in milk from cows fed the herd mix, as compared with 3.73% for those fed the pellets.

There was normal variation in fat test from both groups during the first week of the test. During the second week, however, milk from all cows fed the commercial pellets tested lower than during the standardization period. In contrast, average butterfat content of milk from cows fed the herd meal mix was the same during the second test week as during the standardization period, with only one cow showing a decline in fat.

Results from the Auburn tests suggest that ingredients in the mixture determine whether pelleting of feed will cause changes in fat content of milk. It also appears that any changes in fat content resulting from feeding pelleted concentrates will require about 2 weeks to be noted.

PERFORMANCE OF COWS ON MEAL AND PELLETS AND COMPOSITION OF EACH CONCENTRATE

Item	Meal	Pellets 3/16-in.	Pellets ¾-in.
Composition			
TDN, %[1]	59.9	62.3	61.1
Crude protein, %	16.7	18.0	17.0
N-free extract, %	54.5	56.9	56.4
Crude fiber, %	10.8	9.6	10.0
Ether extract, %	4.5	4.5	4.5
Ash, %	13.5	11.0	12.7
Cellulose, %	10.9	9.8	10.6
Water-soluble nutrients, %	15.6	18.6	21.2
Performance			
Eating time, min./lb.	3.15	2.50	1.87
4% FCM, lb./day	26.10	26.60	26.40
Butterfat, %	4.79	4.88	4.83
Weight gain per 28-days, lb.	7.00	20.50	7.30

[1] TDN content of complete rations.

[1] The study was made under a grant from Cosby-Hodges Milling Co., Birmingham.

RESTRICTED FEEDING
of laying hens

ELLIS CROSS, G. R. INGRAM,[1] and D. F. KING
Department of Poultry Husbandry

ARE YOU WASTING money by feeding layers more than they need?

Recent investigations by the poultry department, API Agricultural Experiment Station, have revealed that this may be true. Feeding experiments over the past 2 years indicate that it is possible to restrict the feed of laying hens without adverse effects.

Restriction Practiced

Restricting the feed of chickens is already being practiced by many operators in two types of poultry enterprises. One, growing pullets on restricted feed, and the other, restricting the feed of meat-type breeder hens.

Three experiments were conducted at the Station to determine the effects of restricting the feed of laying hens (commercial egg-type hens). In the first experiment four groups of 50 hens each were used. Pullets that had been grown on full feed and laying approximately 10 to 15% were placed in individual cages and full-fed until they reached 68 to 70% production. From this point on, the four groups were fed as follows: One group was full-fed (control group), one group was fed 5% less feed than the control group, while the other two groups received 10% less feed.

The amount of feed to be fed the restricted groups was figured on the amount of feed consumed by the control group the previous week. The amount was given the restricted groups in seven equal feedings at 8 o'clock each morning. The 10% restricted groups were only restricted 5% the first 2 weeks and then restricted a full 10% from the third week on. No hens were culled during these experiments and the percentage of production is figured on a hen-day basis. The average figures for the 2-year test are presented in the following table.

[1] Resigned.

Restriction	Production	Av. wt. end of yr.	Av. gain	Feed/ doz. eggs
%	%	*Lb.*	*Lb.*	*Lb.*
None	65.27	4.65	.58	4.65
5	67.25	4.59	.47	4.43
10	62.16	4.29	.26	4.29

From the data presented it is apparent that restricting the feed up to 10% did not reduce production significantly. The smaller birds utilized feed more efficiently resulting in a saving of 1-1½¢ per dozen eggs.

Since the data obtained from the first test indicated that it was possible to restrict the feed of laying hens, tests were then made to determine the possibility of following a pre-determined feeding schedule. In this experiment, three groups of 50 birds each were used. One group was full-fed, while the other two groups were restricted as follows: groups 2 and 3 were fed the same amount of feed each day that the 5 and 10% groups had received for the same day the previous year.

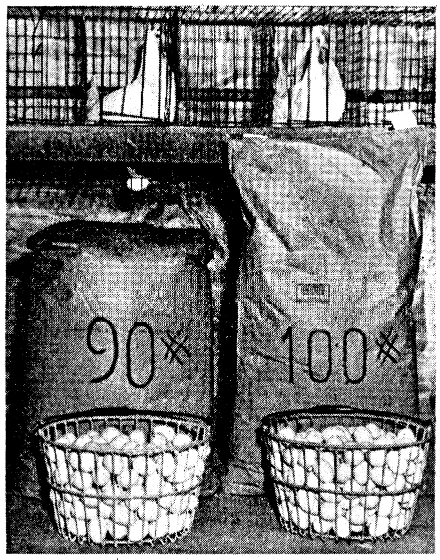
The results of this experiment are given in the following table.

Restriction	Production	Av. wt. end of yr.	Av. gain	Feed/ doz. eggs
%	%	*Lb.*	*Lb.*	*Lb.*
None	65.02	4.69	.71	4.40
None	66.45	4.56	.65	4.16
4	69.79	4.52	.61	4.28

In this experiment group 2, which was fed the same amount of feed that the 5% restricted group had received the previous year, actually consumed more feed than the control group by 1.1%. The control group in this experiment did not eat as much feed as the same group the previous year.

Group 3, which was fed the same amount of feed that the 10% restricted group received the previous year, was actually only restricted 4% when compared with this year's control group.

Although the hens in groups 2 and 3 were not restricted to the same extent as the hens in the first test, the data show that it is possible to follow a pre-determined feeding schedule. Group 3, which was restricted 4%, had a slightly higher production percentage than the control group.



Caged hens are shown with the amount of feed consumed and eggs produced in a year. Hen on left was fed 10 per cent less feed but produced as many eggs as hen on right.

Throughout these experiments it was observed that the 10% restricted group would usually be out of feed by 6 o'clock in the evening and sometimes by 4 p.m. This group had to go without feed until the next morning at 8 o'clock. Time without feed would be another practical way to restrict the feed of laying hens. The old recommendation that hens should clean out the feeders by the end of the day was good advice.

There was no difference in percentage of mortality or egg weight in any group attributed to the method of feeding during these experiments.

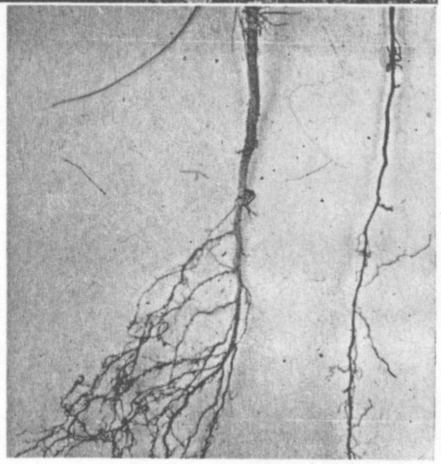
The data from these experiments show that it is profitable to restrict the feed of laying hens. Hens can be restricted up to 10% without adverse effects. In one test (not discussed here) where feed was restricted up to 15%, egg production was not reduced more than the 10% restricted group.

It is possible apparently to restrict the feed of laying hens up to 10%, if it is done properly. The best method to use in restricting the feed is still a question. Probably it would be best to use a control flock on full feed as was done in this test. If this is not possible a pre-determined feeding schedule or providing no feed from 5 p.m. to 8 a.m. each day could be used.

SEEDLING DISEASES

present problem

W. H. PADGETT[1] and J. A. LYLE
Department of Botany and Plant Pathology



Pine seedlings with root-rot infection above (foreground), healthy seedlings (background); below left, healthy seedling, right, seedling with Sclerotium bataticola infection.

AN INCREASED INTEREST in the production of pine seedlings has brought additional disease problems to forest nurserymen.

The pulp and paper industry and the Soil Bank Program placed an additional burden on the current nursery program. New nurseries were established by pulp and paper companies. Nurseries in operation added new seedbed areas to meet increasing demand for pine seedlings. This created a need for research of pine nursery disease problems.

Extensive research concerning fungal organisms associated with the diseases prevailing in nurseries has been conducted in some regions of the United States. However, in the Southeastern States the investigation of forest nursery disease problems has lagged behind other sections of the country.

Survey Made

A survey of diseases was made by the botany and plant pathology department, API Agricultural Experiment Station, during the 1957 growing season and part of 1958. Fungus incidence and disease development of damping-off and root-rot of five southern pine seedlings were studied. Loblolly, longleaf, shortleaf, slash, and Virginia pines were the species studied. Three forest tree nurseries were chosen: (1) Auburn Nursery, Auburn; (2) Coosa River Nursery, Coosa Pines; and (3) John R. Miller Nursery, Autaugaville.

Diseased seedlings were collected from each nursery, and laboratory diagnoses were made to determine fungi present. Inoculation experiments were made in the greenhouse to determine what fungi cause disease to pine seedlings. Twelve different species were obtained from diseased seedlings of the five different pines. All fungi obtained are present in most Alabama soils. Two of them, *Sclerotium bataticola* and *Fusarium* spp., were obtained from all species of pine at each nursery sampled, wherein, damping-off and root-rot diseases of pine seedlings had occurred.

S. bataticola did not appear to cause appreciable pre-emergence damping-off. However, it was severe in the post-emergence phases of this disease. The region of infection appeared to be in the tertiary and secondary root systems of pine seedlings. These roots can be killed back to the tap root where the fungus is retarded in its advance, but the seedlings will not survive when transplanted. In some instances, the seedlings must be culled drastically prior to shipping. Thus, production per sq. ft. of seedbed space is reduced, resulting in fewer seedlings for planting.

The severity of root-rot infection cannot be determined until the seedlings have been lifted and the root systems examined. Some of the damage may be superficial, whereas other injury is quite severe. Inoculation of pine seedlings in the greenhouse with this fungus proved its capability of causing damage to pine seedlings. The organism appeared to be more prevalent at the Coosa River Nursery and John R. Miller Nursery in heavier type soils than at the Auburn Nursery in a lighter soil.

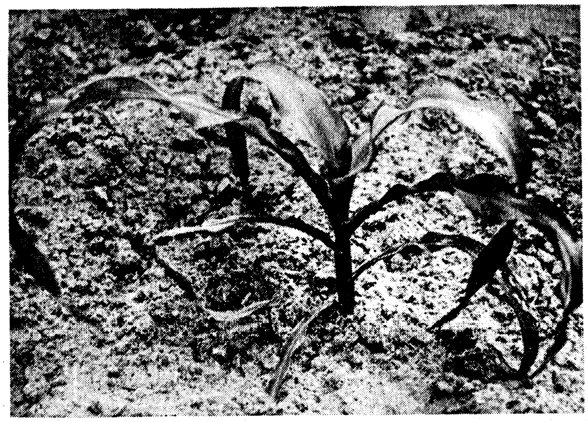
Fusarium spp. also was found to cause disease with experimental inoculations of pine seedlings in the greenhouse. Indications are, however, that its potential for causing seedling damage is not nearly as severe as that of the former organism. It is possible that a disease complex involving these two fungi exists in pine seedlings, since they often are the dominant fungal organisms obtained from diseased roots.

In September, 1957, a root-rot problem was investigated in the E. A. Hauss Nursery, Atmore. This nursery was not in the original survey. The damage, although confined to a relatively small area of slash pine seedlings, was severe. Many tap roots of seedlings had few or no lateral roots, crowns lacked green color, and in many cases seedlings had died. *S. bataticola* and *Fusarium* spp. were the primary fungi obtained from diseased roots of the seedlings. One other fungus-causing disease, *Rhizoctonia sp.*, was obtained from damped-off seedlings of loblolly and slash pine at the Auburn Nursery and from shortleaf pine seedlings at Autaugaville.

Three soil-borne fungus organisms of the nine obtained in the survey were proved in laboratory tests to cause disease to pine seedlings. Additional research is needed to determine the interrelationships between and control of these serious diseases of pine seedlings.

[1] Former graduate assistant.

Zinc deficiency is indicated in corn by yellow streaks in leaves and a white to yellow top.



JOHN I. WEAR
Soil Chemist

ZINC DEFICIENCY

a common disorder of corn

A NEW DISORDER appeared in corn fields of central and southern Alabama in the spring of 1941. The trouble was zinc deficiency.

When corn was 6 in. to 1 ft. in height, yellow streaks in the leaves and a white to yellow top appeared. Most of these plants seemed to recover to normal condition after a few weeks' growth. These symptoms were not observed in many cases under the old system of open pollinated, low yielding varieties that received low rates of fertilizer and that were generally grown on acid, unlimed soils. As progress was made from a 25-bu. to a 60-plus-bu. per acre yield, a new problem was introduced to many farmers. The faster growing corn plant on well fertilized, limed soils could not get enough zinc for maximum yields.

Research Conducted

Research was begun by the API Agricultural Experiment Station in 1941 to determine how much yields were reduced and how to correct this deficiency. The first tests at the Main Station involved use of zinc or other minor elements in an attempt to correct these conditions and to increase yields. Results of these tests from 1941-51 showed an annual increase of over 6 bu. per acre from an annual application of 15 lb. of zinc sulfate per acre. Plots were limed to a pH of 6.0 and were well fertilized.

In 1946 zinc deficiency was observed at the Plant Breeding Unit at Tallassee. The addition of zinc corrected this deficiency and increased yields about 8 bu. per acre.

In 1951 a rate and residual zinc study was started at the Wiregrass Substation on an area that had shown zinc deficiency symptoms. Rates of zinc sulfate of 0, 5, 10, and 15 lb. per acre were applied annually from 1951-54. From 1955-58 a residual study was conducted to determine if zinc applied during the first 4 years would increase yields for another 4 years. The table shows that a small consistent increase of 3.5 bu. was obtained from the unlimed soil (pH 5.9) and 8.7 bu. increase for the limed soil (pH 6.5). No increase was obtained from more than 10 lb. of zinc sulfate per acre. For the next 4 years the test was continued, but no zinc was added. The increases for the residual zinc were 3.7 bu. on the unlimed soil and 7.6 bu. on the limed soil.

Field Tests

From 1954 through 1956, a total of 25 field tests were conducted on farmers' fields in the State on medium to coarse-textured soils. The tests were to measure the yield response of corn to 10 lb. of zinc sulfate per acre. These soils were selected as average unlimed corn land without knowledge of zinc content. At each location yields were measured from areas with and without lime. These tests showed no increase in yield from zinc at any location on unlimed soils (pH 5.1-5.9). On limed soils increases in yield were obtained at 6 of the 25 locations. Soil tests for zinc showed a range of 0.1 to 2.2 p.p.m. extractable zinc. Three of the four soils with a pH value of 6.2 or above and a low zinc content (less than 0.4 p.p.m. zinc) resulted in an increase in yield from applied zinc. All responses were from soils with a pH of 5.9 or higher and 0.9 p.p.m. of zinc or less. No responses were measured on soils with pH values less than 5.9 or with a zinc content of more than 0.9 p.p.m.

A 2-year test at the Lower Coastal Plain Substation and 3-year tests on the Brewton and Monroeville Fields have generally shown the same relationships as the other tests.

Zinc deficiency in corn generally occurs on limed soils with low zinc content. However, all soils low in zinc with high pH value do not show zinc deficiency. Other factors such as moisture, temperature, and amounts of K_2O and P_2O_5 in the soil are undoubtedly of importance in this relationship.

A survey conducted in 1956 in Geneva, Pike and DeKalb Counties showed only 3% of the 391 fields sampled had a pH value over 6.0.

A general recommendation of zinc for corn at the present time is not warranted, because field tests do not show increases in yield on acid soils. Zinc is recommended by the Soil Testing Laboratory for corn on soils known to be low in zinc with pH of 6.0 or above.

RATES AND RESIDUAL STUDY OF ZINC FOR CORN AT THE WIREGRASS SUBSTATION, HEADLAND

Treatment 1951-1954	Yield of corn per acre 1951-1954	Yield of corn per acre 1955-1958	pH value of soil	Zinc in soil[1]
	Bu.	*Bu.*		*p.p.m.*
No zinc	33.8[2]	67.7	5.9	0.6
5 lb./A zinc sulfate annually	35.4	71.1	5.9	0.9
10 lb./A zinc sulfate	37.3	71.0	5.9	2.0
15 lb./A zinc sulfate	36.1	71.4	5.9	2.0
No zinc, lime	27.4	70.2	6.5	0.6
10 lb./A zinc sulfate, lime	36.1	77.8	6.5	2.1

[1] Extractable by Dithizone.
[2] Yield higher second 4-year period due to more moisture.

PLANT FOLIAGE *for* DECORATION

HENRY ORR, *Associate Horticulturist*

Line-mass foliage arrangements are becoming increasingly popular for public buildings and homes where long-lasting arrangements are needed.

If you are interested in growing plants for room interior decoration woody foliage plants may be the answer.

To the commercial users, a woody foliage plant is any hardy, woody plant that produces a decorative, durable foliage and foliage branches usuable in their trade. These same plants can be used by the amateur in the home.

In 1958 an evaluation study was made by the horticulture department, API Agricultural Experiment Station, with five representative groups of foliage users. Three of these groups consisted of amateur flower arrangers; the other two were commercial florists groups. Twelve foliages were used.

Foliage Demand

An important observation of the evaluation study was the greater interest of amateur groups in foliages not commonly used by the commercial florist. Ternstroemia (*gymnanthera*), Loquat, Bronzeleaf Elaeagnus, Chinese and Japanese Photinia were picked in preference to the dark leaf form of Southern Magnolia or Lanceleaf Greenbrier by two of the three amateur groups. The commercial florists preferred the dark leaf form of Southern Magnolia but did choose Loquat as more acceptable than Lanceleaf Greenbrier for home arrangements. Popular ratings given the foliage sprays of Shore Juniper and Japanese Photinia are believed to be indications of the increased interest among commercial and amateur users of foliages in the line-type material.

Where to Grow

A selection of woody foliage plants can be grown practically any place there is suitable soil site and necessary cultural care. Tender plants, such as Podocarpus, Tobira Pittosporum, and Japanese Photinia cannot be grown economically in exposed locations from Montgomery north; production of the broadleaf Rhododendrons is not feasible south of the upland areas of the Piedmont. In each area, however, there are many native plants as well as many introduced, almost naturalized plants, that would lend themselves to orcharding.

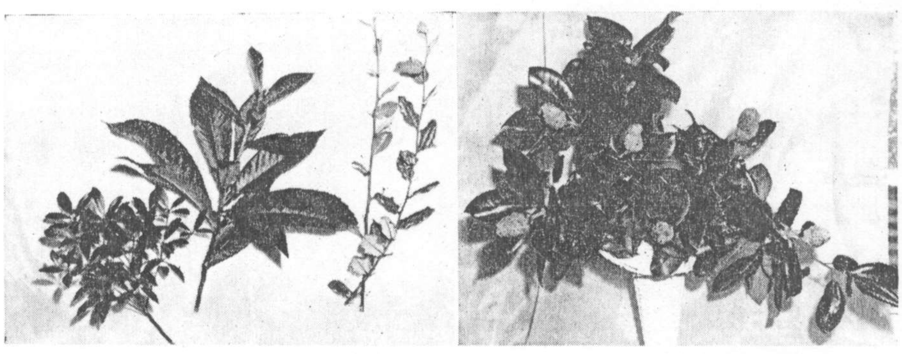
Orchard Location

Those interested in growing a commercial orchard should consider soil and topography in selecting a site. Marginal and submarginal sites should not be considered unless improvements are to be made prior to planting. As in fruit orcharding, skill in management cannot offset the disadvantages of low yields, high cost of production, poor color, low quality, and the loss of plants.

As in other farming and specialized horticultural developments, a good source of water for irrigation, spraying, and processing the finished product is essential. The climatic rainfall is too uncertain to rely upon if uniform crops are desired yearly.

Foliage Processing

Matured branches of Southern Magnolia, Chinese Photinia, Fetterbush Lyonia, and other glossy, "waxy" foliages can be cut, moistened, and shipped to local or distant markets in plastic bags in boxes or in plastic lined boxes. For the convenience of the wholesaler and for design use of the consumer, preferably an assortment of branches should be bunched together. Tender, colorful, and immature branches of shrubs, such as Japanese Photinia and Ternstroemia, should be conditioned overnight by placing the cut ends in tubs of water in a cool place prior to packing and shipping.



Branches of the dark green form of Southern Magnolia, right, are chosen by florists for decorative work in preference to Ternstroemia, Loquat, and Bronze Elaeagnus, left, preferred by amateur groups.

WINTER TOPCOAT

fiber preference

JANET RIEMER, *Graduate Fellow*[1]
NELL SKAGGS GLASSCOCK, *Assoc. Home Economist*

Two of 20 clothing and textile majors making survey model coats of wool (right) and cashmere (left) as first and second choices of 378 API women students.

IS THE LABEL in your winter coat a good basis for selecting fiber content?

Interest in fiber content of garments was studied in a survey made by 20 members of the textile class of the School of Home Economics of The Alabama Polytechnic Institute. The women students were juniors and seniors majoring in clothing and textiles. The purpose of the survey was to determine what fibers and fiber blends were preferred in winter coats owned by API women students.

The woven labels of 378 fabric winter coats were examined and the fiber content information given on each was tabulated. The owner was questioned as to the fiber content of the garment if the information was not given on the label.

The percentages of all fibers used were computed to determine what fibers were most commonly found and preferred.

The results in order of preference are summarized in the table. They indicate that 100% wool is the preferred fiber for fabric winter coats; 100% cashmere was the second choice to wool. The favorite blend was 90% wool and 10% cashmere. Another common blend was 80% wool and 20% cashmere.

Many of the young women preferred cashmere or cashmere blends, as shown by the results. The percentage of 100% cashmere coats might have been even higher had not the cost of cashmere been so great. Its softness and gentle warmth are the characteristics of this luxury fiber that account for cashmere's high desirability.

The fiber content of 16.9% of the 378 coats was reported as unknown, for which there are several possible reasons. The fiber content of some of these coats may not have included any wool, and as yet fibers other than wool are not required by law to be labeled as to percentages of content.

Probably most of the coats reported as having unknown fiber content were originally labeled on a "hang" tag, when the garment was purchased. Such tags are removed before wearing and are usually thrown away or lost. If the owner forgets the fiber content or is not interested at the time of purchase, there is no way of the consumer determining content readily.

Loss of such information often proves unfortunate. When an owner takes a garment having no fiber-content label to the dry cleaners, the operator must clean it thoroughly yet not harm the fabric. Fabrics respond in many ways to various cleaning solvents, and sometimes fibers are even destroyed by cleaning fluids. The consumers risk this possibility when the fiber content is not known. The more information the manufacturer or consumer can give the cleaner, the less is the risk of damaging the garment.

Information about fiber content to facilitate garment care is one of the most important reasons for adequate labeling of fiber content.

FIBER CONTENT OF WINTER TOP COATS OWNED BY 378 API WOMEN STUDENTS LISTED BY PREFERENCE

Fiber content	Per cent
100% wool	19.8
Unknown	16.9
100% cashmere	12.4
90% wool, 10% cashmere	10.3
100% virgin wool	5.0
80% wool, 20% cashmere	4.5
Unknown amount of wool	4.0
Unknown amount of cotton	2.1
80% wool, 10% cashmere, 10% orlon	1.8
Unknown amount of wool and cashmere	1.6
100% alpaca	1.3
Orlon	1.0
Miscellaneous preference[1]	19.3
	100.0

[1] Wool with either mohair, fur, acrylic, rayon, dacron, nylon, camel's hair, lamb's wool (each less than 1% of preference group).

[1] Resigned.

BALANCE SHEET of Alabama Agriculture

EDWARD E. KERN, JR.
Assoc. Agricultural Economist

VALUE of Alabama agriculture continues to grow. This is revealed by a balance sheet showing assets and liabilities for the entire State as of January 1, 1950, 1955, and 1958.

Total farm assets in Alabama in 1958 exceeded $2.2 billion, an all-time high (see table). Asset valuation was about 50% above that of 1950. Assets were controlled mainly by farmers, as assets exceeded liabilities by about 9 to 1. Total farm equities (net worth) on January 1, 1959 were slightly under $2 billion.

Land and buildings comprised over 60% of asset valuation on Alabama farms. This has increased more than 40% since 1950, because of inflation and increased land prices. Economies gained from increasing the scale of operations and the value of real estate as a hedge against inflation offer strong support to real estate values.

Livestock Gains

Value of livestock inventories showed significant gains since 1950. In many cases increases reflect improved quality and higher value of animals rather than increased numbers, particularly between 1955 and 1958. While cattle and calves have shown large increases in number since 1950, a slight decrease occurred between 1955 and 1958. Except for broilers and sheep, other classes of livestock decreased in number or remained the same.

Alabama farmers have added machinery and equipment at a rapid rate. The January 1, 1958 inventory figure was 170% above 1950 and 69% greater than 1955. The data represent average values of one-half of the estimated new cost of trucks, tractors, and equipment.

Feed crops stored on farms, household items, and liquid assets in the form of cash, demand and time deposits, and convertible securities on hand show substantial increases for the periods shown. The main items of feed on inventory were corn and hay stocks. In 1958, corn accounted for about $41 million of the $51 million total. The low 1955 inventory valuation resulted from reduced stocks following dry weather in 1954.

Real Estate Loans

Real estate mortgages and loans backed by net worth statements or chattel mortgages are major classifications of liabilities. A third category is installment credit or other personal loans. Farm real estate loans are usually for land purchases or for refinancing outstanding debts. Loan volume has increased at the rate of about 9% per year since 1950.

Production and other loans unsecured by farm real estate on January 1, 1958 was slightly below the 1955 balance and 27% above that reported in 1950. As these loans represent short or intermediate term debts, outstanding balances among specific periods vary. The size of loan balances is influenced by the ability to repay gained during the previous income period plus the economic outlook for the season ahead.

COMPARATIVE BALANCE SHEET OF AGRICULTURE, ALABAMA, JANUARY 1, 1950, 1955, and 1958*

Item	1950	1955	1958	Change 1950-58	Change 1955-58
	Thousands	*Thousands*	*Thousands*	*Pct.*	*Pct.*
Assets					
Land and buildings	$ 978,407	$1,098,816	$1,384,508	+ 41.5	+26.0
Livestock, poultry	161,056	123,023	171,890	+ 6.7	+39.7
Machinery, equipment	107,186	171,416	289,618	+170.2	+69.0
Crops, supplies	49,154	28,235	51,454	+ 4.7	+82.2
Household goods	90,706	99,504	132,823	+ 46.4	+33.5
Deposits, savings, cash	103,664	127,934	189,748	+ 83.0	+48.3
Total assets	$1,490,173	$1,648,928	$2,220,041	+ 49.0	+34.6
Liabilities					
Real estate	$ 87,156	$ 119,476	$ 156,514	+ 79.6	+31.0
Non-real estate	42,058	54,023	53,311	+ 26.8	– 1.3
Non-reporting (est.)	31,544	40,517	39,983	+ 26.8	– 1.3
Total liabilities	$ 160,758	$ 214,016	$ 249,808	+ 55.4	+16.7
Net worth	$1,329,415	$1,434,912	$1,970,233	+ 48.2	+37.3

* Estimated from governmental and private statistical reports.

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