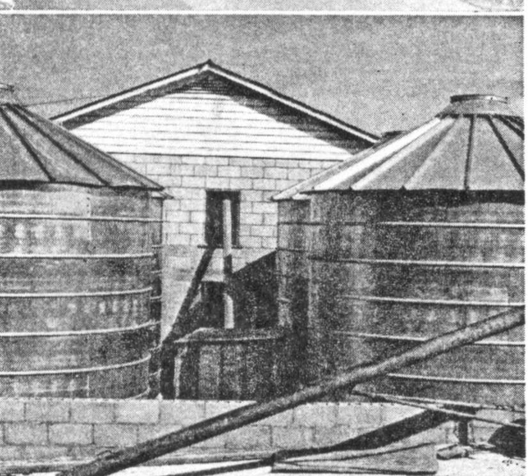
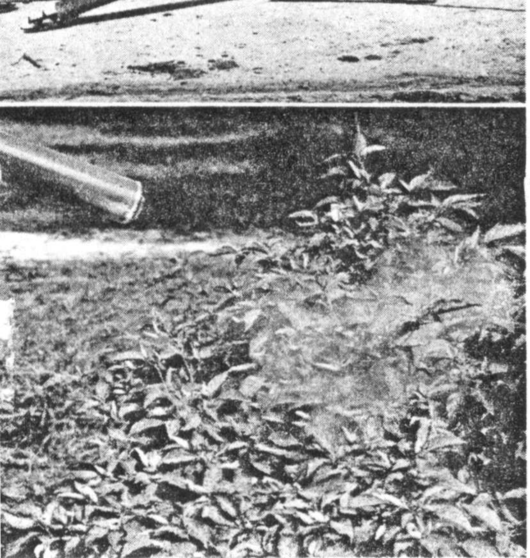


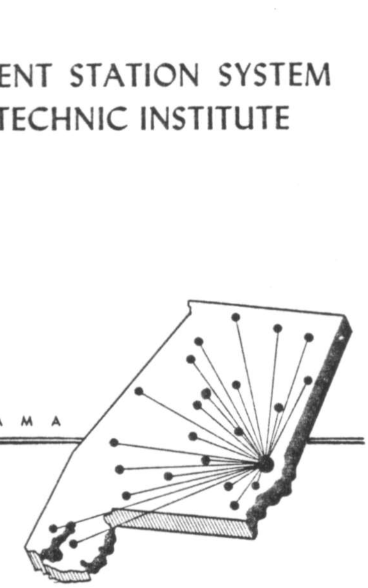
VOL. 4 NO. 4 WINTER 1957

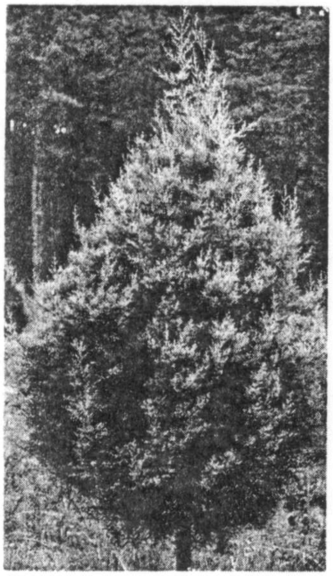
HIGHLIGHTS of AGRICULTURAL RESEARCH

In this issue—Wide-Open Market for High Quality Christmas Trees . . . New Process Produces Superior Jam and Jelly . . . Quality Broilers at Lower Feed Costs . . . Work-Free Dairy Feeding . . . A Word of Caution about Insecticidal Residues. . . What's Your Woodlot Worth? . . . Crimson Clover —Still The Top Forage Producer

AGRICULTURAL EXPERIMENT STATION SYSTEM
of the ALABAMA POLYTECHNIC INSTITUTE

SERVING ALL of ALABAMA





Wide-open MARKET *for high quality* CHRISTMAS TREES

BEN F. ALVORD, *Statistician*

CHRISTMAS TREES are big business in this country. About 38 million were produced or imported in 1955. These were valued at above $13 million when grouped for shipment in producing areas and at about $26 million when delivered in large wholesale quantities. Their retail worth was about $48 million.

Probably over a half million of these trees were used to decorate Alabama homes and places of business. Users may have paid as much as a million dollars for them.

Alabama Production Low

Although the big national Christmas tree market is "wide open," Alabama producers supplied only about a third of the trees used in the State in 1956. Yet, the State has enough idle and semi-idle land to produce several times the number used in the entire nation. Furthermore, climate is favorable for rapid tree growth and to harvest at Christmas time, when ample labor generally is available.

One of the three species most used in the United States, the eastern red cedar, grows wild over practically all of Alabama. It is particularly numerous in the lime soils of the Black Belt and limestone valleys.

The Arizona cypress species (see title photo), which is well received by Christmas tree users, is popular as a plantation tree in the State, but does not supply much of the market. Pines of several kinds are easily produced, but find only a limited market in Alabama.

Local Trees Popular

Many Alabama residents prefer one of the locally produced species. All like the freshness that comes with the late December harvesting practice in Alabama as contrasted with fall harvesting usually done in northern areas.

Despite the preference for local trees in the State, cedars led all species in the proportion left unsold on Christmas eve in 1956. Also, cedars retailed at lower average prices than imported trees of the same size. In addition, no locally produced trees appeared to compete effectively in the expanding market for ornamentals (small tinted trees for table use.)

It was apparent why many trees were unsold. Scraggy limbs and foliage, badly unbalanced growth, large gaps in foliage, crooked stems, or other defects were common.

In contrast, limited offerings of Alabama-grown Arizona cypress and pines apparently were more carefully selected and leftovers were not numerous.

Cedars were priced at about three-fourths that of imported trees of comparable size, undoubtedly because of the many substandard trees. Prices of Arizona cypress were generally equal to those of imported trees.

Quality Handicap to Sales

Poor quality trees probably offer the biggest handicap to sale of greater numbers of local trees. In addition, lack of grading, standardizing, and bundling trees handicap retailers in handling and pricing.

All natural-color imported trees are at least bundled and graded by size for convenience in handling, pricing, and selling. In addition, imported ornamentals for table display are tinted, treated to retard drying out, and mounted in convenient stands.

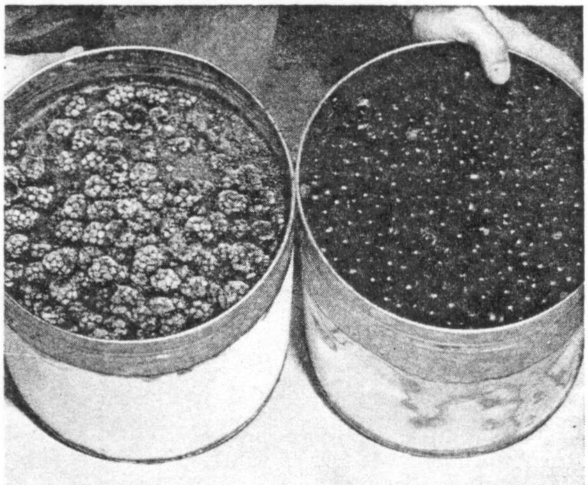
Local producers must undoubtedly compete not only in quality, but in orderly handling to get volume sellers, such as chain stores, to move Alabama trees into the large market outside the State. This is especially important with small ornamentals. This part of the market has expanded in recent years. Ornamentals appear to be the favorite type tree handled by mass sellers, particularly chain stores. Their orderly handling has been efficient. It has led to small marketing margins and apparently modest and attractive retail prices, considering the quality and durability of the product.

The adaptability of locally produced trees to processing, handling, and use similar to those of ornamentals now sold and their acceptability in the market is uncertain. However, importance of the market seems to justify test marketing by producers of local trees as ornamentals.

Eastern red cedar, a popular species for Christmas trees, grows wild in most sections of Alabama. However, quality of these cedars is generally low. In the field shown here, there are hundreds of cedars growing, but only one tree is saleable (inset). Many of these cedars would have grown into good Xmas trees if they had received proper care.

New process produces SUPERIOR JAM *and* JELLY

HUBERT HARRIS, *Associate Horticulturist*



Frozen blackberries and muscadines ready to be made into jam and jelly in Auburn processing laboratory.

ALABAMA BLACKBERRY GROWERS are finding new markets as the result of a freeze.

This time it isn't the weather. Rather, it is a man-made freeze used in making jam and jelly from blackberries. The process, which may also be used on other fruits, was developed in the horticultural food laboratories of the API Agricultural Experiment Station. So popular have the products become that several processors are interested in using the method.

Grocery store customer prefers Chilco jelly made by freeze concentrate process over leading commercial brands on shelf.

Market

Recently, results from studies of consumer preference and acceptance of the jam and jelly in Montgomery were reported in Station Circular 119. These results show that consumers favored the experimental products over leading commercial brands with which compared. The experimental products were sold under the name of "CHILCO," formed from Chilton and county.

Freeze Concentration Process

The freeze process retains much of the natural flavor of fruit lost in boiling. In making jam and jelly, it is usually necessary to remove a part of the water from the fruit. Water removal by boiling causes flavors to escape. The new process removes excess water by freezing, thus eliminating boiling. This results in high retention of flavors. These flavor improvements are evident from a study of the flavor scores on jelly prepared by different processes. (See table.)

Concentration of the fruit by freezing is done by extracting a concentrated juice or pulp from a frozen fruit or fruit product after conditioning to a suitable, partially frozen consistency. The dilute icy fraction left behind may be concentrated by boiling and returned to the other portion. The jelly or jam is then finished by adding and dissolving the correct amounts of pectin, sugar, and acid while the temperature is maintained at about 190° F.

Here packaged for consumer acceptance testing are Chilco jam and jelly made from Chilton County blackberries.

FLAVOR RATINGS OF FRUIT JELLIES PREPARED BY DIFFERENT METHODS

Kind of jelly	Average flavor scores, 10 judges[1]		
	Open pan boil	Vacuum boil	Freeze concentration
Muscadine	13.8	16.8	19.4
Blackberry	15.9	19.8	21.5
Apple	15.8	16.3	18.9
Average	15.2	17.6	19.9

[1] Scores of 1-5 mean poor; 6-10 fair; 11-15 good; 16-20 very good; and 21-25 excellent.

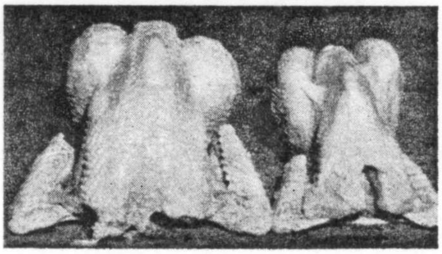
A problem encountered in the new process was separation of the concentrated portion from the dilute icy fraction. Studies on this problem resulted in the development of practical methods for separating different kinds of fruits and different frozen packs in making products. The methods are designed to utilize the frozen state of the fruit when removed from storage. This eliminates a special freezing process.

Temperatures required for best results in separating different frozen fruits vary with the kind of fruit or fruit product, soluble solids content needed in the concentrate, and method of separation.

Considerable research has been done by the Experiment Station on suitability of kinds and varieties of Alabama fruits for commercial preserving. Currently, researchers are studying frozen processes to make jam and jelly from muscadines. The day may not be far off when there will be a national market for numbers of Alabama fruits as the result of this new processing method.

Quality BROILERS *at* LOWER FEED COSTS

G. J. COTTIER,
Poultry Husbandman



Broiler with desired finish, conformation (left) compared with poor broiler. Good bird's full, meaty thighs and breast are what economy-wise shoppers look for.

CAN ALABAMA GROWERS produce better quality broilers at lower feed cost per pound?

The answer must be "yes" if Alabama remains a leading broiler state.

Housewives demand more quality in broilers. With federal inspection on the way, more stress will be placed on quality. And finally, competition is keen and lower feed costs per lb. of gain are necessary for profitable broiler operations.

Finish-Feeding Tests

Realizing problems facing growers, the API Agricultural Experiment Station, conducted studies to find better and cheaper methods of finishing broilers. Different feeding methods were compared during the finishing period – the last 14 days of a broiler's life. Broilers in the studies were either White Rocks or New Hampshires and sexes were equal in each test. Broilers were fed a 20% protein, high energy mash prior to start of finishing period. The following feeding methods were compared in the finishing period.

Pen 1. All mash, same as that fed before finishing period, protein 20%.

Pen 2. All pellets, identical to pen 1 except fed in pellet form.

Pen 3. All crumbles, same as pen 1 except fed in crumble form.

Pen 4. Broiler mash (20% protein) 3 parts mixed with 1 part yellow corn meal; calculated protein 17¼%.

Pen. 5. Broiler mash (20% protein) 2 parts mixed with 1 part yellow corn meal; calculated protein 16⅓%.

Pen 6. Broiler mash ¾, cracked corn ¼; cracked yellow corn fed along with broiler mash at rate of ¼ of ration; calculated protein 17¼%.

Pen 7. Broiler mash ⅔, cracked corn ⅓; cracked yellow corn supplemented broiler mash at 1 to 2 ratio in ration; calculated protein 16⅓%.

Pen 8. Broiler mash ⅔, broiler pellets ⅓; regular pellets fed at ratio of 1 to 2 in ration; calculated protein content 20%.

Pen 9. Broiler crumbles ⅔, cracked corn ⅓; similar to pen 7 except crumbles were used in place of mash; calculated protein content 16⅓%.

Results

Finishing period gains ranged from 0.70 lb. in pen 2 where the all-pellet system was used, to 0.81 lb. in pen 9 that was fed ⅓ cracked yellow corn and ⅔ broiler crumbles. Broilers were slow getting accustomed to pellets. The mash-pellet (⅔-⅓) feeding system was superior to the all pellet method in rate of gain.

Continuing broilers on the all-broiler mash was superior in rate of gain to all-pellets or to broiler mash-cracked corn (⅔-⅓) feeding methods, but was inferior to other methods. Feeding too much cracked corn to broilers (pen 7 vs. pen 6) resulted in poor gains.

Although all-mash feeding was one of the poorest in rate of gain, it was the most efficient method (lb. feed per lb. gain). Satisfactory efficiency was obtained when these methods were used: mash ⅔-pellets ⅓; mash ¾-corn meal ¼; crumbles ⅔-cracked corn ⅓.

The most economical lb. of meat were produced when broilers were fed broiler mash and corn meal at a ratio of 3 to 1. This method was only slightly cheaper in producing meat than broiler crumbles and cracked corn fed at a ratio of 2 to 1. Feeding all-pellets was the most expensive method of producing a lb. of meat. Protein content of rations fed in the 2 most economical methods was 17¼% and 16⅓%, respectively. This is the protein needed for 8 to 10-week-old broilers.

Recommendations

Cost per lb. of meat is the final test of a feeding method. Therefore, growers should use good grade, yellow corn in cracked or meal form to supplement mash or crumbles at not more than a third of the ration for the last 2 weeks. This reduces the cost of producing broilers and increases yellow color of skin and fat.

Hormones increase market quality of broilers when implanted 4 to 5 weeks before marketing. However, gains may or may not result. These drugs are more useful in producing high quality roasters for the winter holiday season.

COMPARISON OF FINISHING METHODS FOR BROILERS DURING 2-YEAR PERIOD

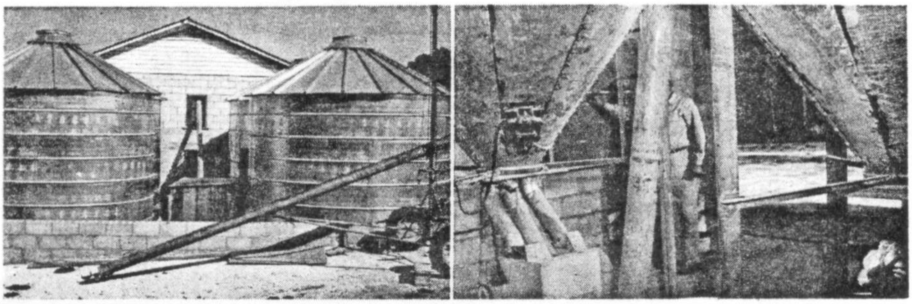
Method	Protein	Gain	Feed per lb. gain	Feed cost per lb. gain
	Per cent	*Lb.*	*Lb.*	*Cents*
All-mash broiler	20*	0.74	3.21	14.45
All-pellets broiler	20*	.70	3.67	16.88
All-crumbles broiler	20*	.78	3.45	15.53
Broiler mash ¾-corn meal ¼	17¼	.78	3.30	14.03
Broiler mash ⅔-corn meal ⅓	16⅓	.75	3.45	14.32
Broiler mash ¾-cracked corn ¼	17¼	.78	3.55	15.09
Broiler mash ⅔-cracked corn ⅓	16⅓	.71	3.89	16.14
Broiler mash ⅔-broiler pellets ⅓	20*	.80	3.29	14.97
Broiler crumbles ⅔-cracked corn ⅓	16⅓	.81	3.33	14.15

* Guaranteed, others calculated.

Price feed per ton: broiler mash, $90; broiler crumbles or pellets, $92; corn meal or cracked corn, $70.

WORK-FREE
dairy feeding

CHARLES A. ROLLO,
Associate Agricultural Engineer



At left are the bulk-grain storage bins. Mixer-grinder and ground feed storage bins are at right. Man in background operates system with push-button controls.

Early to bed, late to rise,
To get more rest, mechanize.

That sounds better than the old version about early rising. And, it should be music to the ears of dairymen who work many extra hours.

This reworded jingle fits what has been developed at the Dairy Research Unit of the API Agricultural Experiment Station. An all-electric feed processing system that was installed in 1956 takes the work out of feed mixing, handling, and feeding.

The mechanized operation takes grain and protein supplement from storage bins and delivers correctly-mixed feed to bins above the milking parlor – all by pushing a switch. In fact, a time clock handles all but one step.

Processing Plant Features

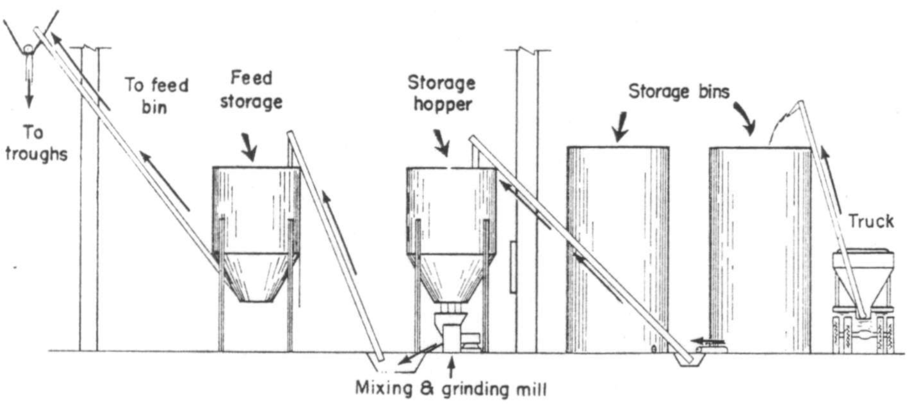
The processing plant has several features combined to make a continuous flow process: (1) bulk-grain storage, (2) stored grain aeration, (3) material handling, (4) mixing and grinding, (5) feed storage, and (6) controls.

Grain is stored in four 1,000-bu. metal bins equipped with perforated floors to facilitate aeration. Bins are on two courses of concrete blocks laid on a 4-in. reinforced concrete slab. Corn and oats are purchased when cost is favorable and stored for later use.

The stored grain is aerated with a fan driven by a 3-hp single phase electric motor. (Fan capacity 5,500 c.f.m. at 1½-in. static pressure.) The portable fan can be moved from bin to bin. It is emphasized that grain stored in metal bins must be aerated to prevent moisture damage.

Material handling is done with augers. Grain is moved in a continuous flow operation from storage bins to a grain-holding bin above the mixer-grinder (see diagram). After the grain is mixed and ground, a vertical auger elevates it to a feed storage bin above the milking parlor. Another auger conveys the feed to the parlor metering devices for feeding.

The mixer-grinder consists of a proportioning unit and a small hammermill mounted on the shaft of a 3,450-r.p.m., 2-hp single phase electric motor. Four small, separate compartments in the upper part of the mill are equipped with feed augers for proportioning the grain and supplement into a mixing hopper from which it flows into the hammermill. If cottonseed meal is used as the supplement, an electric vibrator is needed on the supplement-holding bin to ensure a continuous flow. No vibrator is needed if ¼-in. cottonseed meal pellets are used.



The ground feed storage bin holds 3 tons and is equipped for bagging.

Push Button Control

All electric motors are controlled by push-button switches mounted on a control panel in the grinding room. Safety features prevent activation of the outside storage bin augers unless the auger that delivers grain to the mixer-grinder is operating. Pressure switches shut off the mixer-grinder if any mixer compartment runs empty.

The grinding and storing process is controlled by a time clock. The only labor required is when the grain-holding bin is being filled. All the operator does is position the discharge spout over the proper bin compartment and wait for it to fill.

Installation Cost

Cost of installing the feed processing system for the 150-cow Experiment Station herd was $5,400. A feed storage room was remodeled to house the mixer-grinder, grain-holding bin, ground feed storage bin, and controls.

Cost of processing 1 ton of 13% digestible protein feed made of 52% corn, 29% oats, and 19% cottonseed meal is shown below.

Item	Cost
Fixed cost	$3.50
Electricity	.07
Labor	.74
Grain and supplement	54.40
Interest on grain	1.63
Total	$60.34

Fixed cost includes depreciation, repairs and upkeep, insurance, taxes, and interest on facilities. The total cost of $60.34 per ton was based on processing 150 tons per year. For 100 tons, cost would increase to $61.30 and for 50 tons to $65.30 per ton. Initial cost could be reduced at least $1,200 for the 50 tons per year, since less storage space would be needed.

A word of caution about INSECTICIDAL RESIDUES

GEORGE H. BLAKE, Jr., *Associate Entomologist*

DOES IT DISTURB you to bite into an apple and find a worm? Of course it does! But do you realize that chemical compounds used to ensure worm-free apples, peas, beans, tomatoes, and other edible crops can also create problems?

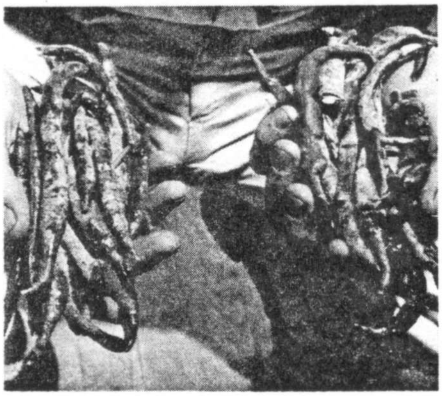
Insecticides deposited on crops by dusting or spraying operations for control of insects remain on the leaves and fruit for periods ranging from several hours to several weeks. How long they last depends upon the kind and amount of insecticide applied and weather conditions following application. Deposits of insecticides that remain on the crops are called "insecticidal residues."

Residue Problem

Insecticidal residues on crops are necessary for effective control of insects, and when Experiment Station recommendations are followed, the insecticides are safe for use. However, a problem develops when excessive amounts of insecticides or insecticides not recommended are used, since the residues may persist until time of harvest of edible crops.

Residues of insecticides may occur not only on vegetable and fruit crops but also in meats, milk, and milk products. Some of the insecticides used on animals are absorbed through the skin and stored in fatty tissues or excreted in milk. Fat storage or milk excretion of insecticides may also occur when the animals eat hay, silage, or pasture crops that have been treated for insect control. These residues, which may have no noticeable effect on the animals, are consumed by humans along with residues on vegetables and fruit, and in turn, may be stored in the human body.

The problem confronting entomologists, then, is to determine not only what insecticide to use but also how to use it for both effective insect control and safety to consumers of treated products. The Miller Bill (Public Law 513) established residue tolerances of various insecticides on nuts, fruits, vegetables, forage and hay crops, and in milk and animal products that are safe when the products are eaten. Small amounts of certain insecticides are not harmful to humans and are allowed by the law to be present in or on all of these except milk. No insecticidal residues are permitted in milk, since milk may be the principal diet of babies. Entomologists of the API Agricultural Experiment Station, as well as those in other parts of the United States, are working to learn more about insecticidal residues so that recommendations for insect control may conform to the established residue tolerances.



Which hand holds beans with residue of insecticides? Troublesome residues usually cannot be seen.

Toxicity Studies

Research was conducted for 3 years by the API Agricultural Experiment Station to determine the toxicity of toxaphene, DDT, and methoxychlor to sheep and cattle grazing on treated areas. The animals were placed on pastures at intervals after treatment with various rates of the insecticides. Observations were made of effects of the insecticides on the animals, and samples of fatty tissues of the animals were analyzed for insecticidal residues. Although the residues were high in animals grazing on areas treated with recommended rates of the insecticides, the residues disappeared from the fatty tissues if the animals were allowed to graze on untreated pasture for 1 month.

As a result of the increased emphasis placed on pesticide residues by the Miller Bill, a residues laboratory was established in 1956 at the Experiment Station. The purposes of this laboratory are to determine (1) insecticidal residues that may affect the marketability of agricultural crops, and (2) residues that result from experimental applications of insecticides in order to make recommendations that are safe for consumer use. Studies of residues on nut, fruit, and vegetable crops are under way. An example of results to date is the finding that malathion may be safely applied to blackberries one day before harvest.

Experiments on insect control establish the insecticides and rates at which they are effective for insect control; the residue studies determine the interval necessary between date of last insecticidal application and harvest of the crop to be sure residue tolerances are not exceeded. The residue studies also permit detection of excessive residues that result when recommendations are ignored or when insecticides are improperly applied.

Alabama recommendations for insect control are based on studies made in the State and in other parts of the country. When these recommendations are followed, there will be little danger of products having residues in excess of tolerances set by the Miller Bill.

WHAT'S YOUR WOODLOT WORTH?

HAROLD E. CHRISTEN,
Forester

(Right) The 20-year-old stand of slash pine has volume of 25 cords per acre.

(Left) Stand of same age on land of like productivity has volume of 5 to 6 cords.

A FARMER CAN COUNT his "tree money" before harvesting his timber.

It is a simple method, based on the system used in estimating the worth of a farm crop. Research of the API Agricultural Experiment Station has shown that five factors are involved. If a farmer applies these, he can determine the value of his timber and how much he can earn from it. Furthermore, the process can be a guide in proper management of timber stands.

Factors Affecting Values

Factors in the "money counting" system are: (1) amount of timber per acre; (2) quality of trees; (3) location of timber with relation to manufacturing plants and transportation; (4) productivity of land supporting the woodlot; and (5) operating expenses needed in handling the woodlot.

The amount of timber present on each acre is largely governed by the number of trees per acre and their age. For any given age of a forest stand, the number of trees per acre largely determines the volume present. Photo above at right shows a stand of 20-year-old slash pine on an acre of average productivity. It has a volume of 25 cords per acre at present, or a value of $150 per acre in timber. This is equal to a gross return of $7.50 per acre per year. The above photo at left shows a stand of the same age on land of like productivity. However, it has only 5 to 6 cords per acre worth $30 to $35. The main reason for the difference in value is the number of trees per acre. In the first illustration, there are 400 trees and in the second only 75 trees per acre. To get the greatest return from the woodlot, it is necessary to use the land fully just as you plant to a full stand of cotton or corn.

Tall, straight, limb-free timber brings a better price as sawtimber and poles from buyers. Here again we find values involved in the woodlot do not differ from those on the farm. Quality of the agricultural crop also determines its value to as great an extent as does the amount.

Location is a factor over which the farmer has no control. As a rule, buyers pay more for products close to the plant on good transportation routes because freight costs are cheaper.

High productivity of the land means more timber. However, unlike land for farm crops, it is seldom possible for the owner to greatly increase the natural productivity by application of fertilizers.

In considering operating expenses, cost of labor is usually the most important. In some areas labor is plentiful and relatively cheap, in others the reverse is true. The high cost of scarce labor often cuts deeply into a farmer's gross return in harvesting a timber crop.

A farm woodlot owner has several choices of when and how he shall harvest his timber crop, according to results of Auburn studies.

Woodlot Harvesting

First, the owner may decide to cut all the timber at one time and start a new crop. This may often give him the most money, but there is a long wait between incomes and income taxes may eat up a big share of his profit.

Second, he may decide to harvest periodically—possibly removing growth every 5 or 10 years. Under this system, he may not get as much money, but he always has a backlog of value that he can tap if he finds himself in need. This is like money in the bank.

Third, he may decide to harvest annually as he does his farm crop – removing each year about what he grows. This system works well if the acreage of the woodlot is large enough to make it worthwhile for a timber buyer to operate in it each year. Often, the woodlot is too small for an annual harvest.

Decisions

The landowner must decide whether to invest in his woodlot in order to increase the number of trees and their quality. How much he can invest will be governed by location and productivity of the woodlot and by labor costs in his community.

He must decide upon his harvesting method. Shall it be once in the life of the woodlot, periodically, or annually?

If the decisions are made wisely, timber resources can add much to the farm income.

CRIMSON CLOVER

—still the top forage producer

W. R. LANGFORD,
Associate Agronomist

FIRST AS A SOIL BUILDER, then as an outstanding forage legume . . .

That's the history of crimson clover in Alabama. Today this dark red flowering clover is still a top forage producer even though many other legumes have been much heralded and introduced in recent years.

Crimson clover was brought to this country from southern Europe about 1819. During the latter part of that century and the early 1900's, the crop was highly regarded as a soil builder. Writing in an API Agricultural Experiment Station bulletin in 1909, the late Director J. F. Duggar described the clover's value for soil improvement.

During the 1920's, Alabama researchers and leading farmers began recognizing the possibility of crimson as a forage producer. Previously, farmers had not used crimson for forage because the clover was most productive in the spring when land had to be broken for cotton and other crops. With the rise of livestock farming in Alabama, crimson clover became an important producer of forage.

Test Results

Results of forage production tests begun in 1953 at a number of research units of the API Station System show that crimson clover produced earlier pasturage and more total forage than any other winter legume in the tests. Other legumes in this study were hairy vetch, ball clover, Mike clover, rose clover, Louisiana and Kenland red clovers, subterranean clover, Louisiana S-1 white clover, and button clover. These crops were planted during September or early October each year on well prepared seedbeds and mowed at frequent intervals during the growing season to determine yield of each.

Hairy vetch was the only legume that came close to crimson clover in performance as a forage. In 18 tests, hairy vetch was 85% as productive as crimson at first harvest and 88% as productive in total yield. It was only on light sandy soils in southern Alabama and on the high lime soils of the Black Belt that hairy vetch outyielded crimson. On Black Belt soils, crimson clover failed because of iron deficiency.

Other legumes studied were much lower in production at first harvest and yielded considerably less total forage than did crimson clover. Results of tests conducted during the 4-year period of 1953-56 show the relative yields of crimson clover and 7 other legumes as follows:

Crop and number of tests	Relative yield 1st harvest	Relative yield Total
	Pct.	*Pct.*
Crimson clover	100	100
Ball clover, 18	17	72
Kenland red clover, 12	5	71
Rose clover, 5	14	71
Mike clover, 12	25	57
La. S-1 w. clover, 10	8	57
Button clover, 13	19	56
Subterranean, 7	17	60

New and Timely PUBLICATIONS

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

Bulletin 308. Sources of Nitrogen for Cotton and Corn in Alabama.

Bulletin 309. Marketing Christmas Trees in Alabama.

Leaflet 53. Peanut Hay for Milking Cows.

Leaflet 54. Reducing Losses from Southern Fusiform Rust.

Leaflet 55. Young Oat Forage—A High Quality Dairy Feed.

Leaflet 56. Low-Cost Milking Barn for Manufacture-Grade Dairy.

Progress Report 68. Breeding Meat-Type Hogs for Alabama.

Free copies may be obtained from your county agent or by writing the API Agricultural Experiment Station, Auburn, Alabama.

HIGHLIGHTS of AGRICULTURAL RESEARCH

Published Quarterly by
Agricultural Experiment Station *of the* Alabama Polytechnic Institute
Auburn, Alabama

FREE Bulletin or Report of Progress
AGRICULTURAL EXPERIMENT STATION
of the ALABAMA POLYTECHNIC INSTITUTE
E. V. Smith, Director
Auburn, Alabama
Permit No. 1132—11/57-8M

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