HIGHLIGHTS

OF AGRICULTURAL RESEARCH

VOLUME 8, NUMBER 1

SPRING 1961

Agricultural Experiment Station

AUBURN UNIVERSITY

HIGHLIGHTS of Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 8, No. 1 SPRING, 1961

In this issue . . .

On the cover. Nearing completion at Auburn University is the new Biological and Plant Sciences Building, which will provide modern teaching and research facilities for the School of Agriculture and Agricultural Experiment Station. When completed it will house the departments of Agronomy and Soils, Botany and Plant Pathology, Horticulture, and Zoology-Entomology. Funds for constructing the building were provided by passage of Amendment 5 in 1957.

Published by

AGRICULTURAL EXPERIMENT STATION of AUBURN UNIVERSITY

Auburn, Alabama

New and Timely PUBLICATIONS

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

Bul. 301. Response of Crops to Lime in Alabama.

Bul. 327. Establishment and Maintenance of White Clover-Grass Pastures in Alabama.

Bul. 330. Costs and Returns of Producing Runner Peanuts in Southeastern Alabama.

Cir. 127. Mechanized Cotton Production in Alabama.

Cir. 136. Nitrogen for Dallisgrass Pastures in the Black Belt.

Leaf. 60. A Comparison of Starr Millet, Sweet Sudangrass, Johnsongrass as Dairy Forages.

Prog. Rept. 74. Opportunities for Profit on Your Farm.

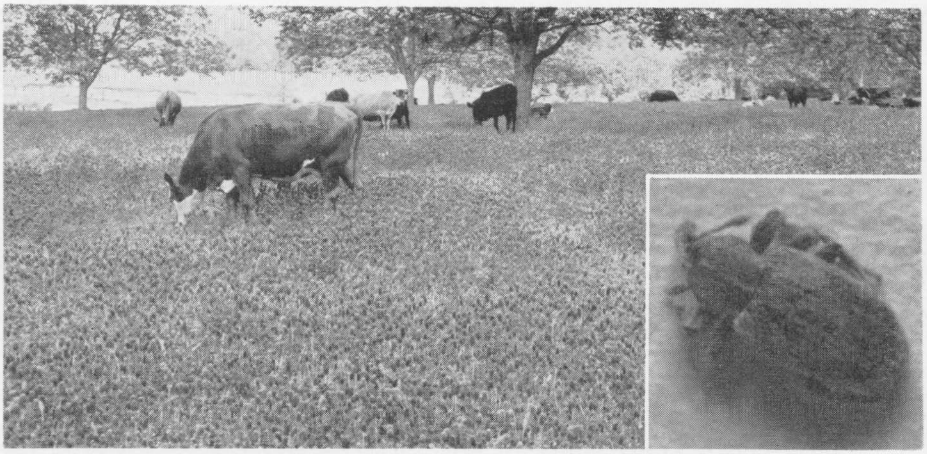
Prog. Rept. 77. Systemic Insecticides for Thrips Control on Peanuts.

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

tiny but mighty

Clover Head Weevil Is Serious Farm Pest

MAX H. BASS
and
SIDNEY B. HAYS[1]
Dept. of Zoology-Entomology



Clover head weevil (inset) can seriously damage crimson clover like that above unless control measures are used when infestations reach the danger stage.

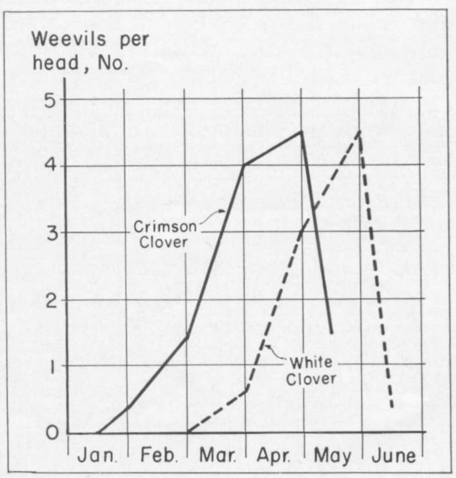
It's the little things that count, according to an old adage. And in many cases this is true.

Take the case of crimson and white clover seed production in Alabama. Yields have been extremely low for the past several years, despite a good job of land preparation, fertilization, seeding, and harvesting. Back of the low seed yields is one of the little things – a small insect known as the clover head weevil, *Hypera meles*.

Clover head weevil damage has been so heavy in some areas where clover is grown for commercial seed production or for a forage or cover crop that many growers are turning to other crops. Seed production has been reduced so much that several million pounds of clover seed are shipped to the Southeastern States every year.

The principal damage from the clover head weevil is caused by the larvae feeding on the ovule and bud of the plant. The seed head may be damaged or even destroyed. With heavy infestation, damaged seed heads may produce no seed or only a few around the base of the floret or on one side of the seed head. Six to 10 larvae and pupae per head are not uncommon. In many cases the larvae bore into the stem causing the flower or bud to fall over and die. This is especially true in heavily infested white clover.

[1] Resigned.



Field population studies have been made at weekly intervals to determine the weevil populations in both white and crimson clover (see graph). Adult weevils are first observed on crimson in mid-February, and a large increase in numbers occurs in late February. These weevils have overwintered by hibernating as adults. No immature forms are seen during the winter months.

The first generation of immature forms are found in mid-March. By April 1 there is a trend toward heavy infestation and by May 1 all infested fields have damage to seed heads, with all stages of weevils being found readily. There is a rapid drop in population during the first days of May, and by combining time (mid-May) few adults or immature forms are present.

Infestation of white clover follows the same general pattern, except it begins in early March with a rapid buildup in April and May. The peak is reached around June 1, followed by a rapid decline to harvest time in mid-June.

Data from Auburn research indicate that this weevil can be effectively controlled with one application of insecticidal dust applied at the 50% bloom to full bloom stage. Effective materials were 2½% heptachlor, 5% DDT, 2% endrin, and 2% parathion dust used at 25 lb. per acre. Equivalent amounts as sprays were also effective when applied during the same stage of bloom. Spraying and dusting in late afternoon avoids unnecessary destruction of pollinating bees.

As a preventive treatment, 1 lb. of technical endrin, dieldrin, or heptachlor per acre in granular form applied in March or early April is effective (see table). Livestock should not be grazed after application of any of these insecticides except parathion. If parathion is used, livestock may be grazed after seed are harvested.

Using ground equipment for insecticidal application has several disadvantages, but machine damage to plants is the primary one. Dusting and spraying by air has been feasible, and is being done in many areas.

Effect of Insecticidal Treatment on Clover Seed Yield

Insecticide used	Per acre yields after use of different forms of insecticide		
	Dusts[1] 2-yr. av.	Granules[2] 2-yr. av.	Sprays[3] 1-yr. av.
	Lb.	*Lb.*	*Lb.*
None	116	255	130
Sevin	225	493	------
Guthion	241	505	222
Heptachlor	240	534	------
Endrin	266	------	182
Malathion	182	460	201
Parathion	------	------	206
Aldrin	------	756	------
DDT	222	------	200
Korlan	187	------	226
Methyl trithion	------	------	226
Thiodan	------	------	215
Dimethoate	------	------	176
Dibrom	------	------	149

[1] Dusts applied at full bloom, one application at 25 lb. per acre.
[2] Granules applied in March, 2 lb. technical material per acre.
[3] Sprays applied at full bloom, ½ lb. technical material per acre.

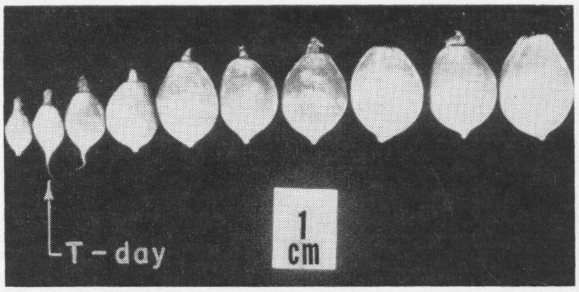
Post-bloom

CHEMICAL THINNING *of peaches*

a coming reality

H. J. AMLING, *Associate Horticulturist*

C. C. CARLTON, *Superintendent, Chilton Area Horticulture Substation*



Peaches above show variation in size at different stages of thinning. Starting at left is 2 days before T-day and extreme right is T + 15, figure corresponds to Table 2.

CHEMICAL REMOVAL of excess peaches after the danger of frost has passed may soon be a commercial reality.

Experiments conducted at the Chilton Area Horticulture Substation and at the Main Station, Auburn, have revealed why most attempts to chemically thin peaches consistently in the post-bloom period have failed.

Importance of Fruit Development

Before reaching maturity a peach goes through 3 recognized stages of development. Stage 1 begins with blossoming and lasts 30 to 40 days. During this period the pericarp (edible portion of peach) increases in size and endosperm (food for seed) completes its development. Stage 2 is recognized by hardening of pit and reduced pericarp growth. During this period embryo development is completed. Following this stage there is a rapid increase in pericarp growth that continues until maturity, stage 3. Successful chemical thinning of peaches with growth regulators has only been reported when such materials were applied in stage 1.

Current Investigations

The first objectives in the current research program were:

1. To find stage of fruit development under Alabama conditions when applications of NAA (napthaleneacetic acid) would reduce fruit set, and to determine if this were the only stage when thinning could be accomplished.

2. To determine if other available thinning chemicals need be applied at same critical growth stage to be effective.

3. To recognize some fruit growth change that could be used to detect this critical stage in the field.

To meet these objectives 200 and 400 single tree plots were used in 1959 and 1960, respectively. Three or 4 limbs of each tree selected at random were tagged, and blossom and fruit counts for each limb recorded separately. A minimum of 1,000 blossoms per tree was used. Three to 5 single tree plots were used for each treatment.

In 1959 and 1960 treatments consisted of periodic applications of 3 CP (chlorophenoxy propionic acid), NAA, and 3-chloro IPC (3-chloro-isopropyl-N phenyl carbamate) coupled with periodic sampling of fruit. Additional studies on the influence of concentration of 3 CP were conducted in 1960.

TABLE 1. INFLUENCE OF NAA, 3 CP, AND CHLORO IPC ON PER CENT FRUIT SET WHEN APPLIED AT DIFFERENT STAGES OF FRUIT DEVELOPMENT OF ELBERTA PEACH

Material	Per cent of fruit set from applications at different stages						
	5DFB[1]	SS[2]	SO[3]	1 week	2 weeks	3 weeks	Check
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
NAA	----	----	25.5	24.3	16.7	----	24.6
3 CP	28.1	23.7	22.8	14.1	9.4	----	24.6
Chloro IPC	----	19.0	13.2	18.7	15.6	21.8	27.6
Temperature (F)	52°	50°	55°	72°	65°	84°	----

[1] 5DFB—5 days after full bloom.
[2] SS—That stage when 80 to 85% of shucks have split.
[3] SO—That stage when 80 to 85% of fruit have ⅔ of their surface exposed.

Results and Discussion

In 1959 the critical stage was found to exist for NAA. It was the only stage that NAA applications resulted in a reduction of fruit set, Table 1. This same critical stage appeared to be related to the thinning effectiveness of 3 CP. Application of the latter growth regulator within approximately 8 days of the critical stage resulted in thinning, Table 1. No reduction in fruit set resulted from applications of 3 CP applied at other times. All applications of chloro IPC resulted in a reduction of fruit set. The degree of thinning achieved at the various stages of development varied.

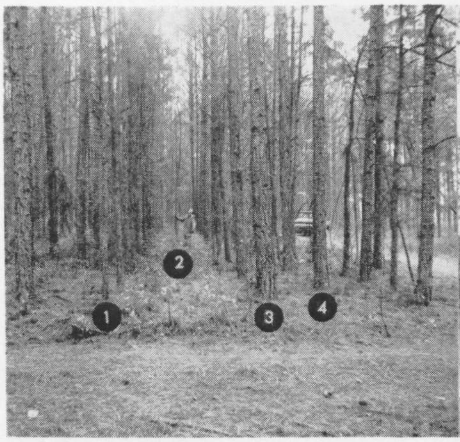
A study of fruit samples collected revealed that the change of endosperm associated with the critical stage as described by other research workers for NAA corresponded to a sudden increase in fruit size. This occurred with each of the varieties studied. The increase was of such amount that the possibility of using it in the field to designate the critical stage offered great possibilities.

The 1960 results confirmed those obtained in 1959. It was found that applications of 3 CP at the beginning of the stage were much more effective than during the latter phases of the stage, Table 2. These studies also indicated that reduction in fruit set can be achieved at the end of the stage if high concentrations of 3 CP are used. However, the concentration that would give satisfactory thinning at the end of the critical stage would eliminate the crop if applied at the beginning of the stage.

TABLE 2. INFLUENCE OF 3 CP ON PER CENT FRUIT SET WHEN APPLIED DURING THE CRITICAL THINNING PERIOD

Material	Per cent of fruit set from applications during critical thinning period											
	T-2	T[1]	T+2[2]	T+4	T+6	T+7	T+9	T+11	T+13	T+15	CK	HT[3]
3 CP-150 ppm	16.0	11.9	21.3	21.9	30.3	17.5	31.7	23.8	30.7	30.6	31.9	22.9
3 CP-125 ppm	20.7	22.3	32.1	19.4	36.2	25.8	35.0	37.0	34.7	34.0	38.9	27.2
Temp. (F)	75°	70°	70°	69°	59°	75°	68°	53°	60°	----	----	----

[1] T refers to that day when the fruit commenced its sudden increase in growth.
[2] Numbers refer to days after T day.
[3] HT refers to hand thinning.



An excellent stand of four species of Southern pine planted in single row mixture on an unburned plot is shown at left. These pines are 25 years old. Species are: 1. shortleaf, 2. longleaf, 3. loblolly, and 4. slash. Reduced volume as a result of burning every 4 years is shown at right. Species are: 1. slash, 2. shortleaf, 3. loblolly, and 4. longleaf.

The effects of FIRE *on* PINE PLANTATIONS

REID I. FOLSOM, *Assistant Forester*

PROTECTION of investments is a sign of success in any business. Therefore, Alabama woodland owners need to know the effects of fire on pine plantations.

In 1934 a study was begun at the Auburn University Agricultural Experiment Station to determine the effects of burning at various intervals on 4 different species of pines in mixed plantations.

An old field area was planted to longleaf, slash, loblolly, and shortleaf mixed by species in successive single rows. Planting spacing was 6 × 6 ft. The area was divided into 5, ¼-acre plots, and each plot received one of the following treatments: no burn, burned annually, burned the second winter following planting and every 2 years thereafter, burned the fourth winter and every 4 years thereafter, and burned the sixth winter and every 6 years thereafter.

Research Results

In 1959, 25 years after planting, a 100% cruise of the experimental area revealed great differences in the species ability to withstand repeated burning at various intervals.

Loblolly was the most susceptible to fire damage. Annual burning killed all loblolly. Survival and growth of loblolly was directly influenced by the period between burns and fire intensity. With increasingly longer periods between burns, growth and volume yield improved, see table. This trend continued until extremely hot fires of the 6-year burning cycle became limiting. These hot fires resulted from heavy litter accumulation during the long period between burns. On the unburned plot the loblolly was among the tallest, had the greatest diameter, and accounted for the highest volume of the 4 species.

In contrast, slash produced greatest volume of any species on the plots burned at 2-, 4-, and 6-year intervals. Slash, like loblolly, survived and grew best on the unburned plot. However, difference in the interval between burns had less effect on volume, height, and diameter of slash.

Annual burning was almost as detrimental to slash as it was to loblolly. Only a few slash survived. Survival and growth of slash was better than that of any other species on plots burned at 2-year and longer intervals. This indicates that slash develops some fire resistance by the second year after planting.

VOLUME IN CORDS PER ACRE AT AGE 25[1]

Burning cycle	Loblolly	Slash	Longleaf	Shortleaf	Total
No burn	23½	16	½	8	48
Annual	0	1	12	4	17
Two-year	2½	12	3½	10	28
Four-year	9½	10½	2½	8	30½
Six-year	9½	14	½	4½	28½

[1] Volume is rounded to the ½ cord.

Longleaf and shortleaf were the only species tested that survived and grew well on the annual-burn plot. Longleaf produced 3 times the volume of shortleaf on this plot.

Longleaf, with its characteristic early grass stage and resulting late start in height growth, was suppressed by the other species except on the annual burn. Diameter growth and volume of longleaf declined as the interval between burns increased.

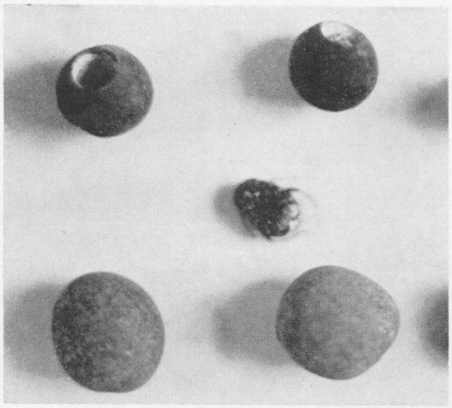
Volume was greatest on the annual-burn plot and least on the unburned plot. The stimulating effect of fire on the growth of longleaf was the result of reduced competition from other, less fire-resistant species.

Shortleaf was second only to longleaf in volume production on the annual-burn plot. Shortleaf had the highest survival of all species on both the unburned plot and the 2- and 4-year burn plots. Average height and diameter of shortleaf apparently was not affected by burning interval. It was the smallest tree regardless of treatment.

In this mixed planting loblolly was the superior species on the unburned plot. However, loblolly was eliminated on the annual-burn plot and was adversely affected by burning at any interval. For any repeated burning at intervals longer than 1 year, slash was the best species. Longleaf produced the greatest volume on the annual-burn plot. Shortleaf was generally small in size, but it showed the highest overall survival.

Results of this experiment reveal the following: (1) loblolly and slash must be protected from fire if they are to produce maximum yields; (2) slash should be favored over loblolly for planting where periodic but not annual burning is expected; and (3) longleaf pine is favored if annual burning is anticipated.

A small volume on an annual-burn plot is shown above. No loblolly survived. Species are: 1. slash, 2. longleaf, 3. shortleaf.



Typical bruchid damage to hairy vetch seed (top row) as compared with sound seed of the resistant Warrior variety (bottom row). Bruchid or vetch weevil is shown in center.

WARRIOR VETCH—

resistant to the bruchid

E. D. DONNELLY, *Plant Breeder*[1]

SIDNEY B. HAYS, *Assistant in Entomology*[2]

THE VETCH BRUCHID or vetch weevil, which does extensive damage to susceptible varieties, has met its match!

Highly resistant to this insect is the new variety, Warrior vetch, recently released by the Auburn University Agricultural Experiment Station. Based on test results, hairy vetch growers can expect to lose about half of their seed crop from damage by the bruchid, whereas with Warrior they would lose none.

Seed of susceptible varieties at harvest are deceptive. What appears to be good seed actually may be of poor quality because of bruchid damage to germination. Visible damage to the seed may not appear for several weeks after harvest when the insects emerge, leaving only empty seed coats. (See photo.)

Besides its use for green manure and grazing, vetch has been grown for seed in Alabama. During the 1941-45 period, annual vetch seed production in the State ranged between 2 and 2½ million lb. (county agent reports). A large percentage of this was hairy vetch seed. Since 1945, however, vetch seed production steadily declined to less than one-half million lb. by 1958, the vetch bruchid being an important factor.

Yield and Resistance Tests

In the fall of 1956, tests were begun to determine yields of Warrior and hairy vetch and their resistance or non-resistance to the bruchid. In all tests cotton stalks were used as support for the vetch, except for one season at Alexandria (1956-57), when rye was used. All plots were located at random and repeated 4 to 5 times on the experimental areas. Seed were threshed with a stationary thresher.

Six to 8 weeks after harvest, bruchid infestation was determined by counting 1,000 seed of each variety from each plot, inspecting each seed, and counting the number of seed from which weevils had emerged.

Results

Results from these experiments show that Warrior is highly resistant to the vetch bruchid, Table 1. At the Alexandria Field (3-year period), bruchid infestation of hairy vetch seed averaged 50.1%, whereas no infestation was found in Warrior seed. Similar relationship was found at the Plant Breeding Unit, Tallassee, and at the Prattville Experiment Field last year – infested Warrior seed, none; infested hairy vetch seed, 45.0% and 48.6%, respectively.

Warrior produced higher yields of seed than hairy vetch at 4 locations, Table 2. Yields of Warrior ranged from 1,009 to 1,432 lb. of seed per acre at Auburn, Tallassee, and Prattville (central Alabama), as compared with 195 to 504 lb. of hairy vetch seed. At Alexandria (northern Alabama) Warrior in a 3-year period averaged 558 lb. per acre while hairy averaged 387. During this period acre yields of Warrior ranged from 144 to 1,003 lb. This spread indicates that Warrior is not as well adapted for seed production in northern Alabama as it is in the central portion of the State.

In small plot experiments on a sandy soil at the Brewton Experiment Field in southern Alabama, seed production of both Warrior and hairy vetch was not successful.

Warrior has produced as much growth for green manure in the southern two-thirds of the State as Willamette or hairy vetch.

The Bruchid

The adult bruchid is a small, almost black, chunky beetle about ⅛-in. long, resembling the pea weevil but less than half as large. Bruchids hibernate during winter in the adult stage, and come out during the first warm days of spring. By the time vetch is in bloom, all of the adults are widely scattered in vetch fields. As pods form the females attach eggs to the outside. Newly hatched larvae penetrate the pods and feed in the seed, where they remain until seed are harvested or until the pods burst open and the bruchids emerge as adults. There is only one generation of bruchids a year. They do not infest seed in storage.

Auburn entomologists have developed effective methods for controlling the bruchid in susceptible varieties. The most effective control requires four applications of aldrin or DDT during the flowering period. Such control measures add to the cost of seed production. The bruchid-resistant Warrior variety offers a more practical and economical solution.

Certified Warrior seed is now being produced under the Alabama Crop Improvement Association program. Last year about 150,000 lb. of certified seed was produced.

TABLE 1. PERCENTAGE OF BRUCHID-INFESTED SEED FROM TWO VETCH VARIETIES

Location	Percentage of infested seed	
	Warrior	Hairy
	Pct.	*Pct.*
Alexandria[1]	0.0	50.1
Tallassee[2]	0.0	45.0
Prattville[2]	0.0	48.6

[1] Northern Alabama, 3-year average.
[2] Central Alabama, 1-year.

TABLE 2. YIELD OF SEED PER ACRE PRODUCED BY TWO VETCH VARIETIES

Location	Yield of seed per acre	
	Warrior	Hairy
	Lb.	*Lb.*
Alexandria[1]	558	387
Auburn[2]	1,009	195
Tallassee[3]	1,139	403
Prattville[4]	1,432	504

[1] Northern Alabama, 3-year average.
[2] Central Alabama, 2-year average.
[3] Central Alabama, 1-year.
[4] Central Alabama, 2-year average.

[1] Authors acknowledge the cooperation and assistance of Fred T. Glaze, F. E. Bertram, and J. W. Langford, superintendents of the Alexandria and Prattville Experiment Fields, and the Plant Breeding Unit, Tallassee, respectively.

[2] Resigned.

FARMERS *and* FERTILIZER DEALERS

J. H. YEAGER, *Agricultural Economist*

YOUR FERTILIZER dealer can provide valuable services. A dealer who keeps up to date on newest fertilizers and latest fertility research information can be of real service to his customers. On the other hand, taking the advice of a dealer who is behind times can be costly.

Importance of the fertilizer dealer as a link in the flow of research facts to farmers was pointed up by a recent study.[1] Fertilizer dealers were most frequently mentioned by farmers interviewed as a source of information about new fertilizers. Thus, the dealer who keeps abreast of changes can give helpful suggestions about kind and amount of fertilizer to use, soil testing, and other cultural practices.

To better understand the influence of fertilizer dealers, information from 41 dealers in 24 Alabama counties was obtained in 1958. This study was in cooperation with the Tennessee Valley Authority.

Fertilizers Sold

During the year ending June 30, 1960, more than 1 million tons of mixed grades and fertilizer materials were sold in Alabama. This included more than 45 different grades or kinds. Total tons sold per dealer ranged from 42 to 4,515, with the average being 1,118 tons.

What fertilizers a dealer handles depends largely on farmer demand. All dealers reported sales of 4-12-12 and more than 90% sold 4-10-7, ammonium nitrate, and nitrate of soda. Some 20% of total sales were of 4-10-7, a grade that is no longer recommended. It does not supply the right proportion of plant nutrients needed in most cases and normally costs more per pound of plant food than higher analysis fertilizers like 4-12-12.

[1] Auburn University Agricultural Experiment Station Bulletin 320, "Fertilizer Use and Practices by Alabama Farmers."

Number of grades and kinds of fertilizers sold by dealers ranged from 4 to 15, with the average being 9 grades. Almost two-thirds of the dealers sold less than 10 grades or kinds of fertilizer. Only 27% reported sale of limestone for agricultural purposes.

Spring sales (January-June) accounted for 97% of all N sold, as compared with 84% of the P_2O_5 and 85% of K_2O. Almost all dealers reported sales of the three primary plant nutrients in the spring, but many did not sell N and, in some cases, P_2O_5 nor K_2O in the fall.

Bulk delivery and spreading of fertilizers were offered by 5 of the 41 dealers. They offered bulk delivery of almost any grade of fertilizer handled. Generally, the cost of bulk fertilizer delivered to farmers was the same as the cost in paper bags.

Purchases by Farmers

The number of farmers who bought fertilizer from dealers ranged from 10 to 1,000 per dealer. The average was 183. Farmers averaged buying slightly over 6 tons of fertilizer. Those who purchased from dealers with a large volume of sales bought the most fertilizer per farmer. These dealers also had more customers and handled more grades or kinds of fertilizers. Farmers who bought from dealers with a large volume of sales traveled farther to purchase fertilizer than did farmers who bought from smaller-volume dealers.

Credit Sales

With increasing capital requirements for farming and seasonal demands for funds to purchase such items as fertilizer, it often becomes necessary to borrow. Fertilizer dealers were listed as second most important sources of credit for fertilizer purchases. Banks were named first and landlords third.

Farmers who bought from dealers extending credit purchased an average of 8.8 tons compared with 4.5 tons for farmers who bought from non-credit dealers. Dealers expressed the opinion that they must offer credit to attract and keep customers; yet dealers offering credit averaged fewer customers than those selling only for cash.

The reported average annual rate of interest charged on credit sales was 7.4% in 1957. This rate of interest was applied to the loan as a flat rate regardless of time by almost three-fourths of dealers extending credit. The remaining dealers charged interest only for the time the loan was outstanding. In most cases a crop note or a personal note was signed as security. Loans were outstanding 6.4 months, as an average.

Almost three out of four dealers suggested to farmers that they have soil tested to better determine fertilizer needs. A majority of dealers also reported that they made suggestions or recommendations as to kind or grade and amount of fertilizer to use.

Information gained in the study points out that fertilizer dealers play an important role in financing fertilizer purchases and supplying information about fertilizers.

Small Units Do Big Job— BREWTON and MONROEVILLE EXPERIMENT FIELDS

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

A LEGISLATIVE ACT of 1927 has been of untold value to farmers of southwestern Alabama. That was the year funds for operating several experiment fields were appropriated by the Alabama legislature.

These fields were established to do research on crops grown in their particular area. Two of the experiment fields – Brewton and Monroeville – are located in southwestern Alabama. They were established on land donated by Escambia and Monroe counties.

The Brewton Field is located on Kalmia fine sandy loam, a gray, light-textured soil that occurs extensively in the Coastal Plains of Alabama. This soil is low in fertility but productive when properly fertilized. It occurs on stream terraces and is level to gently rolling.

The Monroeville Experiment Field is on Magnolia fine sandy loam. This is a brownish-red soil that occurs extensively in the Coastal Plains of southwestern Alabama. It is usually level and well suited to row crop production.

J. W. Richardson has been superintendent of both fields for over 30 years.

Early Research

Agriculture in southwestern Alabama is primarily cotton and corn production. Therefore, experiments were conducted to determine best methods of fertilizing and managing these crops. Without fertilizer, soils of the area would produce only about 10 bu. of corn and 300 lb. of seed cotton per acre.

These soils have been among the most responsive in the State to proper fertilization and, when properly fertilized and managed, have produced yields that compare favorably to any area of Alabama. Large yield increases were obtained from nitrogen, phosphorus, potash, and lime. The Kalmia soil at Brewton has been more responsive to potash than soils of any of the experiment stations. Severe potash deficiency has been found on several crops at this location when potash was not applied.

High Yields Possible

An experiment was established in 1955 at both locations to determine maximum yields of cotton, corn, oats, and soybeans that could be produced without irrigation. Good management and high rates of fertilization are used on the crops in 4-year rotations that include vetch for green manure.

At Brewton, outstanding corn and cotton yields have been produced in this experiment. The 6-year average (1955-60) corn yield has been 104 bu. per acre. The maximum produced was 123 bu. in 1956. In only 1 year has the yield been below 100 bu. These have been the highest yields at any experiment station in the State.

Average cotton yield for the 6 years was 2,136 lb. of seed cotton (1⅔ bales) per acre. The highest was 2.4 bales in 1958. Soybeans have averaged 30 bu. per acre for the period. Each crop of vetch has produced enough green weight to supply an average of 150 lb. of nitrogen. In addition, commercial nitrogen has been used.

On the Monroeville Field, corn suffered from dry weather several years

Crop response to fertilizer and lime is shown by the photos. Vetch field at left is at the Monroeville Field. No fertilizer was applied in foreground, whereas other plots were fertilized with lime, phosphorus, and potash. The grain sorghum (right) at the Brewton Field shows growth response to lime. Lime was applied at left, but plot at right got none.

Left—aerial view of the Brewton Field shows how research plots are arranged. Center—alfalfa at Brewton Field is observed by many visitors every year. Right—this corn plant at the Monroeville Field shows typical symptoms of zinc deficiency.

during the test. The maximum yield was 87 bu. per acre in 1958 and it averaged 67 bu. for the 6-year period. Cotton yields have been about the same as those at the Brewton Field, with an average of 1⅔ bales per acre and a maximum yield of 2.56 bales in 1958. Soybeans have averaged 20 bu. per acre at Monroeville but have suffered from dry weather during several years of the test. The yield in 1960 was 36 bu.

Soybeans for hay produced about 1⅔ tons when planted following oats combined for grain.

Yields in other experiments at both locations have been slightly less than in the maximum yield test, but have been as good or better than production in similar tests at other State locations. These yields show that the production potential in these areas is much higher than present farm yields.

One of the principal types of research has been testing new crops and varieties for adaptability. If found adapted, they are then recommended for farm use. Examples of crops currently being recommended based on such results are Coastal Bermuda, Pensacola bahia, Dallisgrass, Starr and Gahi millet, reseeding crimson clover, Warrior and Woolypod vetch, alfalfa, sericea, and grain sorghum.

To determine best varieties available to southern Alabama farmers, tests have been conducted with cotton, corn, and small grains for many years. The Experiment Station publishes results of these tests each year. In recent years as agriculture shifted toward more livestock production, much research has been done to determine the best forage crops for production of hay and grazing for cattle and hogs.

Other Research

Experiments on the fields have shown that cotton and corn should be planted in early April in this area. September or early October proved best for planting winter grass and legumes. Excellent growth has been produced when these crops were planted at the proper time.

Experiments with commercial nitrogen have shown that 1 lb. of N will produce 15 lb. of seed cotton or ½ bu. of corn when applied at recommended rates. Sources of nitrogen and phosphorus have been thoroughly tested.

Fertilizer placement experiments have shown that some of the nitrogen applied should be sidedressed for most efficient production. Phosphate and potash fertilizer should be placed in the row at planting for row crops. Broadcasting phosphorus and potash results in efficiency loss in most cases.

Studies on rates and kinds of lime have shown increased yields of cotton, grain sorghum, and winter and summer legumes from use of lime.

In addition to studies with nitrogen, phosphorus, potash, and lime, much research has been done with minor and secondary elements. Sandy soils on these Fields are among the most likely in Alabama to need these nutrients. Results on these soils show that (1) zinc is needed for corn, especially when lime has been applied; (2) borax is needed for alfalfa and crimson and white clover for seed production; (3) sulfur should be included in the fertilizer for cotton, corn, and other crops; and (4) magnesium is deficient for cotton on the Kalmia soil on the Brewton Field and should be applied either in dolomitic limestone or in the fertilizer. In no other cases have minor elements been found needed by agronomic crops, although experiments have been conducted using manganese, molybdenum, copper, and other minor elements.

Over 25 years of research has been done with sugar cane to determine best varieties and management practices for producing syrup. New varieties have been found that are resistant to mosiac, red rot, and other diseases. These produce high yields of syrup and good stubble crops for at least 2 years.

Over 600 gal. of syrup per acre per year have been produced with C. P. 29/116 sugar cane for the past 10 years. Annual cane yields were more than 30 tons per acre. Fall planting has been better than spring planting. This work has been done in cooperation with the U.S. Sugar Crops Field Station, USDA Agricultural Research Service, Meridian, Mississippi.

Hog Production

Most of the corn produced in southwestern Alabama is marketed by feeding to hogs. Management units were established at the Brewton and Monroeville Fields to determine costs and returns of producing corn and marketing it through hogs. During the 8-year period, 1948-55, at Brewton, an average of 55 bu. of corn was produced on 19 acres. When sold through hogs, the return to capital, labor, machinery, and management was $47 per acre.

A 36-acre unit at Monroeville that included 7 acres of cotton, 22 acres of corn, and 7 acres of kudzu and temporary winter grazing for hogs returned $75 per acre to capital, labor, and management.

These management units have demonstrated that production practices determined by research can be used to produce cotton and hogs profitably in southwestern Alabama.

IRRIGATION—*a key to successful* POTATO PRODUCTION

SAM T. JONES, *Associate Horticulturist*

IRRIGATION, timed properly and in the right amounts, can mean the difference in success and failure with potatoes, a crop of high per acre value.

The potato is grown in southern Alabama at a time of the year when rainfall is generally adequate. However, as production has increased in northern Alabama the high requirement for water becomes more apparent. Irrigation is quite profitable in drought years, and without it even short periods of drought can be detrimental.

Research Conducted

Research was recently conducted at the Auburn Agricultural Experiment Station to determine the response of potatoes to various soil moisture levels and amount and frequency of irrigation required to maintain these levels. In addition effects of various drought periods at different stages of growth were investigated.

Potatoes were irrigated when available soil moisture fell to 80, 60, 40, and 20% of the total available moisture capacity. The soil was a Norfolk sandy loam, with a total available moisture holding capacity of 1.2 in. per ft. of depth.

Yields Increased

Average yields of U.S. No. 1 Grade, A size potatoes are given in Figure 1. Irrigating at 80% available moisture gave higher yields than irrigating at 60% available moisture. The 60% level also produced higher yields than the 40% level. Although irrigating at the highest level gave the highest yield of potatoes, it does not necessarily follow that maintaining 80% available moisture or higher would be the most economical practice. Irrigating at 80% available moisture required an average slightly above 14 irrigations for the 9-week period from plant emergence to harvest, whereas irrigating at the 60% level required an average slightly above 6 irrigations. All rainfall was excluded from the plots.

The most profitable moisture level at which to irrigate potatoes is influenced by many factors. The range is between the 80 and 60% levels. It is significant, however, that potatoes respond to increases in soil moisture up to the 80% level.

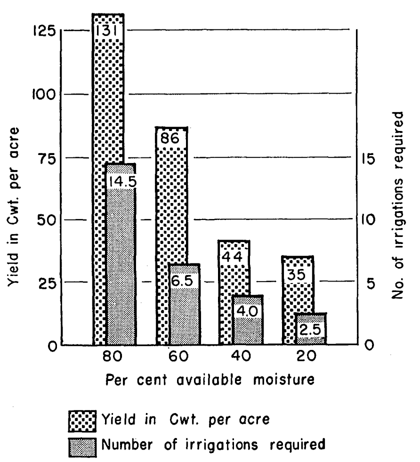


Figure 1. Yields of potatoes from different number of irrigations at various available moisture levels are shown in the chart above.

Frequency of Irrigation

The frequency of irrigation or rainfall required to maintain soil moisture above the 80 and 60% levels is given in Figure 2. During the first 15 days after plant emergence (April), the average number of days between irrigations was nearly 8 for the 80% level and 15 for the 60% levels. During the next 23 days the numbers were about 4 and 7, respectively, and during the last 22 days before harvest 3 and 6, respectively. During the total 60-day period between emergence of potato plants and harvest, average number of days between irrigations was 4.1 for the 80% level and 8.5 for 60% level.

Average daily evapotranspiration losses in inches of water per day is also given in Figure 2. Evapotranspiration rates were slightly higher for the 80% moisture level than for 60% level.

Stage of growth had greatest influence on evapotranspiration rate. Water loss was .04 in. per day during first 15 days after plant emergence; .11 in. per day during the next 23 days and .13 in. per day during the last 22 days before harvest for the 80% level. Calculated maximum potential evapotranspiration was .13 and .16 in. per day during the first and second halves of the 60-day period. (Station Bulletin 316, Agricultural Drought in Alabama.)

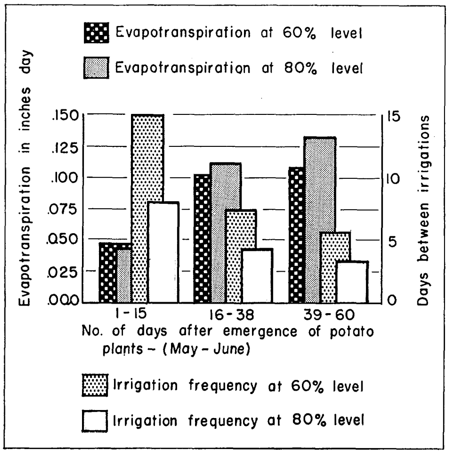


Figure 2. Frequency of irrigation and evapotranspiration rates at different moisture levels are shown in the above chart.

Since rainfall was excluded from these plots, drought could be imposed by withholding irrigation water. The table shows drought results of different durations being imposed at different crop growth stages. Withholding water for 2 weeks during early stages of growth did not reduce yield below that of plots irrigated at the 80% level. However, withholding water for 2 weeks during midseason or later resulted in a yield of only 60% of that produced by drought-free plots. Droughts of 4 weeks duration reduced yield by approximately 35% if it occurred early in the growth period and was more detrimental if it occurred later. Six-week droughts resulted in drastic yield reductions of about 84%.

EFFECT OF IMPOSED DROUGHTS ON YIELD OF NO. 1 GRADE, A SIZE POTATOES

Time of drought	Length of drought, weeks		
	2	4	6
	Cwt./a.	*Cwt./a.*	*Cwt./a.*
Early	132	85	23
Midseason	82	33	21
Late	70	31	19

ABOUT A MILLION acres of cotton and 2 million acres of corn will be planted this year in Alabama. Without fertilizer, these crops could be expected to produce an average of no more than ⅓ bale of cotton and 15 bu. of corn per acre. If properly fertilized and weather is good, an average yield of 1¼ bales of cotton and 50 bu. of corn or more may be expected. Knowing how to fertilize is one of the keys to reaching these production goals.

This is cotton and corn in a 2-year rotation at the Monroeville Experiment Field. Corn is planted following vetch.

Fertilizing COTTON-CORN ROTATIONS

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

Much Research

The Auburn Agricultural Experiment Station has conducted many experiments in all sections of the State to determine the best way to fertilize cotton and corn. These experiments have shown that both crops produce higher yields when grown in rotation than when one crop is grown year after year on the same field. A 2-year rotation of cotton, vetch, and corn has proved to be one of the best cropping systems. Commercial nitrogen becoming available at economical prices has reduced the advantage from using winter legumes, but has in no way decreased their effectiveness.

Experiments with many different grades and rates of fertilizers for both cotton and corn were started on the substations and experiment fields in 1930. Yield increases were produced from use of nitrogen, phosphorus, and potash at all locations from the beginning of the experiments. A response to lime was obtained only where soil pH and calcium supply were low.

One of the best of these experiments has been in progress at six locations since 1930. As information was accumulated, this experiment was revised to test higher rates of fertilizer. It tests rates of nitrogen, phosphorus, potash, and lime on cotton, vetch, and corn in a 2-year rotation. Some of the data for 1959 and 1960 are presented in the table.

Cotton and Corn Needs

Based on data from these experiments and many others, reliable recommendations can be made for fertilizing cotton. All experiments have revealed a need for nitrogen – about 60 to 70 lb. N per acre on most soils. Recent tests at the Sand Mountain Substation and the Brewton and Monroeville Experiment Fields have produced responses to as much as 90 lb. of N.

All soils have also shown a need for phosphorus for cotton. In most cases 60 lb. of P_2O_5 per acre is sufficient. Soils have varied widely in their response to potash. Sandy soils, such as are found on the Sand Mountain and Wiregrass Substations and the Brewton, Monroeville, and Prattville Experiment Fields, have produced large responses to potash. Heavier soils, such as on the Tennessee Valley Substation, have responded less to potash. Response to lime has varied considerably between locations.

Corn has shown a need for more nitrogen and less phosphorus, potash, and lime than cotton in all of the experiments. Corn not following a winter legume should receive 90 lb. of N for best production on most soils. Thirty pounds each of P_2O_5 and K_2O have been sufficient for corn when grown in rotation with well-fertilized cotton.

RESPONSE OF COTTON AND CORN TO FERTILIZATION AT SIX LOCATIONS, 1959-60

Fertilizer applied	Per acre yield *increase* at each location						
	Brewton	Monroe-ville	Pratt-ville	Sand Mountain	Tenn. Valley	Wire-grass	Average
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Cotton (seed cotton)							
First 60 lb. N	246	287	770	551	270	586	452
First 60 lb. P_2O_5	264	147	57	467	190	56	197
First 60 lb. K_2O	791	823	910	2,194	188	411	886
Lime	328	615	42	190	0	0	196
Total yield from 60 N, P_2O_5, and K_2O + lime	1,870	2,267	1,802	2,810	2,618	1,840	2,201
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Corn following vetch							
First 60 lb. N	11.5	0	3.2	0	0	0	2.5
First 60 lb. P_2O_5	7.3	5.2	5.2	6.5	1.6	5.4	5.2
First 60 lb. K_2O	14.4	1.0	0	23.4	8.2	20.3	11.2
Lime	11.5	0	1.1	.7	0	5.1	3.1
Total yield from 60 N, P_2O_5, and K_2O + lime	104.3	59.1	56.2	46.9	55.2	56.1	63.0

Use of Legumes

Using winter legumes, such as vetch or crimson clover, ahead of corn in a cotton-corn rotation reduces the requirement for commercial nitrogen. Winter legumes should be fertilized with phosphorus and potash in the fall – an average of about 300 lb. of 0-14-14 is needed. If the legume is fertilized and good growth is turned under, corn following needs no fertilizer. Effect of the legumes is evident the following year on cotton, but does not eliminate the need for nitrogen fertilizer.

Response to fertilizer has varied widely between locations in the many experiments. This emphasizes the importance of soil testing, since a reliable analysis is the only practical way to predict the best fertilizer for a particular field.

Alabama's CLEAN WOOL CROP *sells below par*

E. L. WIGGINS,
Associate Animal Breeder

ALABAMA WOOL growers produce an unusually high quality product but do not receive full value from its sale! The reason— small volume.

Wools produced in Alabama are unusually high in clean yield. This makes them worth more than lower yielding wools produced in other section of the country.

Wool Quality

Wool as it comes from the sheep is called grease wool. Before it can be used by the manufacturer the dirt and sand, yolk (mostly lanolin), suint (sweat salts), and other foreign materials must be removed by a process called scouring. Although some of these foreign materials (lanolin, for example) may have some value, the wool manufacturer is chiefly interested in the amount of clean wool that remains after scouring. Therefore, fleeces that yield a high percentage of clean wool should sell for more than wool of a lower quality.

Determining Sale Price

In the Western States, the sale is often made on a "clean" basis. In this case the yield of clean wool is determined by actually scouring a representative sample. In the Southeast, however, individual wool clips are small and wool is more variable in grade and length both within flocks and between flocks. Therefore, it is usually not feasible to make clean yield determinations and most wool is sold on a grease basis.

In this case the buyer's offer is based on his estimate of the clean wool a particular lot will yield after scouring. Since yield is very difficult to estimate by eye alone, his estimate may or may not be accurate. If a group of buyers all underestimate the yield of clean wool in a particular lot, the producer will not receive as much as he should for his wool even though it is sold on a competitive bid basis. If the yields of Alabama wools differ from those of wools produced in other sections of the country, then prices paid in those sections do not offer a suitable yardstick for the prices offered for Alabama wools.

Wool Grade Study

Before shearing time in 1958 samples of wool were taken from 300 sheep owned by the Auburn Agricultural Experiment Station System. The breeds and location of these sheep are given in Table 1. The samples were sent to the Sheep, Goat, and Fiber Section, USDA Agricultural Research Service, Beltsville, Maryland, for individual clean yield determinations.

It can be seen in Table 2 that the yields of the various grades of Alabama wools were considerably above the national average. The fine wools yielded about 17% more clean wool, the half-blood wools yielded about 15% more, and the medium wools about 10% more. In view of the range in ages of the sheep sampled and the fact that they were at a number of locations in the State, the clean wool yields obtained in this study should be representative of Alabama wools. These results indicate that Alabama wools are unusually high in clean yield. The small volume of wool produced at present makes it difficult for Alabama producers to sell for its true value. Alabama wool producers should strive to produce a larger, more uniform wool clip. As this goal is attained, it will be possible to sell wool on a "clean" basis and obtain a higher price.

TABLE 2. CLEAN YIELDS OF ALABAMA WOOLS

Wool type	Samples	Av. yield	National yield[1]
	No.	*Pct.*	*Av.*
Fine	193	57.38	40
Half-blood	52	60.57	45
Medium	55	63.06	53

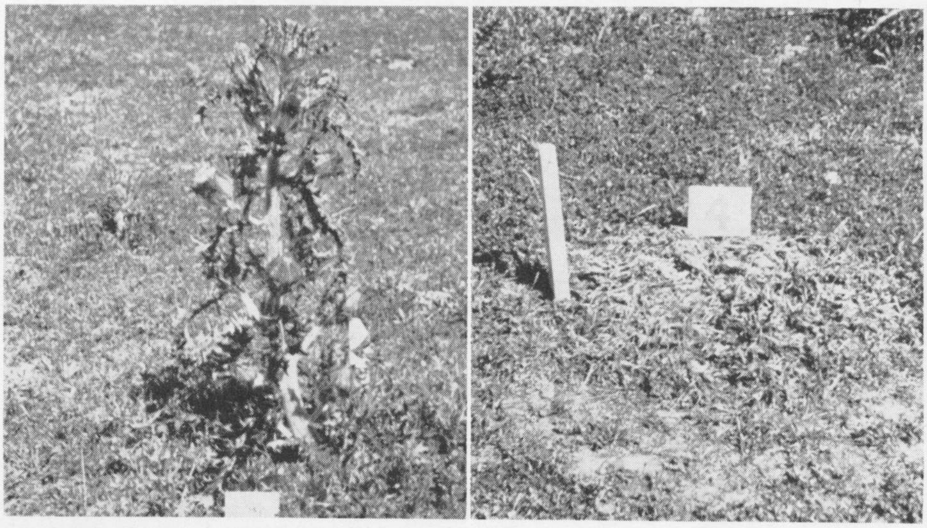
[1] The mid-point of the ranges in yields of domestic wools as given in *The Domestic Wool Clip*, USDA Production and Marketing Administration 1951, pp. 7 and 8.

TABLE 1. BREEDS, AGES, AND LOCATIONS OF SHEEP USED IN CLEAN YIELD DETERMINATIONS

Location	Number of ewes	Breed	Age of ewe	Wool grade
Auburn	22	Medium Wool x Rambouillet	1	half-blood
	101	Rambouillet	2	fine
	52	Rambouillet	3	fine
	10	Dorset	4	medium
Lower Coastal Plain Substation	15	Columbia x Rambouillet	4	half-blood
	15	Hampshire	4	medium
	25	Rambouillet	3	fine
Tennessee Valley Substation	15	Dorset x Merino	4	half-blood
	15	Dorset	4	medium
Piedmont Substation	15	Suffolk x Rambouillet	5	medium
	15	Rambouillet	5	fine

The THISTLE—
No. 1 pasture weed?

DONALD E. DAVIS, *Botanist*



A comparison of untreated and treated thistle is shown above. Left is a healthy plant and right is one treated with 2,4-D.

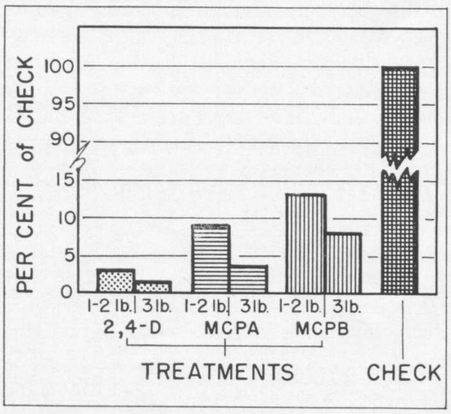
THE PRICKLY, bristly thistle may not be the No. 1 pasture weed in Alabama but it certainly ranks in the top 10.

This thistle, *Cirsium horridulum*, occurs throughout the State. Besides being very prickly, it has many other characteristics that make it an important pasture pest. In Alabama the bristly thistle is a perennial and each plant produces hundreds of seed that may be carried miles by wind and may germinate most every month of the year.

Furthermore, if you chop a large thistle down an average of 4 new plants replace the original. Populations in excess of 15,000 plants per acre have been observed in Alabama. Research on this weed was started in 1956 on William P. Orr's farm in Bullock County and at the Auburn Agricultural Experiment Station.

Chemicals Tested

The following chemicals or mixtures have been tested: dalapon, amitrole, dalapon plus amitrole, 2,4-D amine salts, 2,4-D esters, MCPA, 4-(MCPB), and PBA. The tests included studies of times and rates of application. All chemicals except the 2,4-D's, 4-(MCPB), and MCPA were eventually dropped from tests because they gave unsatisfactory control or because they were too expensive at rates necessary for control. Results of these tests are given in the chart.



Results of applications using various chemicals at different rates to thistle are given in the chart as percentages of weeds left after treatments.

The values from 1- and 2-lb. rates and from 2,4-D amine salts and esters have been combined in presenting the data, since there was little difference in these rates and formulations. MCPA, 4-(MCPB), and the 2,4-D's all gave good control. The 3-lb. rates of chemicals further tested were slightly better than the 1- and 2-lb. rates. The 2,4-D's appeared more effective than MCPA and MCPA better than 4-(MCPB). These three chemicals completely prevented seed production for the year in which they were applied, since the only living thistles remaining in treated plots were too small to flower. The photograph shows a typical untreated thistle and one spot-treated with 2,4-D.

Results of Spray Applications

Results of tests to determine time and number of spray applications per year were variable, but a single application in March gave good results. Difference in results primarily came from variation in seed germination from year to year. Most plants found in plots 2 or 3 months after treatment could have germinated after treatment or been missed by the spray application. In view of this uncertainty, plots were established to study thistle seed germination.

Germination Studied

Six plots were established and at approximately monthly intervals all thistles in plots were counted, dug, and removed. The study, from January 1957 through 1960, showed that thistle seed germination was very irregular. The peak germination occurred during January and February and averaged over 5,000 seedlings per acre for the 2-month period. The second highest germination was in March and April.

Thistle seed germinated in every 2-month period, but in only 1 year out of 3 was germination observed in July and August. It was also observed that new sprouts formed from roots of old thistle plants even though they had been cut off well below the crown. Experiments were begun to study this regrowth.

Large thistles were cut off approximately 2 in. below the soil surface. Approximately every 1½ months the thistles were observed and any new sprouts removed. This was continued until all resprouting ceased. Nearly 100% of the thistles regrew after the first cutting and averaged 4 new thistles for each 1 cut off. The second cutting reduced the number resprouting to about 50% and 4 cuttings eliminated all thistles.

Results indicated that repeated cutting will kill thistles but it is not a practical approach to the problem. Chemicals offer a cheap and effective method of control. The chemical, 2,4-D, at the 3-lb. rate will kill many important pasture legumes, however 4-(MCPB) has been reported less toxic to white clover and certain other legumes than either the 2,4-D's or MCPA.

SUMMER PASTURES for Grazing Steers

R. M. PATTERSON, *Assoc. Agronomist*

W. B. ANTHONY, *Animal Nutritionist*

V. L. BROWN, *Supt., Lower Coastal Plain Substation*

Sometimes it's a little hard to see the silver lining that every cloud is supposed to have. At other times the lining is noticed, but the surrounding black cloud is overlooked. A good evaluation requires consideration of both cloud and lining.

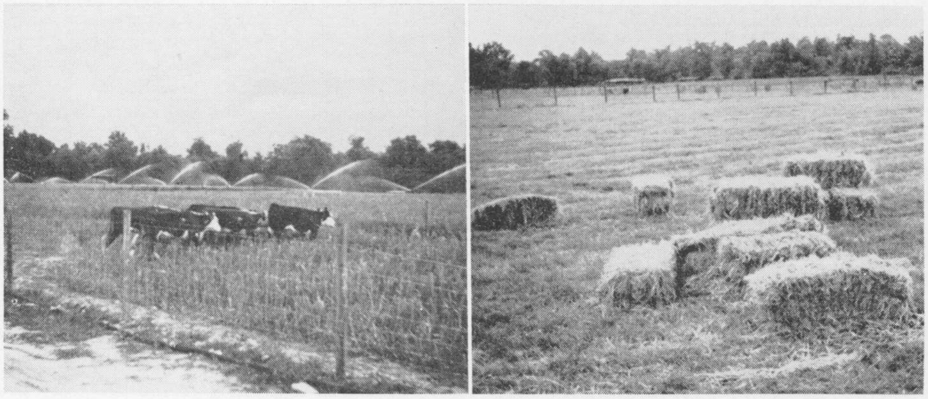
Such is the case with using summer permanent pastures for grazing yearling steers in Alabama. The abundance of forage produced by these crops provides the silver lining, but low individual animal gains produced make the dark cloud. This problem points up the need for better summer grasses and better ways to use such crops for producing steers. This is the aim of continuing research by the Auburn Agricultural Experiment Station.

Forage Systems Studied

Four forage systems for grazing steers have been studied at the Lower Coastal Plain Substation since 1957, with and without irrigation. Forage mixtures were: (1) Coastal Bermudagrass with sod-seeded rye and crimson clover, (2) Dallisgrass-white clover with sod-seeded rye, (3) sweet sudangrass followed by oats-crimson clover, and (4) pearl millet followed by rye-ryegrass-crimson clover. Results from the winter grazing crops were reported in the fall 1959 issue of *Highlights.*

The summer annual crops, millet and sudan, were seeded each year in May. Lime was applied according to soil test and 500 lb. of 0-14-14 per acre was applied before planting. The same kind and amount of fertilizer was applied to the Coastal and Dallis-white clover pastures. Nitrogen (50 lb. N per acre) was applied to millet and sudan as soon as stands were up and again about 6 weeks later. Coastal was fertilized twice at the rate of 80 lb. of N. No nitrogen was applied to the Dallisgrass-white clover. Half of the pastures were irrigated three times in summer of 1958 and 1960 and twice in 1959.

Animal performance and forage production were measured every 28 days on four 2-acre pastures of each summer crop. Yearling steers of good beef breeding were grazed when forage was adequate. When not on test during summer, the steers were on Dallisgrass permanent pasture.



Left: Steers on test Sudan plot in foreground graze while pasture in background is being irrigated with 1½ in. of water during dry period. Right: In addition to grazing, Coastal test pastures provided 1¼ tons of hay per acre in 1959 and 1960.

Results

Data in the table are averages for 3 years, 1958-60, of two paddocks of each pasture crop, irrigated and nonirrigated.

Of the crops tested, pearl millet was the most responsive to irrigation. Irrigation increased carrying capacity of this crop a little more than one-half steer per acre, forage dry matter production by nearly a ton, and live-weight gain by 82 lb. per acre. Carrying capacity and forage and beef production of the Dallisgrass-white clover pastures were similar with and without irrigation. However, more white clover grew over a longer period on the irrigated pastures. Yield response of Coastal and sudangrass to irrigation was negligible during the 3 years.

As would be expected, there was year-to-year variation in response to irrigation. Live-weight gains per acre from irrigated millet were 262, 241, and 378 lb. in 1958, 1959, and 1960; comparable gains from the nonirrigated pastures were 155, 248, and 234 lb.

Gains per animal were improved by irrigation only on sudangrass. Daily gain per steer on sudan for the 1957-59 grazing seasons averaged 1.14 lb. without irrigation and 1.42 lb. when irrigated. Average daily gains per steer for millet were a little more than 1 lb. per day and about ¾ lb. daily on Coastal Bermuda and Dallisgrass pastures.

Without irrigation, Coastal was the most productive of the four summer pastures. In addition to grazing, this crop produced an average of nearly 2,500 lb. of hay in the 1959 and 1960 seasons.

Rainfall was usually adequate for growth during the experiment, although there were short drought periods. Results from this experiment indicate that irrigation is not economically sound in a steer grazing program. These results further showed that millet and sudangrass were not greatly superior to permanent pastures. Because of this and the additional expense of establishing summer annuals, they are not recommended as a regular part of a steer grazing program.

Production of Irrigated and Nonirrigated Pastures for Beef Cattle

Summer pasture	Dry forage yield per acre		Av. daily stocking steers/acre[1]		Beef gain per acre	
	Not irrig.	Irrig.	Not irrig.	Irrig.	Not irrig.	Irrig.
	Lb.	*Lb.*	*No.*	*No.*	*Lb.*	*Lb.*
Coastal Bermudagrass	9,842	10,984	2.36	2.60	261	279
Dallisgrass-white clover	4,646	4,268	1.23	1.26	168	172
Sudangrass	4,304	4,706	1.78	1.75	153	182
Pearl millet	6 615	8,448	2.19	2.74	212	294

[1] Season average for yearling steers.

Index to Articles Published in

HIGHLIGHTS *of* Agricultural Research

1960

For the convenience of Highlights of Agricultural Research readers, articles published in the quarterly during 1960, Volume 7, are listed below according to subject. Complete indexes of the 6 previous years of publication are listed in the spring editions of 1959 and 1960 (No. 1 issues of Volumes 6 and 7. Extra copies of all 1960 issues are available to readers who are missing copies and wish to complete their 1960 file of the research quarterly. Write Editor, Auburn University Agricultural Experiment Station, Auburn, Ala., for needed copies.

WHERE DOES OUR PORK GO?

D. A. LINTON, and M. J. DANNER
Department of Agricultural Economics

FOUR OUT OF EVERY 10 Alabama-produced hogs going to market are bought by large slaughter plants within the State, which represent our principal market.

Here's where our porkers went during the 12-month period ending September 1960: Based on live weight, federally inspected packers bought 42% of the hogs sold at auctions and buying stations; wholesale packers, not federally inspected, purchased 28%; local packers, 9%; and butchers, 1%. Farmers bought 5% and probably more than half of the remaining 15% went to buyers representing or buying for meat processors.

More than two-thirds of the hogs purchased remained in Alabama for processing. Hogs shipped out of state principally went to Georgia, Tennessee, and Florida. Less than 1% was shipped out of the southern region. The majority of pork moving out of state was sold directly to retail outlets in the form of such conventional cuts as ham, loins, bacon, and shoulders. No important amount was shipped as whole carcasses.

Marketing Study

The foregoing information was disclosed by a current study of the Auburn Agricultural Experiment Station. Its purpose is to determine the origin and where hogs go when sold through Alabama market outlets and slaughtered in the State's processing plants.

There are four federally inspected plants processing pork in Alabama. These are the only plants that can legally ship pork out of the State. In a recent survey, these plants shipped 30% of their processed pork out of Alabama. The remaining 70% was sold to other packers, chain stores, and small retail outlets within the State.

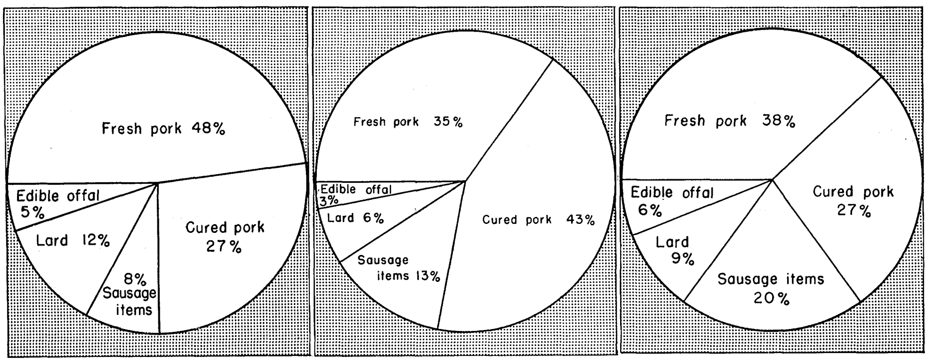
Federally inspected wholesale packers sold 48% of their slaughter in the form of fresh pork, 27% as cured, 5% as edible offal (liver, tongue, and similar items), 8% as sausage and variety meats, and remaining 12% as lard, see figure. This group shipped 38% of their fresh pork out of state, 18% of their cured pork, 15% of their sausage and variety meats, 39% of their lard, and 28% of their edible offal.

From a group of wholesale and small packers not federally inspected, principal differences in processed pork output were noted. These latter pork packers, for example, processed proportionately less as fresh pork, made more sausage, and had less lard than did the larger federally inspected packers, see figure. One-fifth of the output of smaller, local packers was in the form of sausage, whereas sausage production of federally inspected plants amounted to only 8%.

Most of the plants included in this study were concerned mainly with pork slaughter. Their primary interest is to increase the sale of pork and pork products. Among many of these plants, lard made up a smaller percentage of the total output, for which there may be several reasons. It is possible that one of the reasons is in the closeness of trim of fresh and cured cuts. Obviously a closer trim would result in a larger amount of fat and lard.

Summary

In recent years, consumption of pork per person has declined. If this trend is to be reversed, a pork product acceptable to consumers is a necessity. Most consumers desire pork with less fat. Closer trimming would result in a larger amount of a low-valued product, lard, and the need for locating a market outlet for such a product. This is a serious problem that Alabama hog producers can help meat processors solve by greater care in production programs. To this end, Station animal scientists drawing on results of Auburn breeding research have stressed production of meat-type hogs – more meat, less fat.



Make up of pork slaughtered by large, federally inspected wholesale packers (left); and by wholesale packers (center) and by smaller packers (right) not federally inspected.

FREE Bulletin or Report of Progress
AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
E. V. Smith, Director
Auburn, Alabama
Permit No. 1132—2/61-10M

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

NOT ON RT. 1

Returned to Writer

REASON CHECKED
Unclaimed..... Refused.
Unknown.........
Insufficient address.......
Moved, Left no address.....
No such office in state......
Do not remail in this envelope

HENDERSON HALL
ROUTE 2
SLOCOMB, ALABAMA