Highlights OF AGRICULTURAL RESEARCH

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all of Alabama

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AGRICULTURAL EXPERIMENT STATION SYSTEM
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HIGHLIGHTS of Agricultural Research

VOLUME 7, No. 2 SUMMER, 1960

In this issue . . .

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New and Timely PUBLICATIONS

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

Bul. 323. Marketing Poultry Meat in Alabama presents information on marketing practices of retail food stores in non-metropolitan areas of the State.

Bul. 324. Potassium Requirements of Crops on Alabama Soils summarizes results on all major Alabama soils and points up importance of this fertilizer element.

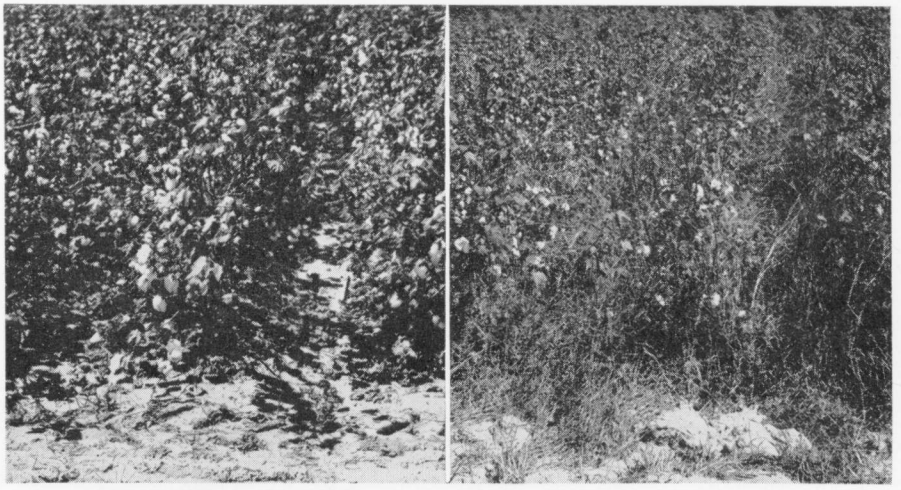
Bul. 325. Rod Closets for Southern Farm Homes gives specifications for closets that will supply adequate clothing storage space for all family members.

Bul. 326. Corn Earworm Control covers research on earworm control in sweet corn carried out at the Gulf Coast Substation and gives recommended spray program.

Prog. Rept. 78. Sorghum Grass and Perennial Sweet Sorgrass in Alabama is a report of results from 2 years of testing of these summer forages.

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

Lay-by CHEMICAL WEED CONTROL *in cotton*



The above photos show treatment versus no treatment: Left—cotton laid-by June 29 and treated with 1 lb. of diuron per acre; picture made 92 days later; yield, 1,645 lb. seed cotton per acre. Right—cotton laid-by June 29 with no herbicide applied; picture made 92 days after lay-by; yield, 1,137 lb. seed cotton per acre.

V. S. SEARCY
Assistant Agronomist

A CHEMICAL applied after lay-by for control of late weeds in cotton is now a reality!

The development has been brought on by: (1) greater interest of cotton growers in controlling weeds after last cultivation, (2) larger number of mechanical pickers in use, (3) extended growing season resulting from use of high rates of fertilization, (4) better control of insects and diseases, and (5) irrigation.

For several years the Auburn Agricultural Experiment Station has recommended pre-emergence and early post-emergence chemical for weed control in the crop. In 1959 the Station began two experiments, one at its Tennessee Valley Substation and the other at its Plant Breeding Unit. The purpose was to find a suitable and effective lay-by herbicide.

Treatments

Diuron (Karmex DL or Karmex) and Simazine were each tested at the rates of 1 and 1½ lb. per acre. CIPC and Eptam each were used at rates of 3 and 6 lb. per acre. Eptam was used just before last cultivation, whereas all other materials were applied immediately after laying-by the crop.

These materials were applied broadcast with one wide-angle nozzle per row middle. The nozzle was set about 8 in. above the soil surface. The chemicals were applied to fully cover the soil between rows – from base of cotton plants in one row to base of those in the next row.

Overhead irrigation was applied within an hour after the herbicides were applied. The cotton was laid-by weed free.

Results

All compounds at all rates gave excellent control of weeds, with exception of 3 lb. of CIPC. The few weeds left in the treated plots were in most instances less than half the size of those in the untreated plots. Eptam was the only material that showed any visible injury to cotton, which was evident only at the Plant Breeding Unit.

Yield of seed cotton was as good or better than that of the untreated check, with exception of the high rate of Eptam at the Plant Breeding Unit. The highest yielding plots in both tests were treated with diuron at 1-lb. rate. Because of a nearby creek overflow, half of the experiment at the Tennessee Valley Substation was lost. Hence, yields from all treatments could not be compared. However, the 1-lb. diuron treatment resulted in 261 more lb. of seed cotton than the untreated plots. Plots at the Plant Breeding Unit getting the 1-lb. rate of diuron and both rates of Simazine yielded 432 to 508 more lb. of seed cotton than the check plots. The odds that these increases are real are 99 to 1.

Based on first year's results at two locations, diuron and Simazine are the best materials tested for post lay-by weed control when considering cost, effectiveness of control, and yield. For best results, such low soluble materials as diuron and Simazine must have some water, either rain or irrigation, within a few days after application. Moisture incorporates these chemicals in the top soil layer, making them active almost immediately. Since Simazine has not been tested widely on cotton, its use is not suggested at this time.

Whether it is safe to use furrow irrigation after applying the herbicides has not yet been determined.

Suggested Procedure

1. Lay-by cotton weed free.

2. Apply diuron at the rate of 1 lb. per acre at last cultivation.

3. Apply if possible overhead irrigation immediately after application of diuron.

4. Take time to learn how to apply the herbicide to get complete coverage of the soil with correct amount. This is necessary for good results.

5. Do not plant small grains, crimson clover, or vetch in the fall on areas receiving lay-by treatment. Poor stand or failure may result, since it is not known whether the herbicide will be out of the soil by fall planting time.

How good is COMMON BERMUDA?

C. S. HOVELAND and R. A. BURDETT
Department of Agronomy and Soils

ALL COMMON Bermudagrass isn't the same.

Recent research revealed wide variation in productivity, earliness, and growth habit of common Bermudas from different parts of Alabama. Plants of the same grass that exhibit such differences due to local adaptation over a long period are known as ecotypes.

In an older experiment at the Wiregress Substation, common Bermuda produced high forage yields. This raised the question of its superiority to that of other Bermudagrasses in the State.

During the spring of 1957 common Bermudagrasses were collected from 11 locations in Alabama. These grasses were planted at Auburn from sprigs and clipped monthly to obtain forage yields. Coastal Bermuda was included for comparison. The grasses were fertilized with 500 lb. per acre 0-10-20 and 240 lb. of nitrogen annually and irrigated when rainfall was inadequate.

Striking Yield Differences

Forage yield differences between these Bermudagrass ecotypes (strains) have been striking during the 3-year period. One of the highest yielding common Bermudas, collected near Prattville, averaged over 1 ton more of dry forage per acre than the least productive ecotype collected near Auburn. The Bermudas collected at Headland and Opp were highly productive.

Productive common Bermudas were not confined to the southern and central parts of the State. A high yielding Bermuda was found at Leighton in northwestern Alabama, whereas a much less productive ecotype came from Camden, over 200 miles south.

PERFORMANCE OF COMMON BERMUDAGRASS ECOTYPES AT AUBURN

Where collected	Dry forage produced per acre, average	
	By June 5 1958-59	Total annual 1957-59
	Tons	*Tons*
Opp	1.61	4.42
Prattville	1.65	4.40
Headland	1.45	3.90
Leighton	1.38	3.86
Camp Hill	1.59	3.82
Crossville	1.25	3.59
Tuskegee	1.17	3.41
Aliceville	0.85	3.25
Marion Junction	1.09	3.07
Camden	0.71	3.05
Auburn	0.91	2.29
Coastal Bermuda	*1.35*	*5.61*

The highest yielding Bermudas generally came from fields with well-drained soils. These soils generally warm up earlier in spring, thus favoring ecotypes that could begin growth early. Natural selection under particular drainage conditions over a long period is probably responsible for occurrence of plants with high yielding ability and early spring growth.

The ecotypes differed widely in forage production early in the season. The best Bermudas produced more than twice as much forage by June 5 as did several of the least productive ecotypes. Bermuda collected near Aliceville gave fair total production, but was very late in the spring. In general, the most productive Bermudas made earliest growth. Several of the best common Bermudas made more early season forage than did Coastal.

Growth Variation

Differences in growth habit were also evident. The plants from Prattville produced few seedheads while those from Camden and Auburn had an abundance of seedheads. Some ecotypes were tough and wiry, others were more leafy and tender.

Results in this study of a Bermuda ecotype at one location do not necessarily reflect productivity of all common Bermudagrass in that area. Instead, it points out that many ecotypes of common Bermuda exist in Alabama. Bermudagrass is a variable species and many types may be found in an area. If these ecotypes had been tested on a poorly-drained soil, performance might have been different.

None of the common Bermudagrasses equalled Coastal in total production. However, the leafiness, high production, and earliness of certain ecotypes suggest that selecting well adapted common Bermuda ecotypes may have merit.

In this limited study, productive, leafy, common Bermudas with early spring production were found. An expanded effort may turn up a reliable common Bermuda with desirable forage characteristics, disease resistance, and good seed production.

Common Bermudagrass collected at Camp Hill (left) gave much earlier production than did the ecotype from Camden (right).

These test plots at Auburn show differences in summer growth of common Bermuda selected at different State locations.

What time is best to IRRIGATE SWEETPOTATOES?

SAM T. JONES, *Associate Horticulturist*

Sweetpotatoes, a drought resistant crop, has the ability to yield well under fairly dry conditions.

However, increasing costs of production have made it necessary to seek ways to increase yields. With the advent of higher yielding varieties, higher fertilization rates, and closer spacing, the need for irrigation becomes apparent.

Irrigation Research

In 1957, research was begun at the Auburn Agricultural Experiment Station to determine the level of soil moisture at which sweetpotatoes should be irrigated. Sweetpotatoes were irrigated whenever the 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.

Average yields of U.S. No. 1 grade sweetpotatoes for 1957, 1958, and 1959 are given in Figure 1. Delaying irrigation until the available soil moisture fell to 20% gave as high a yield as irrigating at higher levels of soil moisture. There was no effect of moisture levels used on the production of jumbo grade sweetpotatoes or incidence of cracking.

Irrigating at 20% available moisture required only 6 irrigations for the entire season, while irrigating at 80% level required 21 irrigations. Rainfall was excluded from the plots under experiment. Total amount of water applied to the crop in each case was approximately 15 in. The number of irrigations required rather than the number of inches of water applied largely determines the cost of irrigation; therefore, irrigating at 20% available moisture would be more economical than irrigating at higher levels.

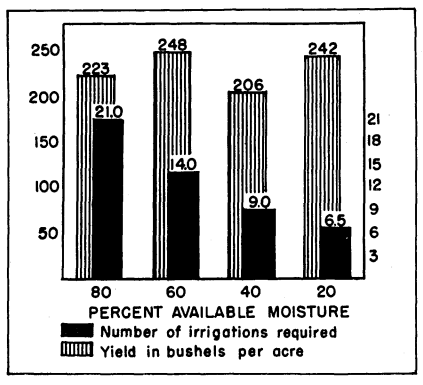


Fig. 1. Effect of irrigation at various soil moisture levels on yield of No. 1 sweetpotatoes and number of irrigations required is shown above.

The frequency of irrigation or rainfall required to maintain available soil moisture above the 20% level depends on weather conditions, size of plant, soil type, and depth of rooting. Weather conditions influence water loss by evaporation from the soil and transpiration from the crop. These combined losses are evapotranspiration.

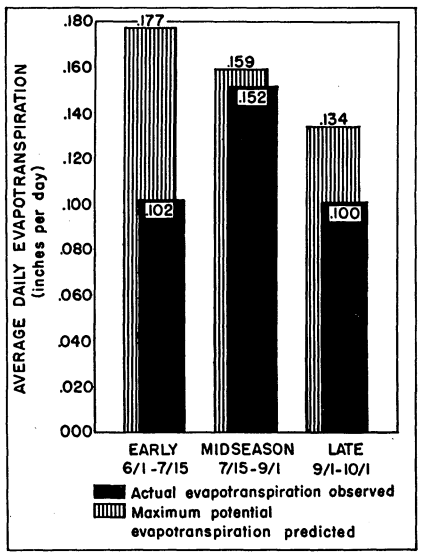


Fig. 2. A comparison is shown of maximum potential evapotranspiration losses predicted by Penman's formula with actual losses observed during different stages of growth with sweetpotatoes.

Prediction of these losses using average climatic data for given localities is made by the use of standard formulas. A comparison of predicted evapotranspiration losses taken from Bul. 316 of this station with actual evapotranspiration losses obtained with sweetpotatoes in this experiment is shown in Figure 2. It may be noted that actual losses closely approximated predicted losses during midseason when the vines covered the ground. However, losses were considerably less than those predicted for early season and late season. These data indicate that evapotranspiration losses predicted from climatic data may be used to predict irrigation needs of sweetpotatoes after the vines cover the ground. One-half to two-thirds this amount would be needed prior to that time.

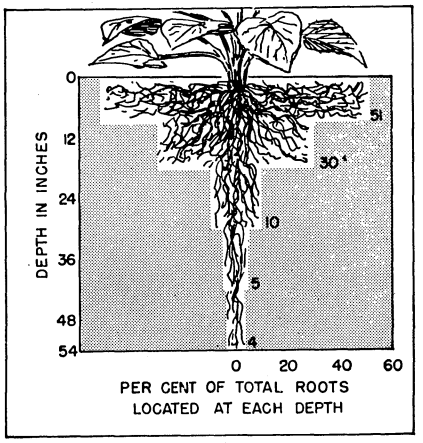
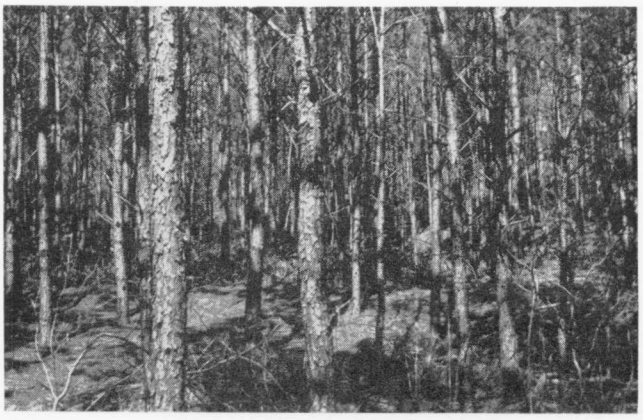


Fig. 3. The above chart shows percentage of sweetpotato roots found at different depths in Norfolk sandy loam soil.

Excavating sweetpotato roots on a Norfolk sandy loam surface soil underlain by a well-drained clay subsoil showed that some roots were found as deep as 4 ft. Fifty-one per cent of the roots were in the top 9 in. of soil, 81% were in the top 18 in. and 91% were in the top 30 in., Figure 3.

To determine when and how much to irrigate the experiment discussed can be used as an example. First start with the available moisture holding capacity of the soil being used, 1.2 in. per ft. for Norfolk sandy loam, (page 26 of Bul. 316) and multiply this by the depth of rooting (2 ft. for sweetpotatoes) to give the total moisture available when the soil is filled to capacity. This equals 2.4 in. Then subtract daily the average daily evapotranspiration for the particular month and locality concerned, page 10, Bul. 316 (.162 in. for July at Auburn). Prior to the time the vines cover the ground use one-half to two-thirds this amount depending on the size of the plants. Any rainfall is added, with the exception that in no case should the total exceed the original figure for the total available moisture in the root zone (2.4 in.). When the available supply has been depleted to 20% of the original level (½ in.) irrigate with enough water to bring the available supply back to the original level. This would require 1.9 in.



Second-growth pine stand above would profitably produce fence posts by thinning.

FENCE POSTS *provide additional income*

SHERMAN D. WHIPPLE, *Associate Forester*

TEN TO 20 MILLION fence posts are needed in Alabama each year.

The extensive acreages of young pine stands in the State are a good source of posts. Many stands become too dense for best diameter growth before reaching pulpwood size. Thus early thinning for post production becomes a desirable improvement practice. This practice produces income and shortens the time required to grow pulpwood and sawlogs.

Post Cutting

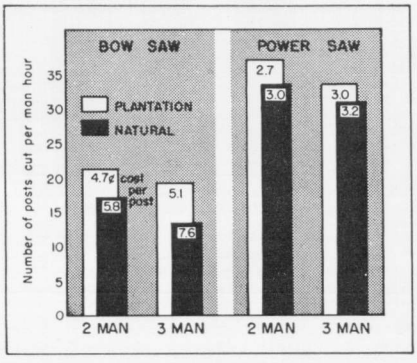
In 1951 a study of fence post production was begun at the Fayette Experiment Forest of the Auburn Agricultural Experiment Station. Dense planted stands 10 years old and natural stands 15 to 25 years old were selected for the study. Post yields from four different cutting methods in two stand classes were compared on the basis of production and costs.

Two-man crews, when cutting or loading, proved to be more economical than three-man crews. The use of a power saw resulted in greater production at less cost than the use of a bow saw. Thinning in plantations resulted in greater production per man-hour than similar thinnings in natural stands.

Post Peeling and Seasoning

For most effective preservative treatment, posts need to be peeled and seasoned. One man can produce between 100 and 200 posts per day by hand peeling with an axe or draw-knife. Of several methods of mechanical peeling, a drum-peeler is the most satisfactory for small operations. At the Fayette Experiment Forest, a stationary drum 3½ ft. in diameter and 9 ft. long was used. Over 600 posts were peeled per day.

A time study showed that time lapse between cutting and peeling was a primary factor in determining the number of posts peeled per hour. Peeling efficiency decreased with each day that peeling was delayed. When posts were peeled the day of cutting, the number per hour was 110. Twelve days after cutting the rate reduced to 54 posts per hour. The cost per post for peeling increased from 1.3¢ to 2.7¢ during this period.



The number of posts cut per hour and cost per post of 2- and 3-man crew using both the bow and power saws are shown above.

Rough, crooked, and knotty posts that were poorly trimmed did not peel as well as clean, straight posts. Loading the drum to slightly more than half of capacity produced the best results. Peeling during the winter months and during drought periods lengthened peeling time.

Efficient peeling did not begin until a week after spring growth became evident and ended after 3 or 4 weeks of constant dry weather regardless of season. The best time for peeling was from April 1 to August 1 of the growing period.

Marketing

The demand in Fayette County is for posts 3 to 4 in. in diameter and 6 ft. long. Clean, straight posts are preferred. It is desirable to obtain treating plants' specifications for posts before harvesting posts for sale. Peeled posts, 2½ to 5 in. in diameter, 6 ft. long, sell for 15¢ each and 7-ft. posts bring 20¢ when delivered to local industrial plants. Post prices will average 4¢ per in. of diameter f.o.b. the plant untreated.

Posts may be treated in industrial pressure treating plants, in small, open tanks owned by individuals, or in those provided through vocational agriculture programs. The landowner can also treat posts with his labor and simple equipment.

Early thinnings for posts from pine stands supply a need on the farm, benefit young pine stands, and produce small income for the timber owner.

Second-growth pine stand of widely-spaced trees unsuitable for fence post production is shown above.

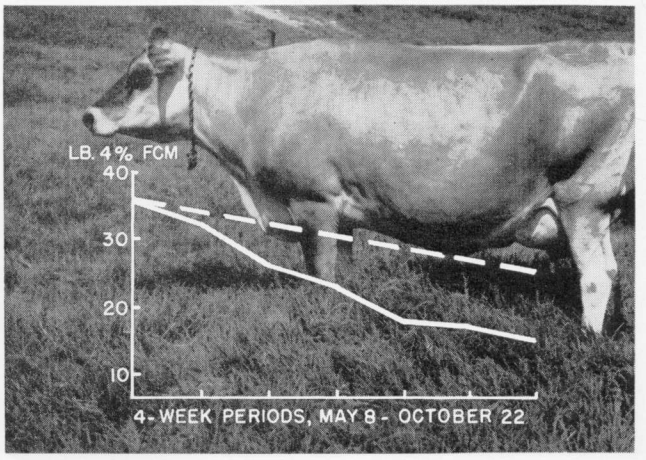
WANTED
Good Summer Perennial Grasses for Dairy Cows

G. H. ROLLINS,
Assoc. Dairy Husbandman

C. S. HOVELAND,
Assoc. Agronomist

A PERENNIAL GRASS that will maintain good milk production during summer is needed by Alabama dairymen. Most summer grasses that grow well in the State do not provide high quality forage needed for high production.

Pensacola Bahiagrass, Coastal Bermudagrass, and Dallisgrass are productive forages, but they do not appear to fill the bill for a good milk producing pasture. Cows confined to pastures of these grasses had a rapid drop in summer milk production during 3 years of testing on Piedmont soil at the North Auburn Dairy Research Unit. This drop was not overcome by irrigation or by a combination of rotational grazing and irrigation.



Decline in daily milk production during 1957 on the test grasses is shown by solid line of graph. Broken line illustrates normal drop. Data are for 4% FCM (fat-corrected milk).

Evaluation Studies

During 1956-57, grazing tests were conducted to compare milk production of cows on irrigated and nonirrigated Bahia, Coastal, and Dallisgrass pastures. All pasture paddocks were continuously grazed. There were 3 cows on each of the six forage treatments, a total of 18 test cows.

In 1958, irrigated Bahia and Coastal grazed continuously and rotationally were compared with good quality alfalfa hay fed in drylot. Three cows were used for each of the five forage treatments, a total of 15. Each cow received each forage for 3 consecutive weeks during the 15-week test.

In all tests, each cow on continuous grazing had access to her entire paddock. Each cow on rotational grazing was rotated to a fresh area within her paddock at least weekly. All cows received a grain mixture at the daily rate of 1 lb. to 4 lb. of 4% fat-corrected milk.

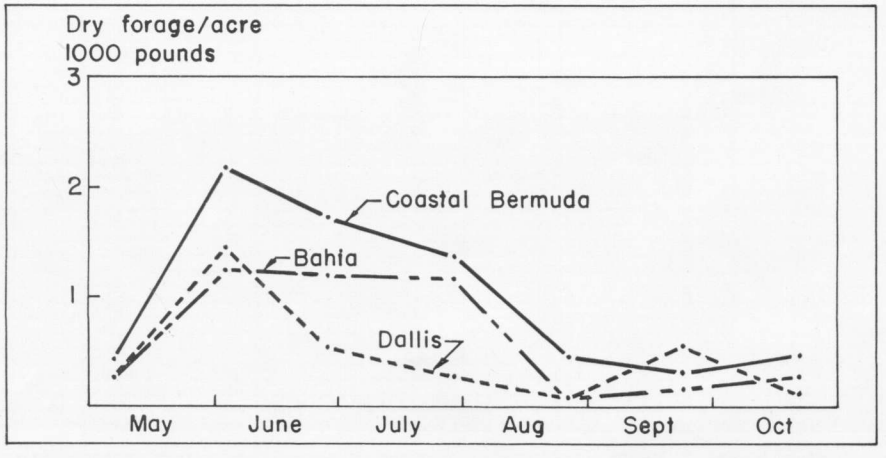
The pastures were limed initially and fertilized liberally each year with phosphate and potash. To better evaluate the grasses, legumes were omitted and commercial nitrogen applied. From 200 to 300 lb. of nitrogen per acre was applied each year in split applications of 50 lb. each.

Forage Yields

Coastal Bermuda was highest in dry forage yield per acre, with Bahia intermediate and Dallisgrass lowest. Yield of dry forage during the 3 years averaged 6,800 lb. per acre for Coastal and 4,413 lb. for Bahia. Two-year average yield for Dallisgrass was 3,300 lb. Most of the forage was produced early in the season, see graph. This was true for all test years.

Irrigation increased forage yields during dry weather. Dallisgrass showed the least response to irrigation. For unknown reasons, most of the Dallisgrass died during the second year.

Crude protein content averaged about 11% for Coastal and 13% for Bahia and Dallisgrass over the entire season. The grasses contained about 18% protein in early May but dropped to 11% by early June. From July until October, crude protein varied from 9% to 13%.



Seasonal production of the three test grasses in 1957 is shown by the graph above.

Milk Production

Daily production per cow during the first test (June 10-October 18, 131 days) in 1956 dropped from 29.1 lb. at the start to 18.4 lb. during the final week. During 1957 (168-day test, May 8-October 22) daily milk production dropped from 36.7 lb. per cow at the start to 14.6 lb. during the final week, see title illustration. In both tests the forages were grazed continuously.

Milk production response from all three grasses was similar. Although irrigation increased forage growth, it did not affect milk production.

Daily milk production of cows fed alfalfa hay (22.4% total protein) in drylot was superior to that of cows grazing Bahia or Coastal, continuously or rotationally. Rotational grazing did not increase milk production.

The CHILTON AREA HORTICULTURE SUBSTATION—

a story of research geared to needs of the area's farmers

R. E. STEVENSON, *Assistant Editor*
C. C. CARLTON, *Superintendent*
K. C. SHORT, *Assistant Superintendent*

EFFECTS OF research at the Chilton Area Horticulture Substation are easy to see. The surrounding area presents visual proof of how research information is being put to use on farms.

Well-kept peach orchards, berry fields, vegetable plots, and produce stands line major highways through Chilton County. Peach orchards in bloom present patterns of beauty on hillsides in the spring. But, the most important evidence shows up in the summer when peaches ripen. Chilton County peaches are recognized for their high quality and command top prices in eastern markets where many carloads are shipped each year.

Peach production and quality have increased tremendously since the Chilton Area Horticulture Substation was established in 1948 near Clanton in Chilton County. Total production in 1949 was about 200,000 bu. Last year it reached about 1,800,000 bu., and better production practices left their mark in increased quality.

Research Begun

Farmers in the Chilton County area were primarily interested in production of horticultural crops, so first work of the Substation was directed toward solving problems involved with such crops. This stress on horticulture has continued during the 12 years of operation. Much emphasis has been placed on peach production and some of the most important work has been on this subject.

Major changes in varieties grown have come about as a result of variety testing. Of the varieties now recommended, Elberta was the only one being grown when testing was begun, but many new ones have been added. Introduction of early varieties has made it possible to begin marketing up to 6½ weeks ahead of Elberta and continue 1 week after Elberta. Since early-season prices are normally higher because of less competition, the early peaches have been highly profitable. The price spread between early and late peaches has been large in some years.

Cardinal and Hiland, the earliest recommended varieties, ripen 6½ weeks earlier than Elberta. Rio Oso Gem is 1 week later than Elberta, with other varieties coming between. A promising experimental variety now being tested bears 5 to 7 days ahead of Cardinal and Hiland.

Peach Production Practices

Much effort has been directed toward solving disease and insect control problems for peaches. Spray schedules have been worked out that are effective in preventing peach damage.

Trying to find a method of controlling bacterial spot of peaches has been a big problem at the Substation. A material now being tested, dodine, shows promise of providing the needed control. It has been used with fungicides and insecticides in the spray program during the past 2 years with good results.

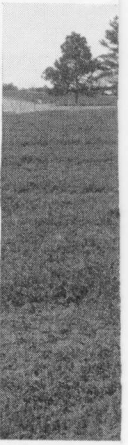
Trials during the past 2 years revealed that Sevin can be used safely in the last two sprays to replace parathion or arsenic compounds. Sevin is safe to use the day before harvest, but parathion must be stopped 3 weeks before harvest and arsenic compounds 4 weeks.

Thinning peaches has become a necessary production practice to ensure marketable size of fruit. Although the job can be done by hand, labor costs may run as high as picking costs.

Because of high cost of hand thinning, a project on chemical thinning is

Many meetings and tours for farmers and farm leaders begin here at the headquarters of the Chilton Area Substation.

Trellessing of vines, shown above, is necessary production practice in growing top yields of trailing blackberries.



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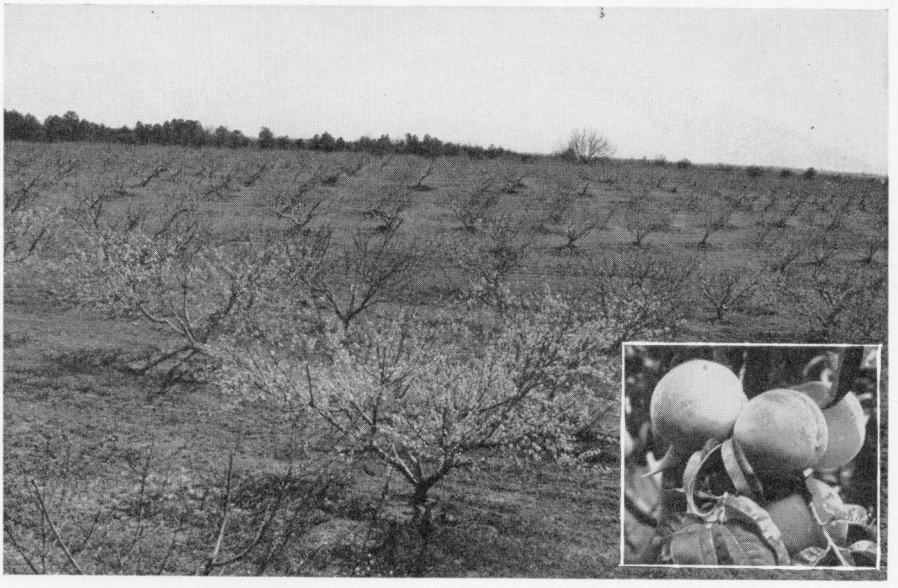


The experimental orchard at right is used for variety testing and peach production research at the Substation. Top-quality peaches like those shown in the inset show results of Substation research.

being carried out. Although only 2 years old, the study shows much promise. Three compounds, NAA, CIPC, and 3CP, have given good thinning. Thinning with chemicals is done after full bloom when frost danger is past and late enough for farmers to determine if fruit set is heavy enough to require thinning.

Trunk sprays of DDT or parathion, or both, have given excellent control of peach tree borers at the Substation. Applications are made July 1, August 1, and September 1. Eleven-year-old trees that have received the trunk sprays without basal treatments have remained clean.

Sod culture tests have shown that more peaches can be grown on sod than with clean culture. Where legumes are grown, orchards have shown no need for additional nitrogen. On clean culture orchards, nitrogen has given increased growth and fruit yield.

Other peach projects include value of irrigation, peach replanting, orchard establishment on new ground, and a new fertility study now underway.

Other Horticultural Crops

Commercial production of trailing blackberries is an important enterprise in Chilton County and several blackberry studies have been made at the Substation. Best variety of trailing blackberry has been the Youngberry.

The first control program for leaf spot and strawberry weevil on trailing blackberries was developed at the Substation. The results showed that leaf spot can be controlled by a fungicidal program consisting of a dormant spray of lime-sulfur and three applications of ferbam, maneb, or captan at 7- to 14-day intervals after leaf development and before harvest.

For controlling the strawberry weevil, three applications of DDT or toxaphene spray at 7- to 14-day intervals during the budding period proved best. This weevil treatment increased berry yields 1,500 to 1,800 lb. per acre. The leaf spot and strawberry weevil treatments can be combined for most efficient use.

Yields of sweetpotatoes have been greatly increased by use of improved varieties that performed well in tests at the Substation. Red Gold, one of the new varieties, produced as high as 690 bu. per acre total and 424 bu. marketable in 1959 when conditions were ideal. Porto Rico, the old standard, yielded only 276 bu. total and 103 bu. per acre marketable. Other high yielding varieties in 1959 were Georgia Red and the experimental variety HM 288.

Variety testing has played an important part in improving production of beans, peas, tomatoes, watermelons, cantaloupes, strawberries, and other truck crops. In addition, seed of such crops as the Giant Blackeye pea that was developed by the Auburn Station have been increased at the Substation to provide seed for seedsmen to multiply.

Testing of strawberry varieties is a good example of how this program can pay off for farmers. Blakemore and Klonmore are old standard varieties that have been in use for many years, but newer varieties are yielding much higher. Three-year average yields of 24-qt. crates for the different varieties were: Blakemore, 132; Klonmore, 125; Florida 90, 190; Pocahontas, 294; and Dixieland, 260 crates per acre.

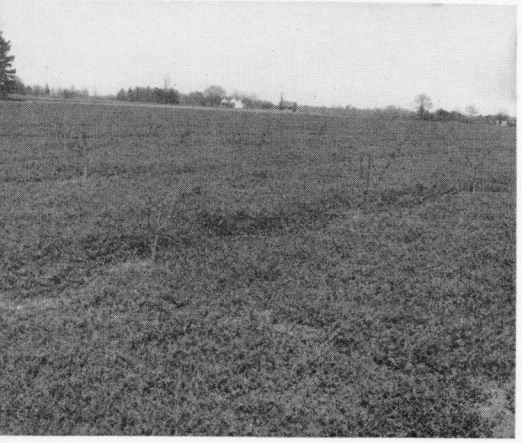
In other experiments with strawberries, methods of chemical weed control were perfected that gave good results. A combination of 2 lb. of CIPC and 2 lb. Sesone per acre applied three times per year was highly effective.

Insect Control Studies

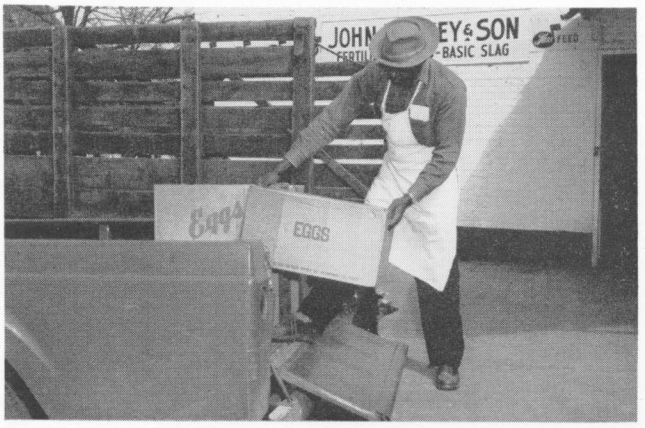
Since insect control is vitally important in horticultural crop production, a great deal of time has been spent developing control measures for many pests. Among the more important projects was one on control of corn earworm in sweet corn. The best treatment was 2 lb. of DDT per acre, put on as sprays. The spray schedule calls for two sprays put on 2 days apart before first silks appear, followed by every-other-day application until silks are brown. Daily spraying during silking gave better worm control.

Muscadine production is another phase of work of the Substation. Present work is aimed at finding self-pollinating varieties that process well.

Many other studies have been made and are being carried out at the Chilton Area Horticulture Substation in cooperation with subject matter specialists from the Main Station at Auburn. This program has contributed greatly to the farm economy of the Chilton Area in the 12 years the Substation has operated and shows a bright promise for the future.



studies revealed that a crop of vetch like that in orchard above supplies nitrogen needed for peaches.



Egg assembly costs on PICK-UP ROUTES

MORRIS WHITE, *Associate Agricultural Economist*

Assembly costs are important expenses in egg marketing. These costs have a direct bearing on Alabama egg producers' success in competing with those in other areas.

An increasing proportion of table eggs are being handled by fewer intermediate egg dealers or are being transported direct from farm to retailer. As a result, assembly costs comprise a greater proportion of total marketing costs.

The trend toward larger and fewer commercial flocks is contributing to lower assembly costs. Cost of assembling eggs from 2 producers with flocks of 10,000 hens each would be much less than from 40 producers with 500 hens each. Length of route, number of stops, and volume of eggs collected per mile directly influence assembly costs.

Fluctuations in egg prices are not immediately reflected in assembly costs. Operations necessary for maintenance of egg quality require the same amounts of time, labor, and equipment per case when retail price of eggs is 30¢ per dozen as when they retail for 50¢.

Data collected in the summer of 1959 on operations of 13 egg assembly routes in Alabama provided information on costs and time involved in assembling eggs.

Route Costs

Costs per case varied from a low of 3¢ on a 39-mile route to a high of $1.42 on a 160-mile route. The weighted average cost for assembling eggs picked up on the 13 routes was 17¢ per case. Labor, the most expensive item, comprised 40% of total cost. Other variable costs amounted to 38% and fixed costs 22%.

Total costs per route varied with length of route and with time spent on the route. When separated according to variable and fixed costs, the average for all routes was as follows:

Cost items	*Av. daily cost/truck*	*Av. cost/mile*
Wages	$ 5.26	$0.056
Other variables	5.01	.054
Fixed	2.98	.032
Total	$13.25	$0.142

Volume of eggs picked up relative to distance traveled was the factor having the greatest influence on costs. The route having the most cases picked up per mile had the lowest cost, while the one picking up the fewest cases per mile had the highest cost. Five routes with average costs of 9¢ per case picked up 5 times the quantity of eggs per mile as did routes having 21¢ per case average cost. Almost one-third (31%) of the stops were on the five routes having the lowest cost per case, but 64% of the total volume of eggs was assembled on these routes. The four routes having highest costs picked up about one-tenth the volume of eggs as did routes with the lowest cost.

Time Required

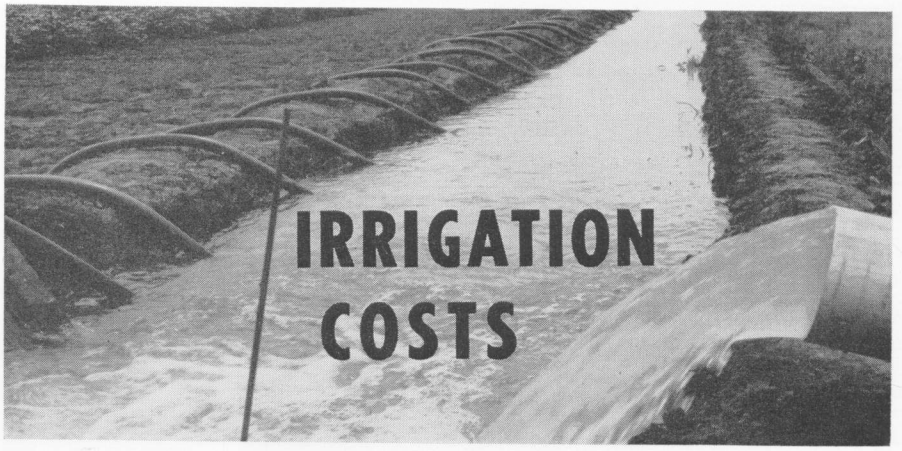
Total time spent on routes varied between 1.3 and 10.6 hours, with the average being 4.6. Routes that required the most time were long and generally had more stops. Route men spent 55% of their time driving; 30% was spent at stops to pick up eggs and 15% at stops for other purposes.

Determining the best use of time is difficult. Time devoted to discussions with farmers about problems in production, cleaning, and storing of eggs, and new market developments and prices may be time well spent. However, efficient use of time is important because 40% of costs of assembling eggs was for labor.

Length of Route, Cases Picked Up, and Costs and Time Involved, 13 Egg Assembly Routes, Alabama, 1959

Route	Length of route	Time on route	Cases picked up	Assembly costs	
				Total per route	Average per case
	Miles	*Hours*	*Number*	*Dollars*	*Dollars*
1	39.1	2.5	189.0	5.88	0.03
2	13.8	1.3	45.0	2.57	.06
3	43.0	2.9	57.3	4.32	.08
4	126.7	10.6	285.0	35.16	.12
5	42.5	1.8	30.0	3.67	.12
6	130.0	6.0	110.0	15.70	.14
7	211.9	8.2	115.0	24.37	.21
8	47.6	1.6	15.0	4.14	.28
9	76.1	5.8	38.9	13.21	.34
10	18.3	1.4	6.1	2.82	.46
11	116.0	3.6	20.0	12.76	.64
12	72.7	4.2	14.6	13.84	.95
13	160.0	9.8	15.5	22.12	1.42
Total or average	84.4	4.6	941.4	160.56	.17

J. H. YEAGER
Agricultural Economist



IRRIGATION COSTS

WILL IRRIGATION PAY? Will it pay better than other uses on which available funds can be spent?

These are two important questions farmers should ask before installing an irrigation system. Usually an irrigation system means a sizeable dollar outlay. Hence, it is wise to estimate as accurately as possible the costs involved and probable returns.

Reasons

There are several reasons for irrigating. Yields may be increased and made less variable over a period of years. A farmer may shift to crops of higher value per acre. He may increase his production efficiency, resulting in greater return per dollar spent and reduced production costs per bushel or pound. Although such gains from irrigation may appear quite favorable, costs should not be overlooked.

Initial Investment

Such factors as source of water, size, and kind of system have a bearing on size of first investment. Sprinkler and furrow irrigation are the two major methods used in Alabama.

With the same source of water, such as a stream, the first investment in a sprinkler or furrow system to irrigate 60 acres may not be far different. If a large amount of land leveling is required, the furrow system investment likely will be greater. Investments of $150 per acre are common for either system. A higher investment cost in a furrow system, however, may be justified because of lower annual labor costs.

Annual Costs

Certain annual costs of irrigation depend on type and amount of initial investment. Annual costs are either fixed or variable. Fixed costs go on regardless of use, whereas variable costs depend on use. Fixed costs include depreciation, interest on investment, and taxes. Variable costs are labor, fuel, electricity, lubrication, repairs, and maintenance.

Suppose a farmer has invested $150 per acre, or $9,000 for 60 acres, in a sprinkler system that pumps from a dependable stream. A 12½-year average life for all depreciable items (pipe, pump, and fittings) means $720 per year depreciation cost. Interest on investment should be calculated on only half of the orginal cost, since pump and pipe depreciate in value. At a rate of 6.1%, interest and taxes would be $274 per year. Thus, total fixed costs would be $994, or $16.57 per acre.

If 8 acre-inches of water are applied in 4 settings (2 man-hours per setting) and 40 hours of other labor are required, the annual labor cost will be $520 ($1 per hour). Fuel, oil, and repairs are estimated at $400 per year for 60 acres. These variable costs total $920, or $15.33 per acre. Both fixed and variable costs amount to $31.90 per acre, or almost $4 per acre-inch of water applied.

Even with irrigation, the most profit will not be made unless increased amounts of fertilizers and insecticides are used. Also, with higher yields labor for harvesting the added production must be included in the cost.

For irrigated cotton, fertilizer recommendation is double that for non-irrigated cotton. It is estimated that five additional applications of insecticide should be given irrigated cotton. In all, the extra fertilizer, insecticide, labor, and picking costs are estimated to add $56.47 per acre to costs.

Will It Pay?

Estimated fixed and variable costs associated with a sprinkler system for irrigating 60 acres of cotton are given in the table. These costs plus extra costs for fertilizer, insecticide, and labor are shown at various levels of investment per acre. With an investment of $150 per acre in a sprinkler system and with cotton at 34¢ per lb., it would require an additional 262 lb. of lint cotton, a little more than a half bale, to cover the added costs. With cotton at lower prices and/or a higher investment per acre, greater increases in production would be necessary to make irrigation profitable.

If estimated additional return is more than anticipated additional cost, irrigation should be a good investment. However, it should be remembered that funds put into irrigation should pay better than when put to other uses if the most profit is to be realized on individual farms.

ADDITIONAL YIELD OF LINT COTTON NEEDED TO COVER IRRIGATION COSTS, SPRINKLER SYSTEM

Investment in sprinkler system per acre	Total annual fixed and variable irrigation costs[1]	Added costs for fertilizers, insecticides, and labor[2]	All additional costs associated with irrigation	Pounds of lint cotton to cover all additional costs if price per lb. is:			
				26¢	28¢	32¢	34¢
$100	$27.00	$56.47	$ 83.47	321	298	261	246
150	32.50	56.47	88.97	342	318	278	262
250	43.50	56.47	99.97	385	357	312	294
350	54.50	56.47	110.97	427	396	347	326
500	71.00	56.47	127.47	490	455	398	375

[1] Includes depreciation, interest on investment, and taxes calculated at 11% of original investment, plus variable costs at $2 for each in. of water applied; it was assumed that 8 in. of water were applied.

[2] Assumes an additional 500 lb. of 4-12-12 for $9.25, an additional 40 lb. of N for $4.80, 5 additional applications of insecticide costing $8.62 (including cost of application), and additional labor for picking cotton.

Much of the fresh vegetable distribution is done by transport truck. Here a load of fresh produce is being unloaded at a supermarket.

Distribution of FRESH VEGETABLES *presents problem*

D. R. STREET and E. E. KERN
Department of Agricultural Economics

THERE'S AN interesting geographic background to the vegetables on the average Alabama family table today.

Concentrating these vegetables within the State for distribution through retail stores is the job of wholesale receivers located in important towns along main transportation routes.

Survey Conducted

In 1959, a survey was conducted by economists of the Auburn Agricultural Experiment Station to determine practices and problems of jobbers in procuring fresh vegetables. Emphasis was placed on opportunities available to local producers to participate in expanding markets for fresh produce. Sixty-two firm managers were interviewed. Twenty received primarily in "carlot" quantities and the remainder in "less-than-carlots."

A diversity of marketing functions was performed by firms studied resulting in a wide range of investment in plant and equipment. Average gross sales for all firms amounted to about $700 thousand in 1954 compared with about $1½ million in 1958. A large part of this sales volume was from fresh vegetables. Many small jobbers failed to show an increase in sales between the two periods and some experienced sharp declines.

Patterns and Problems

Firms drew vegetable supplies from most states of the United States and from several foreign countries. Although availability of supplies related to seasonal production and climatic conditions was important in determining procurement practices, other factors were also involved. These included organized marketing facilities, varieties available, quality and pack offered, and types of containers used. Other influences were pricing arrangements, custom, type of seller, and promotion. For the reasons given buyers often drew supplies from more distant areas even when closer areas were in production. Some commodities, important to Alabama producers, were obtained from the following number of states:

Commodity	*Number of states*
String beans	8
Cabbage	18
Corn	15
Cucumbers	14
Okra	7
Field peas	6
Sweet pepper	15
New potatoes	11
Tomatoes	17
Watermelons	6

Buyers preferred to obtain perishable and bulky commodities from nearby producing areas for economic reasons. However, it was noted that local produce often created market instability and low prices by sporadic offerings of various quantities, qualities, and types. Further, these often moved from farms through a range of outlets resulting in greatly restricted competition at the point of first sale.

Opportunities for Adjustment

Buyers were in general agreement that the greatest opportunity facing local producing areas was a consistency in producing and marketing vegetables to meet current trade demands. This would include organized marketing in volume according to grade, quality, and pack. Buyers favored efforts of the entire industry to bring about these changes. This would discourage "topping" or "facing" a pack with better produce than the pack average. It would also create an appreciation of quality, grade, and the necessity of using suitable containers.

Buyers reported that inferior containers often preclude moving produce longer distances without extra costs incurred for facilities, labor, and time in repacking. The open-top market basket, common container for tomatoes in produce markets, was considered especially inferior. Preferences were expressed for the 20-lb. cardboard carton for tomatoes, mesh sacks for cabbage, and bushel hampers for beans. Spoilage losses, convenience, adaptation to transporting, cost, and trade demands were factors considered important in choice of containers.

Money Appropriated

Additional appropriations recently made to the Shipping Point Inspection Service of the State Department of Agriculture and Industries should permit important advances in the problem areas mentioned. Buyers seek the highest quality produce available consistent with trade demands. On the Birmingham farmers market, full-time inspectors are already available for help in quality maintenance of fresh vegetables. Certificates of quality and educational material will be made available to market participants. This inspection and educational program with certain segments of the trade is designed to work toward economic growth.

CORN—
King of silage crops

W. B. ANTHONY, *Animal Nutritionist*
J. K. BOSECK, *Supt. Tenn. Valley Substation*

Proper storage of silage is a must to ensure best quality feed. Here a trench silo at the Tennessee Valley Substation is being covered to reduce spoilage.

Corn, the top acreage crop in Alabama, is also the king of crops for silage.

No other commonly fed harvested feed can compete with corn silage, when properly supplemented, for growing young cattle through fall, winter, and early spring in most of Alabama.

Research Conducted

Research on silage crops by the Auburn Agricultural Experiment Station conducted at the Tennessee Valley Substation, Belle Mina, included oats, sorghum, and corn. In one phase of this silage research, special emphasis was placed on determining the chemical composition of the various plant parts of these crops. When cut for silage, the oats were in the bloom to early milk stage, the corn grain was dented, and the sorghum grain was in the milk to early dough stage. Data on analysis of the oat plant are given in Table 1.

Results

The stem of the oat made up about 50% of the green weight of the plant and more than 50% of the total cellulose. Cellulose, however, is an undesirable component and its presence lowers nutritive value. The stem contained only about one-quarter of the valuable nutrients – minerals, protein, and fat. In contrast, the grain, although making up only 36.8% of the total plant green weight, contributed more than half of the most important nutrients. Likewise, the leaves added significantly to the total protein and calcium.

Table 1. Total Chemical Components Present in Plant Parts of Oat Silage

Nutrient	Leaves	Stem	Grain
	Pct.	*Pct.*	*Pct.*
Green matter at harvest	14.53	49.47	36.00
Dry matter	15.68	42.94	41.25
Crude fat	20.41	20.42	59.17
Crude protein	25.02	23.17	51.80
Cellulose	12.62	57.89	29.49
Ash	16.64	25.42	57.95
Phosphorus	15.56	27.66	56.78
Calcium	41.11	26.39	32.50
Magnesium	21.24	36.89	41.87

Table 2. Total Chemical Components Present in Plant Parts of Sorghum Silage

Nutrient	Head	Leaves	Stem
	Pct.	*Pct.*	*Pct.*
Green matter at harvest	3.70	28.62	67.07
Dry matter	5.25	32.88	61.87
Crude fat	6.07	41.48	52.46
Crude protein	9.82	42.65	47.53
Cellulose	5.82	38.45	55.74
Ash	10.99	53.92	35.09
Phosphorus	11.28	41.91	46.82
Calcium	2.86	51.10	46.05

Tracy sorghum silage was harvested and handled the same as oat silage. Chemical data for the plant parts are given in Table 2. Sorghum produced a small amount of grain (head), and the leaves were superior to stems as a source of nutrients. In one year of the test heads made up 16% of the total plant weight.

Corn Silage Tested

The chemical composition of the corn plant is given in Table 3. To illustrate the quality of this silage, long-yearling cattle consumed 52 lb. of it daily. In addition to the silage, the ration consisted of 4 lb. ground ear corn and 1.5 lb. of CSM. During a 130-day feeding period, they gained 2.46 lb. daily and the average slaughter grade was raised from Utility to Good.

The silage dry matter contained 36% grain. This is equivalent to a yield of about 50 bu. of air dried grain per acre. The husks, cob, and tassel contributed about 26% of the plant dry matter, and about 41% of the cellulose. These three parts contained only 15% of the total plant protein. The corn leaves contributed significantly to the protein and mineral nutrient value of the plant. This was also true of oats and sorghum.

Results showed that leaves and grain are the most valuable parts of plants harvested for silage. Good silage results from careful preservation of these parts. An important factor in preservation is storage at 65 to 70% moisture. High moisture materials may need to be wilted before they are put in the silo.

Table 3. Total Chemical Components Present in Plant Parts of Corn Silage

Nutrients	Stalk	Leaves	Grain	Husks	Cob	Tassel
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Green matter	31.63	16.83	30.64	20.13		0.77
Dry matter	21.64	16.23	36.39	15.03	8.99	1.73
Crude fat	8.26	10.85	72.46	5.30	2.42	0.71
Crude protein	12.68	26.24	46.01	10.37	3.39	1.32
Cellulose	32.45	20.38	6.26	21.94	16.34	2.63
Ash	20.43	42.07	17.09	14.07	3.80	2.55
Phosphorus	22.73	15.74	39.88	17.78	3.62	0.94
Calcium	27.34	43.08	6.39	15.29	5.50	2.41
Magnesium	25.13	34.14	20.83	11.43	5.74	2.73

Hydrocooling PEACHES

HUBERT HARRIS
Associate Horticulturist

PULLING TEMPERATURE of peaches down before refrigerated shipment to distant markets is a development of recent years. Pre-cooling with low-temperature water is rapid and continuous. It fits in well with packing shed line operations. However, to get the full benefits, the fruit must be sufficiently cooled.

Advantages

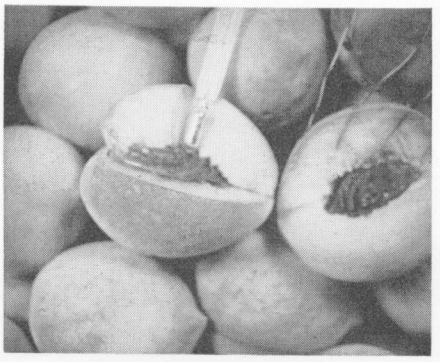
Cooling peaches before loading results in lower fruit temperatures during transit. This holds back the growth of rot-causing organisms. It also retards respiration and ripening of the fruit. To further protect against rot, a very small amount of chlorine may be added to the cooling water.

Direct benefits include: (1) greatly reduced losses from decay, (2) less bruising, (3) decreased shrinkage from evaporation, and (4) lowered refrigeration loads.

Hydrocooling also permits picking somewhat riper fruit; in turn ripening time and decay at destination are reduced, resulting in improved color and flavor. Thus the process results in lower shipping and marketing losses and a better quality product for the consumer. All of these benefits should be reflected in more favorable prices and increased returns to the grower.

Research on Hydrocooling

For the process to yield the foregoing advantages, the peaches must be adequately cooled. A temperature of 57° F. or lower at pit depth is necessary. This corresponds to a fruit temperature of about 50° F. as measured with a thermometer. Usually peaches are not cooled to this extent by conventional hydrocooling operations. The time in the cooler as a rule is too short for this amount of cooling because of low heat exchange between fruit and the cooling water. During rush season and/or very hot weather, the fruit may be insufficiently cooled.



In experimental hydrocooling, thermocouples (above) are used for recording temperatures at different depths within the peach and at different positions in the basket. Temperatures, accurate to a tenth of a degree F., are read at 2½-minute intervals at exact position of the small thermocouple junctions. The comparatively crude thermometer method shown above is inadequate for precise measurements.

Research on hydrocooling by the Auburn Agricultural Experiment Station has been concerned with this problem. Experiments were done on methods of increasing the cooling capacities of peach hydrocoolers by upping the efficiency of heat exchange between fruit surface and cooling water. Spectacular results were obtained from use of a wetting agent either in the hydrocooler water or as a pre-dip before cooling. The effect of the wetting agent was (1) to wet the entire surface of the peach through the fuzz, and (2) to keep the flowing water in direct contact with the fruit surface throughout the cooling period.

Without the wetting agent, the peach had a tendency to shed water much like an umbrella. Also, fruit in the middle of a half-bushel or bushel basket cooled more slowly than did fruit at the top or bottom of the pack. Use of the wetting agent eliminated this irregular cooling and resulted in much faster cooling throughout the basket. Results of some of the tests are given in the table.

The wetting agent used in the hydrocooler water caused considerable foaming and left a noticeable residue on the fruit. These problems were solved by using the wetting agent as a pre-dip before hydrocooling.

Applied to commercial peach hydrocooling, the wetting agent pre-dip would increase cooling capacities of present hydrocoolers by 40 to 60%. Further increases are attainable by finely crushing the ice to obtain a lower temperature of the cooling water. These increases in capacities could be used to great advantage in obtaining adequate cooling of the present volume of fruit and/or handling increased volumes from expanded acreages.

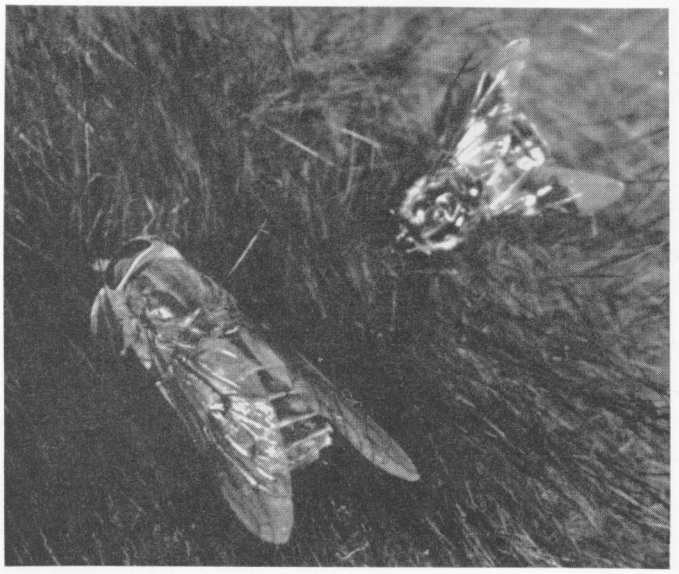
EFFECT OF WETTING AGENT IN A PRE-DIP AND OF DIFFERENT HYDROCOOLER WATER RATES ON TEMPERATURE DECREASE OF ELBERTA PEACHES

Water g.p.m./ sq. ft.	Beginning temperature	Wetting agent[1]	Temperature decrease, pit depth[2]			Increased cooling from pre-dip[3]		
			Minutes cooled			Minutes cooled		
			10	15	20	10	15	20
	Deg. F.		*Deg. F.*	*Deg. F.*	*Deg. F.*	*Pct.*	*Pct.*	*Pct.*
5	84.6	None	4.4	8.0	13.2			
		Pre-dip	11.4	19.4	26.4	160	143	100
10	83.9	None	5.8	12.1	18.8			
		Pre-dip	9.4	18.2	26.4	62	51	41
15	81.4	None	6.9	14.3	21.4			
		Pre-dip	10.9	19.2	26.6	58	34	24
20	83.0	None	7.1	14.1	20.7			
		Pre-dip	10.0	18.7	26.6	41	33	29
30	79.7	None	10.8	17.9	24.5			
		Pre-dip	14.6	22.9	29.7	35	28	21

[1] Submerged, 30 seconds, 5,000 p.p.m. of wetting agent.
[2] Firm-ripe fruit, 2⅝ in., average pit depth temperatures at top and middle of half-bushel basket.
[3] Percentage of increase in amount of cooling as result of pre-dip.

Facts about HORSEFLIES

KIRBY L. HAYS, *Assistant Entomologist*



THERE ARE MORE than 2,500 different kinds of horseflies and deer flies. About 500 kinds occur in America north of Mexico. Over 100 of these are found in Alabama.

Adult forms of these insects are known best because of the blood sucking habits of the females. The males do not bite and subsist largely on nectar and juices of plants.

In some parts of the United States, horseflies and deer flies attack livestock in such numbers that the animals take refuge in barns at midday or lie in ponds with only their heads above the water. Farmers in the northern United States even put old overalls on the legs of their work stock to keep flies off. It has been estimated that some animals may lose as much as a pint of blood per day during heavy horsefly and deer fly attacks.

Disease Spread

In addition to sucking blood, the flies also transmit diseases and parasites to man and animals by biting. The best known of these diseases is tularemia, "rabbit fever" or "deer fly fever." Anthrax, trypanosomiasis, and hemorrhagic septicemia are also transmitted by the bites of these flies. Lately, they have been suspected of transmitting anaplasmosis of cattle. Sick animals offer less resistance to the flies and are prime hosts.

Besides transmitting diseases to men and animals, blood that seeps from the bite wound attracts other scavenger flies. Bacteria left by these flies may cause sores or boils. The blood also provides an excellent site for depositing eggs of screwworm and other disease producing flies.

Life Cycle

Horse and deer flies mate in the air or upon some stationary object. Afterwards the female seeks a blood meal to obtain protein for production of eggs. The eggs are deposited in masses of 200 to 500 on plants, stones, or debris over or near water.

When first laid the egg masses are white, but soon darken until they look like drops of tar. These masses are attacked by small wasp-like insects, which may destroy as many as 80% of the eggs.

In 7 to 10 days the unparasitized eggs hatch simultaneously, and the larvae drop as a group to the ground or water. Those that drop into the water float on the surface until the waves disperse them to all parts of the pond. Those that fall on the soil burrow in the top 2 to 4 inches and begin to grow.

The larvae feed on any small animal with which they come in contact. They have been found feeding on insect larvae, earthworms, snails, and even their own species.

The horsefly larva has large, fang-like mandibles (jaws) that he uses to kill his prey. If the prey is large enough the larva will enter the body of his host while feeding. When horsefly larva meets horsefly larva, it is a fight to the death. The loser is quickly devoured. If handled, large horsefly larvae may even "bring the blood" from the finger of an adult human.

Most horseflies and deer flies spend their larval stages in the soil, under water or in wet places. After 10 to 11 months in this stage the larva moves through the soil to a drier place and forms the pupa. The pupa is a resting stage inside which the adult fly is formed. After 10 to 14 days a slit forms down the back of the pupa and the adult climbs out of the pupal shell and digs to the surface of the soil. The fly climbs up a plant and expands its wings and waits for its body to harden. Once the wings have expanded and the body hardened, the adult flies away. The adult may live as much as 6 to 8 weeks and takes several blood meals during this time.

Control Difficult

Horseflies and deer flies are the most difficult animal parasites to control. The usual sprays for horn flies and lice are relatively ineffective, since they do not prevent the attacks of horseflies. However the fly may die later.

Several repellents, such as Delphene, Tabutrex, 612, and others, will keep the flies away if the material is applied daily. Undiluted pyrenone concentrate (1% pyrethrins plus 10% pipernoyl butoxide) applied daily with a treadle sprayer will control these pests.

If the larval habitats of the economically important species can be determined, future control measures may be directed at the larval stage. This approach would make it possible for the flies to be controlled before they become adults.

Watch out for CHINCH BUGS

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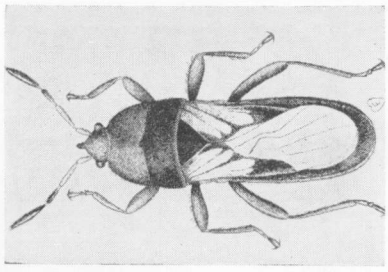

IF YOU HAVE a St. Augustine grass lawn, watch for chinch bugs this summer! It may be severely damaged or killed by these small insects unless control measures are followed.

The adult chinch bug[1] is black-bodied and about 1/5-in. long. It has white wings that reach almost to the tip of the abdomen. Each of the upper pair of wings has a black spot on the outer margins. The legs are yellowish to red.

The insect passes the winter in the adult stage in dead grass, leaves, and other litter. In deep grass the bugs crawl into the sod and overwinters. They emerge when the weather warms in the spring. Soon after emergence they mate and begin to lays eggs.

Two or more generations per year occur in the Mobile area; however, the generations overlap to such an extent that all forms are present after early summer. Chinch bugs have an offensive odor, especially when crushed. A severely infested lawn has an odor that can be detected by walking across it.

Chinch bugs damage grass by sucking the sap. Many bugs will collect at the base of one plant, suck the sap, and attack adjoining plants. The gregarious habit of the bugs causes damage to occur in spots in a lawn.

The first sign of chinch bug injury is small yellow spots of grass. The spots increase in size as the bugs increase in number and attack new plants. The damaged plants turn from green to yellow and finally brown as they wither and die.

Control

Results of research conducted by the Auburn Agricultural Experiment Station at Mobile in 1959 revealed that the chinch bug can be effectively controlled. Results from some of the treatments are given in the table.

DDT at 5, 10, or 20 lb. per acre as sprays or 10 lb. per acre as granules and Zytron at 20 lb. per acre as granules protected the grass for a 4-month period. The 10-lb. rate of DDT as spray or granules was more effective than 5 lb. as a spray. However, 20 lb. as a spray was no better than 10 lb. as spray or granules. Ten lb. of Zytron as granules or spray was less effective than the 20-lb. rate.

VC-13 at 5 gal. per acre controlled the bugs for 3 months. Ethion and Dipterex had some residual action against the chinch bug after 1 month, but were not as good as DDT, Zytron, or VC-13. Diazinon at 5 or 10 lb. per acre as a spray, American Cyanamid 18133 at 4 lb. per acre as granules or 8 lb. per acre as a spray, Zytron at 10 lb. per acre, phorate at 4 lb. as spray or granules, and Trithion at 4 lb. per acre as a spray controlled the chinch bug for 1 month after application.

Research gave no indications that chinch bugs were resistant to DDT.

Phorate and American Cyanamid 18133 are extremely toxic compounds. Ethion and Trithion are highly toxic but less than Phorate or 18133. Diazinon and VC-13 are considerably less toxic than Ethion, Trithion, Phorate, or 18133, but must be used with proper precautions to prevent ingestion, inhalation, or skin absorption. DDT and Zytron are relatively safe to handle, but normal precautions should be observed.

CHINCH BUG INFESTATIONS IN ST. AUGUSTINE GRASS BEFORE AND AFTER CERTAIN INSECTICIDAL TREATMENTS, MOBILE, 1959

Treatment	Method	Rate[1]	Bugs per .6 sq. ft. by dates (av.)				
			6/18[2]	7/21	8/19	9/22	10/15
		Lb.	*No.*	*No.*	*No.*	*No.*	*No.*
Check			17	233	92	22	24
DDT	spray	5	8	6	19	3	3
DDT	spray	10	12	1	8	1	1
DDT	spray	20	10	2	13	2	3
DDT	granules	10	11	1	5	1	1
Zytron	granules	20	11	3	15	2	4
Zytron	spray	10	4	4	31	7	10
Zytron	granules	10	18	2	28	8	9
VC-13	spray	5 gal.	34	10	13	3	8
Ethion	spray	4	12	9	37	5	10
Dipterex	granules	5	5	61	15	8	8
Diazinon	spray	5	12	6	57	12	19
Diazinon	spray	10	16	2	31	32	18
Am. Cy. 18133	granules	4	12	8	46	21	20
Am. Cy. 18133	spray	8	6	11	24	11	14
Phorate	spray	4	9	3	23	12	14
Phorate	granules	4	14	3	37	22	21
Trithion	spray	4	4	10	22	9	13

[1] Indicated rates are pounds of technical material per acre.
[2] Counts were made prior to treatment on June 18.

[1] *Blissus leucopterus insularis* Barber.

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