HIGHLIGHTS

OF AGRICULTURAL RESEARCH

VOLUME 9, NUMBER 1 SPRING, 1962

Agricultural Experiment Station
AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 9, No. 1 SPRING, 1962

In this issue . . .

On the cover. This pelleting mill with associated feed milling equipment will permit concentrated research studies on the value of pelleting feed for cattle. Use of pelleted high roughage rations for beef cattle is covered in an article on page 3.

Published by

AGRICULTURAL EXPERIMENT STATION of AUBURN UNIVERSITY

Auburn, Alabama

E. V. SMITH .... *Director*
COYT WILSON .... *Associate Director*
CHAS. F. SIMMONS .... *Assistant Director*
KENNETH B. ROY .... *Editor*
E. L. MCGRAW .... *Associate Editor*
R. E. STEVENSON .... *Associate Editor*

Editorial Advisory Committee: COYT WILSON; H. J. AMLING, *Associate Horticulturist;* K. M. AUTREY, *Dairy Department Head;* E. A. CURL, *Associate Plant Pathologist;* AND KENNETH B. ROY.

New and Timely PUBLICATIONS

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

Bul. 337. Nitrogen and Moisture Requirements of Coastal Bermuda and Pensacola Bahia summarizes results of 8 years' field tests on fertility and water needs of the two grasses and effect of nitrogen applications on chemical properties of soils.

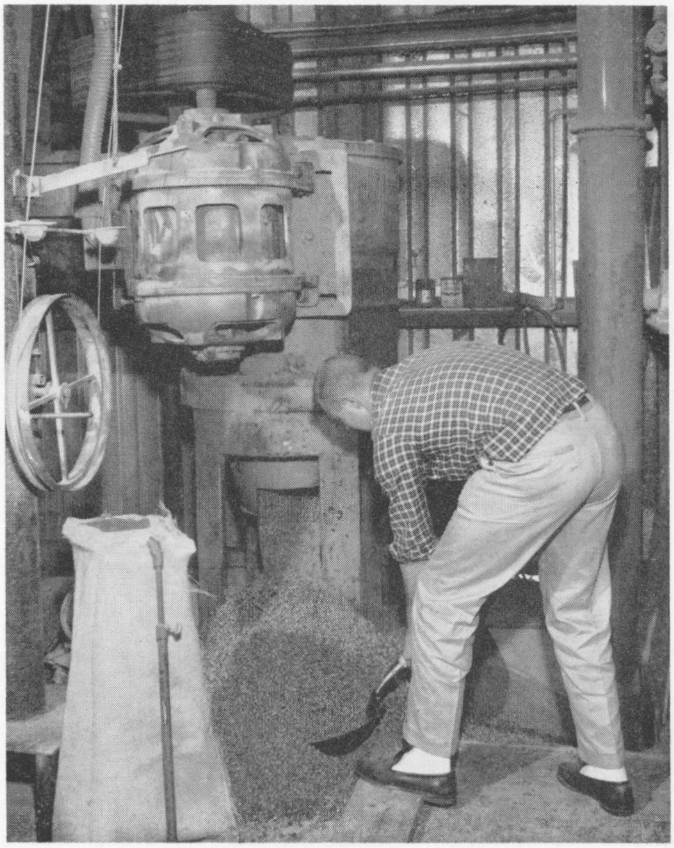
Bul. 338. Opportunities for and Limitations of Social and Economic Adjustments in an Alabama Rural County gives detailed sociological data gained in a study made in a low-income area of Alabama.

Cir. 141. Response of Field Crops to Fertilizer and Returns per Dollar Invested gives response of different crops to various fertilizer elements and amount of return from each dollar spent for fertilizer.

Leaf. 66. Forage Production of Winter Annuals Sod-Seeded on Dallisgrass-White Clover presents results from sod-seeding oats, rye, wheat, ryegrass, rescuegrass, Caley peas, and vetch on well established Dallisgrass-white clover in the Black Belt.

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

Feeds are pelleted in this machine at the Main Station, Auburn, for use in feeding tests to evaluate high roughage pellets.



PELLETED FEEDS— promising method for improving beef production on high roughage rations

W. B. ANTHONY, R. R. HARRIS, J. G. STARLING, V. L. BROWN, and J. K. BOSECK*

LIVESTOCK PRODUCERS may profit from use of pelleted feeds – hays, silages, and high roughage mixtures.

Advantages that have been shown for pelleted feeds are (1) increased daily feed consumption by animals, (2) improved storing and handling properties of pelleted feeds, and (3) some improvement in nutritive value resulting from the pelleting process.

Feed pelleting information has been critically appraised and several tests have been conducted by the Agricultural Experiment Station with limited facilities.

New Equipment Installed

The facilities limitation was solved last fall with installation of a pellet mill and supporting feed milling equipment at the North Auburn Beef Cattle Research Unit. This mill is now being used to pellet feeds fed in tests at the Wiregrass Substation, Headland, the Lower Coastal Plain Substation, Camden, and Main Station, Auburn.

The first Auburn report concerning nutritive value of pelleted silages was published more than 2 years ago (Journal of Animal Science, 18:1506, 1959). This report revealed that dehydrated and pelleted corn silage contained about the same available energy for cattle as did a commonly used fattening feed. Furthermore, daily intake of the pelleted silage was as great as the intake of the fattening ration. When fed as conventional silages, corn silage was much superior to that made from sorghum or oats. However, when dehydrated and pelleted these three silages had similar nutritive value.

Pelleted Coastal Good

In a 1960 test at the Lower Coastal Plain Substation, pelleted Coastal Bermudagrass hay proved to be far more satisfactory for stocker calves than did the hay in long form. Performance data from this trial clearly show that pelleting hay increased feed intake by cattle and improved live weight gain, as given below:

	Long hay + supplement	*Pelleted hay + supplement*
Animals on test, no.	15	15
Length of test, days	155	155
Average daily gain, lb.	0.97	1.45
Average daily intake, lb.	9.6	12.6

Another pelleted hay trial was done at Auburn. In this test the basal ration was a pellet made mostly of sun cured Coastal Bermudagrass (93.9%). Other ingredients were salt, 1%; dicalcium phosphate, 0.1%; and cane molasses, 5%. A second ration was a pellet similar to the basal one except it contained 5% cottonseed meal, 5% ground shelled corn, and 4% alfalfa meal. These two pelleted rations were full fed to yearling steers for 62 days. Results are summarized below:

	Basal pellet	*Basal + CSM, corn, and alfalfa meal*
Daily gain, lb.	2.17	2.22
Feed per cwt. gain, lb.	754	764

Although some results of feeding pellets to slaughter cattle look promising, it may be a long time before widespread use can be made of pelleted hays. The large initial investment in adequate processing equipment limits present use of pellets to large commercial operations. Perhaps new ideas, research, and initiative may usher in a pelleted feed era.

* Anthony and Harris, animal science department; Starling, Wiregrass Substation; Brown, Lower Coastal Plain Substation; and Boseck, Tennessee Valley Substation.

What is your FARM WORTH?

J. H. YEAGER, *Agricultural Economist*

AVERAGE MARKET value of land used for avocado production in California in 1960 was $4,750 per acre! What made this land so valuable?

Three major factors account for the value of a farm – net earnings or net income that a farm will produce, location, and home features. Any one may contribute more to value than the other two. In most cases, however, all three items influence farm value.

Value

Some understanding of value is necessary. Value is often thought to be the same as price. Price is the value of a specific good or service expressed in terms of money. Value is much broader. A thing is of value because it satisfies wants. When a farm is sold, it is valued at the sales price. To the buyer the farm may have a value more than the sales price.

Market value is the highest price that property will bring if sold on the open market within a reasonable period. The buyer should be informed as to the best uses of the property. Both buyer and seller must know the value of similar property in the community. The seller must be willing to sell.

There are many other kinds of value. Condemnation value is used in connection with taking property for highways, lakes, airports, and other public uses. This value is related to market value, but normally it is somewhat higher. Other values are determined in connection with loans, liquidations, and for inheritance, income, and property tax purposes.

Influence of Net Income

Net income from a farm may be considered as the flow of value over a period. The amount of interest received in a year from a savings account is related to the money on deposit. So is net farm income related to farm value.

Historically, the value of farm real estate has changed with net farm income (see graph). Changes in real estate value have lagged behind changes in farm income. A major exception in this relationship has occurred since the early 1950's. This exception may indicate that farm real estate values are influenced more by other factors than net farm income.

Capitalization of net income that property will bring over a long period is one process of estimating farm value. Suppose net income is $3,000 – in this case return to farm real estate after costs including labor and management are deducted. If capitalization rate is 6%, capitalized value is $50,000 ($3,000 ÷ .06). In case of a farmer owning and operating a farm, the capitalization rate should be higher than the prevailing first mortgage interest rate. A higher rate should reflect risks of owning and operating the farm compared with investing in a real estate mortgage.

Location and Home Features

The $50,000 figure above probably would not be the market value of the farm. Such factors as location in respect to roads, churches, schools, towns, cities, hazards, and available utilities affect value. USDA reports show that discounts in average sales prices of farms for location on unimproved dirt roads may run as high as 20%.

A home does not contribute directly to income. Thus its value would not be reflected in the capitalized value, although it adds to the value of a farm. Home surroundings, age and condition of house, architecture, size, location relative to other parts of the farm, roads, and neighborhood affect home value.

To determine the value of a farm, income-producing ability, location, and home features should be taken into account. Value comparisons should be made with similar farms that have been sold in recent years.

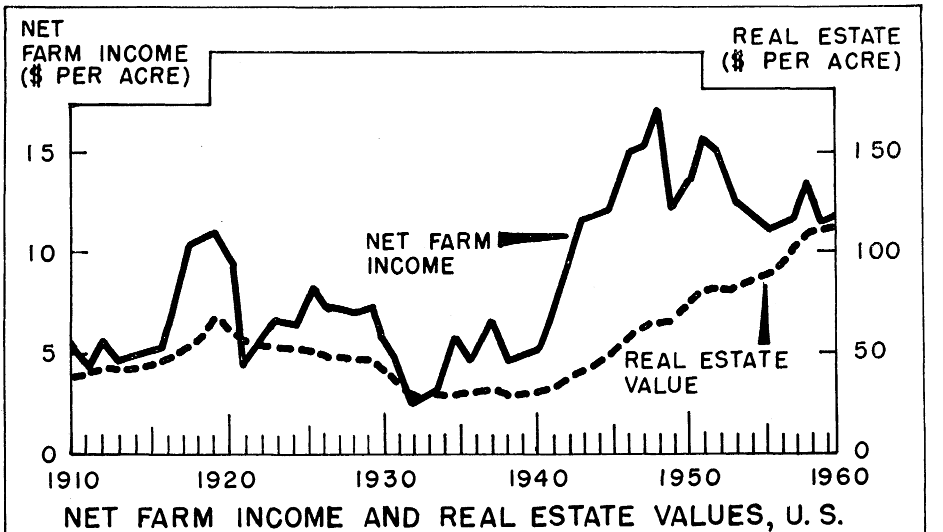
Trend in Values

In 1950 the average value of farm real estate in Alabama was $49 per acre; in 1955 it was $59; and in 1960, $81 per acre. The increase since 1955 has averaged 5% per year. Will farm land continue to increase in value?

No one knows the answer to this question. It seems logical, however, that farm real estate values will continue upward as population increases. Land needs for roads, airports, cities, pipelines, and hundreds of recreational uses, such as lakes, parks, game preserves, and golf courses, will grow.

Some additional land may be needed to produce expanded food and fiber needs, although per acre yield increases will meet a large part of these needs. Government programs and policies are also factors affecting values.

Why the $4,750 per acre for avocado land in California? It is because of high net income per acre along with many other factors that contribute to the increase in demand for land. Nonfarm uses, as they affect farm real estate values, are becoming increasingly important.



NET FARM INCOME AND REAL ESTATE VALUES, U. S.

Increasing ROW PLANTER EFFICIENCY

E. S. RENOLL
Associate Agricultural Engineer

HOW MANY ACRES per day can you plant? Is your neighbor getting more capacity from his machines than you? Does seedbed preparation have any influence on row-crop machine capacity?

These and many other questions are being continually asked by farmers. Field capacity varies greatly from field to field and from operation to operation. Many factors influence machine capacity. Some of these factors have been well analyzed. Other factors, such as turning space at row ends and quality of seedbed preparation, are now being measured and their effects on machine capacity are being determined.

Lost Productive Time

Lost productive time for typical farm machines ranges from 10% for disk harrows to 50% or more for combines. Recent studies of lost time for row crop planters suggest that some of these machines have a lost time value as great as 65%.

During planting operation, time spent adding seed, fertilizer, chemicals, turning at row ends, and making field stops and adjustments are lost time and as a result will influence the field capacity of the planter.

Field stops and adjustments might be caused by faulty equipment or by poor judgment on the part of the operator. These field stops and adjustments might also be influenced by the seedbed condition at planting time.

Seedbed Preparation

Farmers have known for years that a well prepared seedbed has many advantages. Increased planter capacity during the planting operation probably is not generally considered to be one of the chief advantages of a well prepared seedbed. During recent studies at Auburn of some of the factors that influence field capacity, it appeared that seedbed conditions did influence planter capacity.

In 1960 a comparison of two fields was made to determine if seedbed preparation did influence planter capacity. Field A had a well prepared seedbed. The soil was well pulverized and firm. Crop residue was plowed under and the surface was reasonably smooth. Field B had much of the previous crop residue on the surface. The seedbed contained large lumps and clods and was rough and uneven. A 2-row planter was used on both fields. Planting operations on the two fields were identical with respect to tractor, driver, speed, row length, and turning area.

A record of the lost time for field adjustments and stops, which appeared to be associated with seedbed conditions, was kept. The results of this planter capacity study are as follows:

Item measured	*Field A*	*Field B*
Time to add seed and fertilizer, pct.	3.3	3.3
Time for turning, pct.	9.3	9.3
Time for field adjustments and stops, pct.	8.7	21.0
Planter speed, m.p.h.	3.9	3.8
Planter capacity, acres per hour	3.0	2.6

Under the conditions of this test, the planter capacity in Field A was 0.4 of an acre an hour greater than in Field B. The field with the well prepared seedbed had 8.7% stop and adjustment time whereas the field with the poorly prepared seedbed had 21%.

Cultivator Capacity

These same fields were compared for cultivator capacity during the first cultivation. Using a 2-row cultivator, the capacity in Field A was 1.3 acres per hour and in Field B it was 1.1 acres. During the cultivation a record was kept of each stop and adjustment that appeared to be associated with field surface condition. An analysis of these data indicates that Field B had 10% more stops than Field A.

Summary

Planter and cultivator capacity as influenced by seedbed condition points up the following:

1. Seedbed condition at planting time can influence planter capacity.

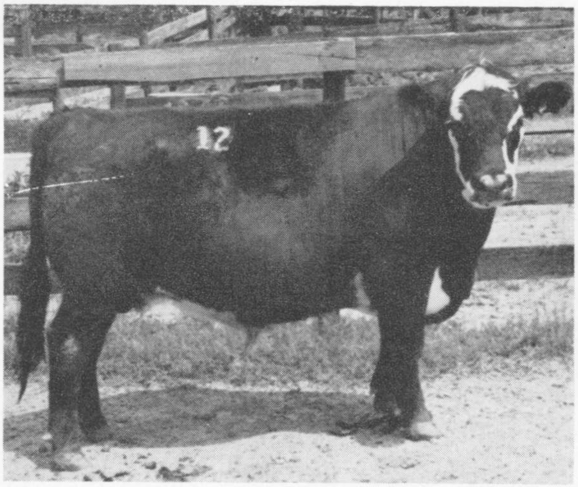
2. Planting capacity of a 2-row planter was 0.4 acre per hour greater on the good seedbed than on the poor one.

3. Surface trash, lumps, clods and uneven surface conditions of the poor seedbed caused excessive field stops and field adjustments.

4. Cultivator capacity was influenced by seedbed condition.

5. Cultivator capacity during first cultivation was 1.5 to 2.0 acres per day greater in the good seedbed field than in the field with the poor seedbed.

Increased field capacity obtained from planters and cultivators as a result of good seedbed conditions will make it possible to (1) handle more acres with a given size planter or cultivator, or (2) to use smaller and less expensive planters and cultivators.



The steer shown is an example of the type to be expected from a Hereford and Angus cross.

CROSSBREEDING

with British Breeds

TROY B. PATTERSON, W. M. WARREN, J. F. PRICE, and
G. B. MEADOWS, *Department of Animal Science*

EXTENSIVE RESEARCH has been conducted on crossing Brahman and British cattle in the Gulf Coast region with application of results limited largely to that area.

In contrast, few studies have considered the performance of crosses among British breeds. While data on crossing British breeds are not conclusive, there is sufficient evidence to warrant further investigation of this breeding method to improve production.

Results presented are limited to data collected on steer calves produced over a 3-year period at the Auburn University Agricultural Experiment Station.

Research Conducted

Twenty-four cows each of the Angus, Hereford, and Shorthorn breeds were bred at the Station to produce calves sired by bulls of each of the 3 breeds. Thus, basic comparisons are available between purebreds and all possible types of crossbreds.

All cows were maintained under practical conditions. No differences in environment were deliberately introduced. All calves were raised on pasture without creep or nurse cow. At weaning the steer calves were placed on permanent type pasture until weaning was complete. At least 2 weeks were allowed for adjustment after weaning before going to the feedlot.

The steers were full fed a 30% roughage ration for an average of 233 days. All steers were slaughtered when each group had obtained the average grade of Choice. Average age at slaughter was approximately 19 months.

Results

Steer performance and carcass data summarized for the 3 years are given in the table.

In general the crossbreds performed better than the purebreds. However, there are 4 differences resulting from hybrid vigor that have economic significance. These differences from weaned weight, final feedlot weight and chilled carcass weight amounted to 10%. The 17% greater fat covering over the rib in crossbreds was a result in part from faster gain and heavier final weights. The fact that crossbreds were fatter is reflected in slightly higher slaughter grade. This difference of approximately one-third grade was fairly uniform throughout. As a result of extra fat and heavier carcasses, the crossbreds had a smaller area of rib-eye per cwt. of carcass. However, after correcting for differences in carcass weight, the difference amounted to only 0.09 sq. in. indicating that had the heavier crossbreds been slaughtered earlier these differences would have been very small or non-existent. Differences from weaning weight and from feedlot gain account for only 62 lb. of the 94 lb. difference in final feedlot weight. The remaining 32 lb. are a result of faster gains made by the crossbreds on pasture after weaning.

Crossbred steer calves weaned heavier, gained faster in the feedlot, and had heavier carcasses that graded slightly higher than purebred calves. Purebred calves were leaner than crossbreds as indicated by fat covering over the rib.

PUREBRED AND CROSSBRED STEER DATA, THREE-YEAR AVERAGE, 1957-60

Breed	Steers	250-day adjusted weaned weight	Av. daily gain feedlot weight	Final feedlot weight	Chilled carcass weight	Carcass grade[1] Federal	Fat thickness	Adjusted rib-eye per cwt. carcass
	No.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Rating*	*In.*	*Sq. in.*
Angus	13	477.2	1.79	926.9	571.1	12.4	0.68	2.13
Hereford	12	408.8	1.86	862.3	517.6	10.8	0.69	2.18
Shorthorn	14	430.6	2.05	892.3	542.9	12.0	0.60	2.21
A × H[2]	3	488.7	2.16	1,005.0	622.7	12.7	0.83	1.98
A × S	4	450.2	2.09	971.0	599.2	12.8	0.89	2.24
H × A	7	477.8	1.90	956.7	581.6	12.0	0.74	2.12
H × S	6	532.7	2.03	1,039.0	649.3	12.3	0.76	2.08
S × A	10	476.4	1.86	967.2	586.6	13.0	0.71	2.06
S × H	9	472.6	2.05	1,007.3	612.4	12.5	0.77	2.04
Av. purebreds	39	439.4	1.90	894.6	544.5	11.8	0.65	2.17
Av. crossbreds	39	482.7	1.98	988.9	605.4	12.6	0.76	2.08
Difference		43.3	0.08	94.3	60.9	0.8	0.11	−0.09

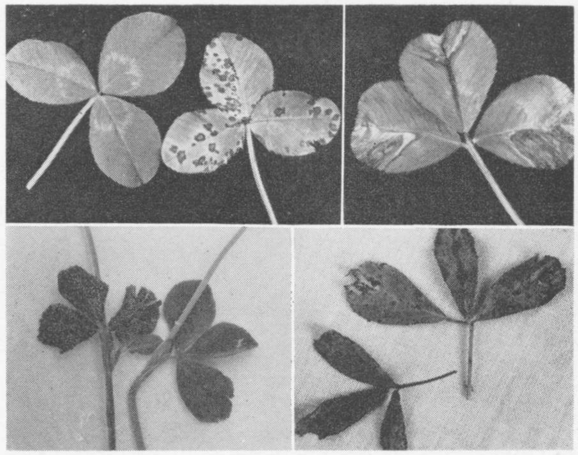
[1] Carcass grade ratings used were: 9—Low Good; 10—Medium Good; 11—High Good; 12—Low Choice; 13—Medium Choice; 14—High Choice.

[2] Abbreviations are used for the breeds crossed. The first abbreviation of each cross is the male and the second the female.

WHITE CLOVER, crimson clover, and alfalfa, important Alabama crops, are constantly plagued by numerous disease-causing agents.

E. A. CURL
Associate Plant Pathologist

DISEASE PROBLEMS of clover and alfalfa



Upper left shows healthy white clover leaf contrasted with that diseased with bacterial leafspot. Upper right shows white clover with Curvularia leafspot; lower left shows sooty blotch on crimson clover and lower right is Ascochyta blight of alfalfa.

Crown rots and root rots are probably the most important diseases of clovers and alfalfa because they kill entire plants. Often overlooked, however, are the leaf-spotting diseases that kill a large number of leaves or cause excessive leaf-drop and reduction in the yield and quality of hay, forage, or seed. The primary agents causing these diseases are fungi, but some are caused by bacteria, viruses, and nematodes. The diseases are commonly named according to the parasitic organism infecting the plant. For example, Pseudoplea leafspot of clover is caused by the fungus *Pseudoplea trifolii.*

The occurrence and severity of specific diseases depend largely upon temperature and rainfall. Therefore, most diseases are prevalent during the spring and summer months when temperatures favor growth and reproduction of the greatest number of parasitic organisms.

Survey Conducted

During the spring and summer of 1959 through 1961, a survey was made of kinds and relative severity of diseases of white clover, crimson clover, and alfalfa in Alabama. Most emphasis was placed on the occurrence of leaf diseases, since these have received least attention in the past. One or more of the 3 crops were examined in small plots and fields at 11 substations or experiment fields of the Auburn University Agricultural Experiment Station. Some fields were examined more than once during the same year. Leaf-disease severity was rated according to the following numerical system: (1) clean; apparently no disease present; (2) up to 10% of leaves affected but no appreciable quantity of tissue destroyed; (3) 10-50% of leaves affected and/or up to 25% of tissue destroyed; (4) 50-90% of leaves affected and/or 25-50% of tissue destroyed; and (5) over 90% of leaves affected and/or over 50% of tissue destroyed. Severity of root and crown diseases for a particular year was designated as slight, moderate, or severe.

Diseases Encountered

Ten different diseases were encountered on white clover, 4 on crimson clover, and 9 on alfalfa. The most destructive disease of white clover was Sclerotium blight caused by the soil fungus, *Sclerotium rolfsii.* The disease was severe at the Black Belt Substation in August, 1961 during a prolonged period of abundant moisture and high temperatures. The most damaging leafspot diseases of white clover were Stagonospora leafspot and Ascochyta blight in May and June of 1960 and 1961. A bacterial leafspot caused considerable leaf damage in May of 1961.

Cymadothia leafspot (sooty blotch) was the most prevalent and damaging disease of crimson clover in the early spring of all 3 years. Lower leaves were most severely affected, and the disease was most prevalent in fields that had not been grazed by livestock. The only other disease that occurred consistently was Cercospora leafspot.

Alfalfa was damaged most by Ascochyta leafspot in May and June of 1960 and 1961. Spring blackstem, caused by the same fungus, was also prevalent on stems but caused little damage. Pseudopeziza leafspot and Stemphylium leafspot were common on alfalfa throughout the summer causing yellowing and considerable leaf-drop. Alfalfa diseases were intensified in fields not recently clipped or along strips or borders not clipped.

RELATIVE SEVERITY OF DISEASES OF CLOVERS AND ALFALFA IN ALABAMA DURING THE PERIOD APRIL TO AUGUST, 1959-61

Diseases	White clover			Crimson clover			Alfalfa		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
Cymadothia leafspot	2.00	1.44		2.43	2.86	2.77			
Ascochyta blight		1.47	2.54				1.52	2.36	3.47
Cercospora leafspot		1.91		1.68	2.00	2.06		1.60	2.01
Pseudoplea leafspot	1.72	1.98	1.60				2.00	2.00	1.30
Stemphylium leafspot					2.25		2.20	1.95	1.99
Stagonospora leafspot	2.00	2.35	1.80						
Bacterial leafspot	1.60	1.33	2.10						
Pseudopeziza leafspot							2.31	2.11	
Yellow patch (virus)	1.53	1.47	1.18						
Curvularia leafspot		1.41	1.90						
Black patch	1.80								
Powdery mildew								1.74	
Phyllosticta leafspot				1.69					
Sclerotium blight			[1]						
Sclerotinia crown rot							[2]		
Spring black stem							[3]	[3]	[2]
Summer black stem									[3]

[1] Severe
[2] Moderate
[3] Slight

Control Measures

Because of the relatively low cash value of most forage crops, chemical control measures are seldom practical from a cost standpoint. Severity of leaf diseases may be reduced by frequent clipping or grazing. This interrupts the life cycle of the parasitic organisms and prevents the disease from building up to intensive proportions. Since Sclerotium blight and Sclerotinia crown rot are caused by fungi that live for several years in the soil, long rotations with grass crops may reduce their severity.

Sorghum almum— FRIEND or FOE?

C. S. HOVELAND, *Associate Agronomist*

WHAT ABOUT Sorghum almum? Is it a potential pest that deserves the ban it has received in some states? Or is it worthy of the "valuable forage plant" description used by some?

Neither idea is completely correct, according to results of Auburn University Agricultural Experiment Station research. These studies have been done during the last 4 years to determine the value of Sorghum almum as a forage plant for the State.

Natural Hybrid

Sorghum grass, or Columbus grass, is usually referred to by its scientific name of *Sorghum almum*. It appears to be a natural hybrid of Johnsongrass and an unknown sorghum, discovered in Argentina about 25 years ago.

A tall-growing summer perennial grass, Sorghum almum reaches a height of 6 to 10 ft. It resembles Johnsongrass but has thicker stems and wider leaves. Sorghum almum has thick, short rhizomes, but they do not penetrate as deeply into the soil as those of Johnsongrass. The seed are slightly larger but difficult to distinguish from Johnsongrass.

Is Sorghum almum a vigorous perennial grass? Results of clipping trials show that stands are often depleted by spring of the second year. Sometimes stands thickened from tillering of remaining plants and produced satisfactorily the second year. Because of generally poor vigor and low yields the second year, Sorghum almum should be considered as an annual rather than a perennial in Alabama.

First-Year Production High

In the establishment year, yield of Sorghum almum has been about the same as that from well-established, fertilized Johnsongrass. However, the superior seedling vigor of Sorghum almum results in higher production than from a new stand of Johnsongrass.

YIELDS OF ANNUAL FORAGE CROPS, 10 ALABAMA LOCATIONS

Location	Dry forage yields per acre		
	Sorghum almum	Gahi-1 millet	DeKalb SX-11
	Tons	*Tons*	*Tons*
Belle Mina	4.18	5.56	4.54
Crossville	3.07	3.35	3.35
Camp Hill	2.94	3.08	3.00
Auburn	2.27	4.04	2.86
Tallassee	6.48	4.32	5.07
Prattville	4.85	5.28	4.33
Marion Junction	5.56	4.57	5.77
Headland	6.76	6.92	5.06
Brewton	3.64	5.13	3.66
Fairhope	4.54	5.71	4.61
AVERAGE	4.43	4.80	4.22

Since Sorghum almum is, for all practical purposes, an annual plant, how does its production compare with other summer annuals? As shown in the table, it has generally been no better and sometimes less productive than Gahi-1 millet. However, on Sumter Clay at the Black Belt Substation, Gahi-1 millet has always been less productive than Sorghum almum. Production was about the same when compared with DeKalb SX-11, an annual sorghum-Sudan cross. Sorghum almum has produced considerably more forage than sweet Sudan. It maintains production better into the fall than millet, but no better than SX-11 when clipped monthly.

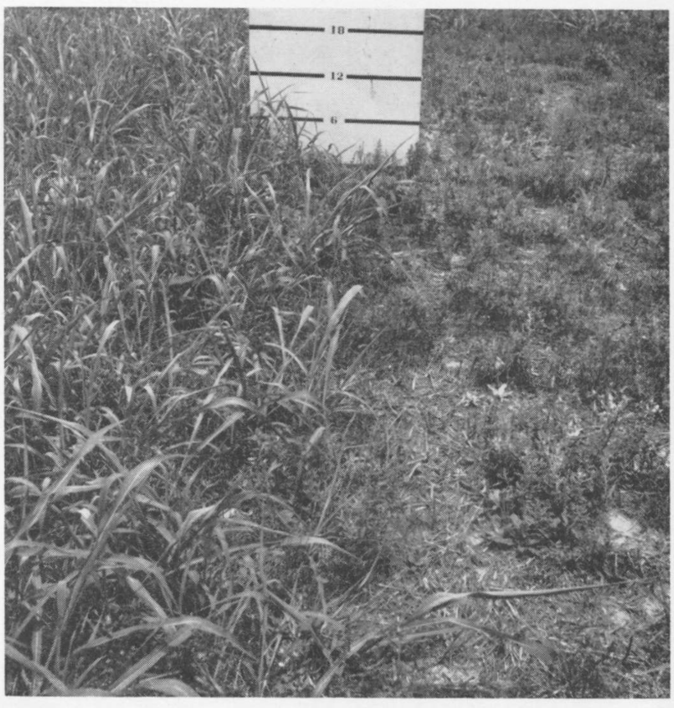
Leafiness of plants is a measure of forage quality. Separation of the forage at each harvest during the growing season revealed that Sorghum almum was leafy in early season. However, it was always less leafy than Gahi-1 millet.

Will livestock eat Sorghum almum? Observations at the Black Belt and Piedmont Substations indicate that cattle like the forage.

Can Be A Pest

Is Sorghum almum a pest? No problems have developed in controlling grass from the rhizomes. However, volunteer stands have occurred where the species has reestablished itself on cultivated land from seed produced the preceding year. At the Gulf Coast Substation, Sorghum almum was a pest in corn following a crop of the grass.

Even when considered as an annual, Sorghum almum is not superior to Gahi-1 millet or SX-11 sorghum-Sudan cross in yield or quality. In addition, it can become a pest from reseeding in cultivated areas. Consequently, other annual grass species are recommended instead of Sorghum almum for summer forage.



Stand survival of Sorghum almum (right) is generally poor the second year as compared with survival of Johnsongrass (left).

Resistant Cottons, Nematocides, and Fallow vs. NEMATODES

N. A. MINTON, *Nematologist, USDA*
E. J. CAIRNS, *Nematologist*
A. L. SMITH, *Plant Pathologist, USDA*

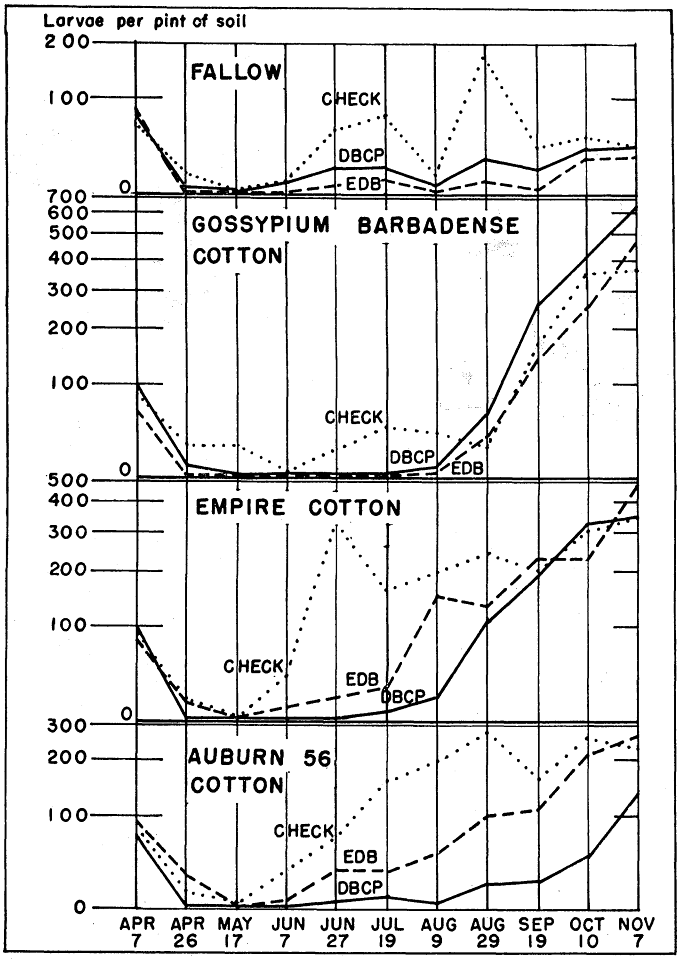
ROOT-KNOT NEMATODES, serious cotton pests, may reduce cotton yields 50% or more.

To find ways to prevent this loss, researchers at the Auburn University Agricultural Experiment Station conducted studies of the effects of 3 types of cotton, 2 nematocides, and land fallowing on the number of root-knot larvae in the soil. These tests were made at the Plant Breeding Unit, Tallassee.

Tests Conducted

The first soil samples were collected on April 7, 1960 just prior to the application of nemagon (DBCP) and ethylene dibromide (EDB) fumigants to certain plots. Auburn 56, a moderately resistant variety of cotton; Empire, a highly susceptible variety; and *Gossypium barbadense,* a highly resistant selection were planted April 18.

Soil samples were collected periodically and a count made of the nematodes recovered per pint of soil. This information for the various collection dates is given in the chart.



The chart shows infective root-knot larval populations in plots planted to various cottons or left fallow when fumigated with DBCP, EDB, or left untreated.

The number of nematodes in all treatments declined during April and May. The decline in number in the nonfumigated plots resulted from the small amounts of roots available for feeding and the rapid utilization of food reserves in the nematodes resulting from increased activity as the soil temperature rose. The nematodes also began entering the cotton roots as they grew and were no longer free in the soil. During June and July the number of nematodes increased in both the fumigated and nonfumigated soil, but the increase was much greater in the nonfumigated soil.

Late-season differences between fumigated and nonfumigated plots were slight. However, fumigants are effective if the nematodes are suppressed until the plants become well established, since the seedling stage is the critical period for nematode control. The aim of practical fumigation is not to eradicate nematodes but to reduce the number present to a level low enough to permit plants to become established. The cost of eradication would be prohibitive. Both DBCP and EDB effectively reduced the nematode population level during the critical early growing period of cotton.

The nematode population levels did not rise as rapidly under the resistant cottons, especially under *G. barbadense,* as under the susceptible Empire. Although the resistant cottons tolerated nematode attacks well, the nematodes were able to reproduce on the resistant plants. Galls were smaller and less numerous and root decay less severe on resistant plants than on the more susceptible ones.

Fallow and fallow plus fumigation maintained the root-knot larval population at a low level throughout the tests. Fallow without fumigation was almost as effective as fallow with fumigation. However, results indicate that resistant cottons or soil fumigants will not reduce the nematode population to a level safe for root-knot susceptible crops the following year.

Recommendations

Planting root-knot resistant cotton varieties, such as Auburn 56, is the most economical root-knot control measure for most Alabama soils. Other tests have indicated that soil fumigation plus the use of a resistant variety may be practical on productive soils that are heavily infested. In addition to being resistant to root-knot nematodes, Auburn 56 is also resistant to Fusarium wilt. Fusarium wilt does not occur in the absence of root-knot nematodes and it increases as the number of nematodes increase. Therefore, the root-knot and Fusarium resistant qualities of Auburn 56 make it a good variety to plant in root-knot infested soil.

COTTONS of TOMORROW

L. J. CHAPMAN, *Assistant in Agronomy*
A. L. SMITH, *Plant Pathologist, USDA*

COTTON MAY BE hard to recognize in a few years. Its appearance might be entirely different – maybe even red instead of green.

Although not so apparent, there will be other differences. A backlog of genes is waiting to be put into improved cotton varieties. All of the tools of modern genetics – cytology, pathology, nematology, and plant breeding – are being used in intensive efforts to develop varieties better suited to cotton producer and consumer needs.

Hybrids, When?

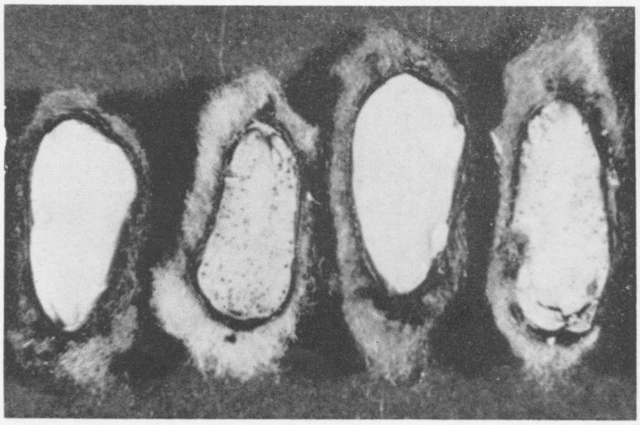
Full use of hybrid vigor (heterosis) in cotton varieties, as used in corn for many years, is still in the future. There are two major problems to be solved before true cotton hybrids can be made available to growers. These are (1) mode of cross pollination and (2) full controlled pollination.

Unlike corn and other crops, cotton pollen is too heavy to be carried by wind. Insects must do this job. The bumble bee is the most efficient cross pollinator of cotton, far ahead of the honey bee. Since it has not yet been possible to rear bumble bees in captivity, high natural populations will be necessary for satisfactory production of hybrid seed.

The problem of controlling pollination appears even more difficult. In producing hybrid corn seed, it is a simple matter to remove the male portion of the flower (tassel) from the female parent and allow pollen from another source (male parent) to be deposited on silks of detasseled plants for cross pollination. In addition, male sterility factors have been developed in corn. This makes it possible to produce hybrid seed without detasseling. This method is also being used in producing hybrid grain sorghums and other crops.

In cotton, both male and female floral parts are in the same structure. Removal of the male parts by hand is far too laborious and time-consuming to be practical. A satisfactory source of male sterility in cotton has not yet been found. This approach appears to be the most promising possibility and cotton geneticists are hopeful that a satisfactory source of sterility will be found.

Use of chemicals to induce male sterility is another promising avenue of research. It has been found that certain chemicals, when applied to cotton at critical times and at suitable rates, will cause male sterility. The most promising of these, however, also causes a certain amount of female sterility, thereby reducing yield of plants on which hybrid seed are being produced. This reduced yield would greatly increase the cost of hybrid seed.



Sections of cottonseed at right show results of one phase of cotton breeding research. Dark spots in two of the seed produce substance known as gossypol, which is poisonous to some animals. Seed without spots are from a glandless line that does not produce gossypol.

Low Gossypol

Gossypol is a substance produced by the tiny dark glands visible in bark and leaves of cotton plants and occurring in the seed. This substance is toxic to certain non-ruminant animals, and limits the use of cottonseed meal. Gossypol must be removed from cottonseed oil before it is suitable for human consumption. Glandless lines of cotton have been isolated and are being used in developing new varieties with little or no gossypol.

Insect and Disease Resistance

Cottons of the future may well be resistant to certain insects. Already scientists have discovered that boll worm moths are attracted by and feed on substances secreted by the nectaries at the base of cotton flowers and on the midrib of leaves. Lines without nectaries have been developed and are being used in breeding programs seeking varieties that suffer less damage from boll worms. An intensive effort is being made to locate and develop resistance to boll weevils and red spiders.

Greater resistance to the major diseases of cotton (*Fusarium* wilt, root-knot nematode, *Verticillium* wilt, and bacterial blight) will become a reality in the future. At present, no varieties with satisfactory resistance to *Verticillium* have been developed.

With the rapidly increasing percentage of cotton acreage being harvested with spindle pickers, such characters as smooth leaf and storm resistance will be of increasing importance. Smooth leaves are desirable to improve cleaning at the gin. Storm tolerance allows cotton to be left in the field until all is open without fear of weather loss. Higher tensile strength is needed to improve spinning and wearing qualities of cotton.

The cotton breeding program at Auburn, which is cooperative between the Agricultural Experiment Station and USDA Cotton and Cordage Fibers Research Branch, is actively working toward tomorrow's cottons. Efforts are being made in these areas: (1) male sterility, (2) *Fusarium* wilt and root-knot resistance, (3) bacterial blight resistance, (4) smooth leaf, (5) high tensile strength, (6) glandless (low gossypol), and (7) nectaryless.

SPRAY vs. DUST for Peanut Leafspot Control

J. A. LYLE, *Head, Department of Botany and Plant Pathology*

LEAFSPOT IS AN important disease of peanuts. It is often considered the most important peanut disease because of frequency of its occurrence. Control of this disease is imperative, since Alabama production is worth more than $20 million annually.

Control studies give the best index of the importance of leafspot control. In recent years, average yields of peanuts in different Alabama tests have been considerably lower on untreated areas than where leafspot was controlled. In addition, there were corresponding increases in leafspot incidence on untreated plots.

Two types of spotting are common on peanuts in the southeastern United States. Each of these spots is caused by a different species of the fungus genus *Cercospora*, *Cercospora arachidicola*, and *Cercospora personata*. However, effects of the two organisms are regarded as only one disease.

Control measures seem equally effective on both organisms. In addition to spots on leaves, they occur on stems, petioles, pegs, and pods. Associated with early defoliation of plants have been blights and rots of these plant parts, including peg breaking and stem rot.

Peanut leafspot, as shown in the photo, may be invisible for as long as 3 weeks after leaves become infected. Once the leafspot organism gets into the leaf it cannot be killed. Thus, leaves should be kept coated with a fungicide to prevent infection. The fungicide kills the fungus spores before they can penetrate the leaf. Beginning in the first part of July on runner peanuts, three or four fungicide applications are needed at 10- to 14-day intervals. With this schedule, the last application will be made about a month before harvest.

Considerable information on using fungicidal dusts for leafspot control was obtained in 9 years of research at the Wiregrass Substation, Headland. Yield data are given below:

Year	*Yield, pounds per acre*	*Increase from dust, pounds*
1945	1,599	231
1946	2,079	267
1947	2,053	261
1948	3,302	1,149
1949	2,393	496
1950	1,888	322
1951	335	18
1952	1,405	252
1953	1,127	108

Many different dusts and schedules were tried during the 9 years. The most consistent in performance was sulfur dust containing about 3.2% metallic copper. Except in unusually dry years, four applications gave best control.

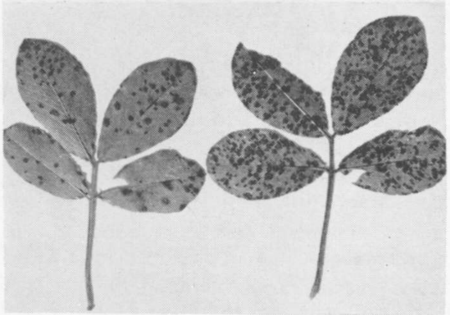
Fungicidal sprays applied at low gallonage rates per acre have been evaluated during the past 2 years at the Wiregrass Substation. Relative effectiveness of dusts and sprays in *Cercospora* leafspot control was measured by decreased incidence of the disease and yield increase of nuts.

Fungicides used in the sprays have been wettable powders, except Tennessee Copper-90 which is a liquid copper compound. All wettable powders are available commercially, but the liquid copper is not yet on the market. Sprays were applied four times at the rate of 30 gal. per acre each year.

As shown by data in the table, most of the spray fungicides were as good or better than copper-sulfur dust in controlling leafspot. This is evidenced by the incidence of leafspot and yield of nuts. All fungicides used were compatible with insecticides recommended for peanut insect control.

As learned in the studies, fungicidal sprays show promise for effective control of *Cercospora* leafspot of peanuts. The sprays also showed several advantages over fungicidal dusts: (1) permits dual use of ground spray equipment used in insect control; (2) better coverage of plant parts is obtained; (3) drift, which is common with dusts, is eliminated; (4) spraying can be done at any time of day; and (5) operator safety is improved.

Whether dust or spray is used, leafspot control is profitable. It prevents yield and quality loss from the disease. Chance of leafspot the following year is lessened, since treatment prevents fallen leaves that provide organic matter on which fungi grow.



These leaves show typical spotting caused by peanut leafspot. The disease organism may be in the leaf for 3 weeks before the spotting is noticed. Once leaves are infected, there is no effective treatment.

EFFECT OF DIFFERENT SPRAYS AND DUSTS ON YIELD AND INCIDENCE OF PEANUT LEAFSPOT

Fungicide and rate per acre	Spots per leaf, average		Yield per acre		Yield increase	
	1960	1961	1960	1961	1960	1961
	No.	*No.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Copper-sulfur dust, 15-25 lb.	5	2	1,544	2,072	84	213
Cyprex spray, 1 lb.	2	3	1,571	1,861	111	2
Cyprex spray, 2 lb.	3	2	1,562	2,103	102	244
Dithane M-22 spray, 1-1½ lb.	2	8	1,604	2,155	144	296
Dithane M-22 dust, 15-25 lb.	7	10	1,429	1,867	0	8
Dithane M-22 + sulfur dust, 15-25 lb.	5	5	1,623	2,174	163	315
Phaltan spray, 2 lb.	4	8	1,531	2,124	71	265
Tennessee Copper-90 spray, 1 gal.	4	4	1,425	2,168	0	309
Tennessee Copper-90 spray, 1½ gal.	2	2	1,606	2,210	146	351
Tennessee Copper-90 spray, 2 gal.	2	3	1,850	2,229	390	370

Examples of foliar feeding of both landscape plantings and canned plants are shown.

FOLIAR FEEDING

for woody plants

TOK FURUTA and BILL MARTIN
Department of Horticulture

FEEDING WOODY PLANTS by applying fertilizer to the above-ground portions is not new. By using radioactive fertilizers, scientists have found that aerial portions of plants – leaves, twigs, fruits, flowers, and branches – will absorb nutrient elements.

Before this recognition, benefits reported from applications of insecticides and fungicides to control insects and diseases may have resulted from leaf absorption of the nutrient elements contained. Partial correction of iron deficiency in plants has been observed at the Auburn University Agricultural Experiment Station from the application of Ferbam.

Foliar Feeding

Foliar feeding is not limited to the use of microelements. There are definite commercial possibilities for its use in the production of some crops.

Foliar feeding of ornamental plants has been tested for several years at the Auburn Station. From a series of experiments using selected varieties of narrow-leaf and broadleaf evergreens, and deciduous plants, the following results were found: (1) plant growth was as good when one soil application of fertilizer was followed by foliar applications throughout the season as when frequent soil applications were made; (2) less plant growth resulted when only foliar applications of fertilizer were made as compared with frequent soil applications even though the plant did not exhibit visual symptoms of nutrient element deficiency; (3) all woody plants tested readily absorbed foliar applied nitrogen; (4) a complete fertilizer applied to the foliage was as effective as soil applications of phosphorus and potassium and foliar applications of nitrogen; (5) the effectiveness of foliar feeding varied with plant species; (6) the effectiveness of foliar feeding varied with the compound or complete fertilizer used; (7) the cost of applying fertilizer to container-grown plants was reduced; and (8) no plant damage occurred from properly applied foliar applications of fertilizer.

Experimental Results

Nitrogen applications made to the soil using either a complete fertilizer containing 8%N or an equivalent amount of N from urea formaldehyde fertilizer was selected as the standard. Foliar applications of urea as a source of N prevented the development of deficiency symptoms. However, total growth of the plant tops was less. Study of the cost of materials and the cost of applying fertilizers revealed that the soil applications were higher than the foliar applications. The cost of fertilizer and labor required per 1,000 cans is for a 6-month period.

Fertilization	*Cost of material*	*Labor required hr.*	*Fresh plant tops, wt. gm.*
Farm grade 8-8-8 to soil	$ 1.32	24	86.1
Urea formaldehyde nitrogen plus 0-8-8 to soil	14.52	24	90.2
Foliar feeding with urea	9.58	15½	64.6

Foliar applications combined with soil applications resulted in excellent plant growth. Long term urea formaldehyde fertilizer was incorporated into the soil before planting and the plants foliar fed the remainder of the season. Plant growth was as good with a complete fertilizer applied to the foliage as when only nitrogen was applied and phosphorus and potassium applied to the soil.

Fertilization	*Fresh plant tops, wt. gm.*
Urea formaldehyde N and 0-8-8 to soil	56.2
Foliar feeding with urea and 0-8-8 to soil	59.1
Foliar feeding with 23-21-17	60.8

Advantages

Foliar feeding is not liquid feeding because the latter means only that the fertilizer is applied to the soil in a liquid solution. Foliar feeding is spraying the fertilizer on the foliage – generally only a small amount of spray is used.

The technique of foliar feeding will supply needed nutrient elements to woody ornamental plants, will result in plants of excellent quality, is safe to use, and will reduce the cost of fertilization. The technique may be used for commercial production of plants, or for proper caring for plants in the landscape.

Management practices affecting SOW PERFORMANCE

C. D. SQUIERS, *Assoc. Animal Husbandman*

MOST SWINE PRODUCERS know that the number of pigs raised per sow is a major factor in determining profit.

A common question asked by a producer seeking a herd boar is "How many pigs were in the litter?" Research has shown that the number of pigs raised is a trait having low heritability. This means that it is strongly influenced by environmental factors and not easily improved by selection. Research has also shown that a well-planned crossbreeding program is the best breeding method available to the producer who seeks to improve sow performance rapidly in a commercial operation.

Research Conducted

Researchers at the Auburn University Agricultural Experiment Station and at other state experiment stations have conducted many tests to learn which environmental factors are important, how they exert their influence, and how the producer can control them through proper management. Research has shown that gilts bred too young will, on the average, ovulate fewer ova and farrow fewer pigs than those not bred until they are at least 8 months of age. Also, well-grown gilts that are lean and firm at breeding time but gaining in condition raise more pigs than those too fat when bred. Gilts and sows kept in firm, muscular condition during gestation have less trouble at farrowing and raise more pigs than those that are fat.

Conditioning Important

Proper conditioning before and after breeding can be accomplished only by limiting total dietary energy without reducing protein, vitamins, and minerals below safe levels. A bred gilt should receive about 0.8-1.0 lb. of protein in her daily ration – a bred sow slightly more. Five or six pounds of a well-balanced 16% protein ration containing at least 15% alfalfa meal will supply this amount and usually furnish adequate vitamins and minerals. One to 1½ lb. of 40% protein supplement and 4 or 5 lb. of corn daily will also supply about this amount of protein. However, it may not supply enough vitamins unless the protein supplement has been formulated for the purpose or supplemented with good pasture or good quality legume hay in racks.

MANAGEMENT INFLUENCE ON REPRODUCTION

Treatment	Ova	Pigs
	No.	*No.*
Concrete	13.30	10.04
Pasture	13.48	10.68
Antibiotic	13.56	10.23
No antibiotic	13.22	10.45

Pasture Desirable

Excellent pasture is very desirable for the breeding herd because it supplies high quality protein, vitamins and minerals, facilitates conditioning through exercise, and makes it easier to safely limit energy intake. General health of the gilt or sow at breeding time and during gestation has a marked effect on the number of pigs farrowed and raised.

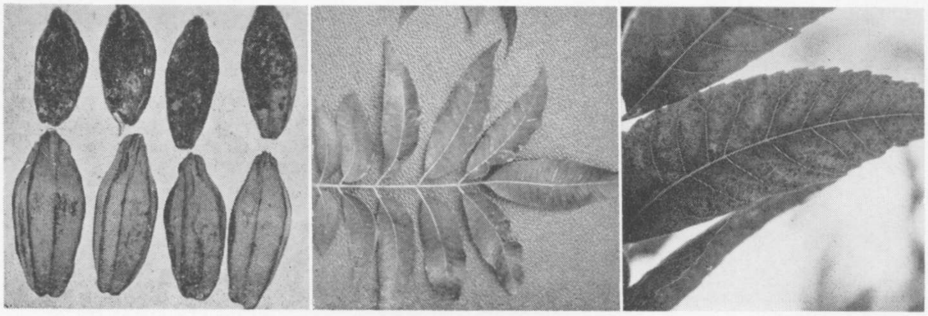
Disease Control

Brucellosis, leptospirosis, and erysipelas are important causes of poor performance. Respiratory disorders, enteritis, abscesses or other infections that cause fever or weakness at critical times are also important. A group of sows to be bred should be watched carefully as breeding time approaches. Any sickness should be treated and every effort made to have each female in top health when bred. Poor health at this time will cause fewer ova to be shed, fertilized, and properly implanted. Individual animals, obviously in poor condition, should be removed from the group, treated, and held for later breeding. A group of bred sows should also be observed carefully during gestation for condition and general health. Prompt action may prevent an individual sow from losing her pigs or farrowing a weak, poorly viable litter. Hot summer temperatures adversely affect litter size and viability of litters. For this reason bred sows should be kept cool by using shade, sprinklers, or wallows.

Feeding Tests

Since gilts perform better if not excessively fat at breeding, it has often been recommended that they be limited-fed before reaching 200 lb. Recent work at this Station does not indicate that this is necessary. Thirty-two gilts were kept on full feed on concrete until they reached 200 lb. An equal number of litter-mate gilts were removed from concrete at 112 days of age and given a limited ration on pasture. When the gilts confined to concrete reached 200 lb. they were also placed on limited ration on pasture. Both groups were "flushed" by increasing their feed intake shortly before breeding was started. No difference was found in number of ova produced or in number of pigs at 30 days of gestation.

It has been reported by the Missouri Station that feeding a high level of terramycin or aureomycin for a period of a few days before and following breeding resulted in increased litter size. In recent work at Auburn, 0.6 gm. of terramycin per head per day was fed to one-half of the gilts in a group of 64, for 5 days before and after breeding. No benefit was found in number of ova shed or number of pigs at 30 days gestation. It may be that response to a high level of antibiotic at breeding depends upon presence or absence of disease organisms which are sensitive to the drug.



Left: pecans from unsprayed tree (top) were ruined by scab; those from tree sprayed with Cyprex (bottom) are undamaged. Center: These leaves show symptoms of magnesium deficiency typical of Stuart variety. Right: Magnesium deficiency symptoms on Success pecans differ from those on Stuart.

Pecan Problems ATTACKED by Research Team

URBAN L. DIENER, *Assoc. Plant Pathologist*
GEORGE H. BLAKE, *Assoc. Entomologist*
HARRY J. AMLING, *Assoc. Horticulturist*

PECANS BRING in as much as $10 million to Alabama growers in a single year. Yet, this is only a fraction of potential production, because poor disease and insect control, improper fertilization, and other poor management limit yield.

In comparison with other crops, there is little basic information available on physiology and on disease and insect pests of pecans. Since correct management in all of these areas is necessary for top production, a team approach is being tried at Auburn University Agricultural Experiment Station to solve some of the fundamental problems.

Diseases

Pecan diseases frequently cause partial or complete loss of nuts and weaken trees by premature defoliation. The pecan scab fungus destroys nuts of highly susceptible varieties in about 4 out of 5 years. Varieties resistant to scab are often highly susceptible to downy spot and brown leafspot. Trees of lowered vigor are attacked more readily by such diseases as leaf blotch, Gnomonia leafspot, and powdery mildew.

Fungicidal spray experiments were done in 1961 with cooperators in Autauga, Baldwin, and Mobile counties. Both high-pressure (hydraulic) and air-blast sprayers were used to evaluate pecan scab control with dodine (Cyprex), zineb (Dithane Z-78, Parzate), and ziram (Zerlate) on Schley and Success varieties. Eight applications were made at 3-week intervals beginning before bloom.

As shown in the table, excellent control of scab was obtained with dodine in 1961, a severe scab year. Unsprayed trees suffered heavy losses.

Insects of Pecans

Insects are destructive to pecans in different ways. Casebearers (nut and leaf) bore into buds and destroy foliage. Aphids reduce vitality and frequently defoliate trees, causing a loss of the nut crop for the following season. The hickory shuckworm bores into nuts or shucks and pecan weevils cause nuts to drop prematurely. Serious defoliation is caused by the fall webworm and the twig girdler girdles small limbs and twigs in summer and fall. The pecan carpenter worm bores into trunks and large limbs. These are only the more important of many insects that damage pecans.

In 1961 research, insects were effectively controlled by regular applications of malathion, parathion, or methyl parathion (combined with DDT in late applications). Insecticides were applied with the fungicides listed in the table.

Physiology

Fertilizer requirements of pecan trees differ considerably from those of annual crops and perennial pastures. Nitrogen and zinc are the most important plant nutrients. Phosphorus and potassium needs are considerably less than for other crops.

Since soil tests do not show how much nitrogen and zinc is available to pecan trees, leaf analysis data are needed for determining requirements of these and other nutrient elements. Grower-cooperative experiments in 1960-61 permitted rapid identification of magnesium deficiency. Results revealed that over-fertilization with potassium was a major reason for occurrence of this condition. Visible symptoms of magnesium and other nutrient element deficiencies appear long after the condition develops. Through leaf analysis, "hidden" deficiencies or toxicities can be corrected before causing serious yield losses.

Studies on physiology of biennial bearing are also being done and correlated with leaf analysis work.

Field observations and leaf analysis data indicate that most Alabama pecan growers are using too little nitrogen and applying it too late for proper shoot and leaf growth. Pecans make their growth during a 30-day period commencing shortly after buds break in spring. Thus, nitrogen should be applied well ahead of this period.

The ultimate goal of this team study is high annual production of good quality nuts. Results emphasize that all phases of management – disease and insect control, fertilization, and cultural practices – must be used together. Use of one good practice without the others is a waste of time and money.

CONTROL OF PECAN SCAB WITH AIR BLAST AND HIGH PRESSURE APPLICATION OF FUNGICIDES, 1961

Fungicide and rate per 100 gallons	Disease index[1] for two varieties at three locations			
	Schley, Autauga		Success, Baldwin and Mobile	
	Air blast	High pressure	Air blast	High pressure
Dodine, 1 pound	0.71	----	0.70	0.08
Dodine, ½ pound	----	2.10	.67	.41
Zineb, 2 pounds	1.76	2.40	1.46	----
Ziram, 2 pounds	2.43	3.80	2.78	----
Check, insecticide only	3.98	4.00	3.57	1.49

[1] Scab index: 0, no scab; 1, trace to 10%; 2, 11-25%; 3, 26-50%; 4, 51-100%. Data were taken just before shuck-split.

Index to Articles Published in

HIGHLIGHTS *of* Agricultural Research

1961

In 1961, 52 articles reporting research results in 16 major areas of investigation were published in HIGHLIGHTS OF AGRICULTURAL RESEARCH (VOLUME 8). For convenience of the quarterly's readers, articles published last year are listed below by subjects. Complete indexes for the 7 previous years are listed in the spring issues of 1959, 1960, and 1961. You may wish to bring your files up to date. Extra copies of all 1961 issues are available to those who are missing copies and wish to complete their files. Write Editor, Auburn Agricultural Experiment Station, Auburn, Ala., for replacement copies, specifying which issues.

Auburn's AGRICULTURAL EXPERIMENT STATION SYSTEM

LILLIAN FOSCUE,
Graduate Assistant

AUBURN UNIVERSITY CENTENNIAL FEATURE

THE BLESSING of agricultural abundance in the United States is the result of a dream of 100 years ago!

An idea grew to free man from his dawn-to-dark struggle to wrest food and fiber from the soil. In this land founded on freedom and equal opportunity, universities were to be established in every state to teach the working man to do his job quicker and more efficiently. All men were to be free to gain an education "in the several pursuits and professions in life."

The Land-Grant Colleges in every state were made possible by passage of the Morrill Act in 1862. At the end of the Civil War, Alabama accepted the land-grant offer of the Federal Government and the Alabama Agricultural and Mechanical College was established at Auburn.

There were questions that confronted early agricultural educators. "What were better ways of farming" and "how to teach these ways?" Only through trial and error – by actual experiments on the land – could the most productive practices be determined. The first Board of Trustees sought to establish a system of experimental farms in the State. A college farm of 16 acres was under cultivation by 1874 and arrangements had been made to experiment with cotton and corn in the Tennessee Valley near Courtland. Outlying experiments were added 3 years later in Wilcox County.

In 1883 the College was provided the funds through a fertilizer tax to establish and maintain an experimental farm of 226 acres. The purpose of an agricultural experiment station, the first director, J. S. Newman, defined as follows: "Farmers generally cannot afford either the time or money to conduct experiments with such accuracy and persistency as to render the results valuable. Hence, the necessity for an agricultural experiment station where such investigations are conducted for the general good under the auspices of the State."

Impetus to agricultural research came in 1887 with passage of the Federal Hatch Act. Research funds available for agricultural research were almost tripled in Alabama with the beginning of federal-state cooperation in a nationwide research program on behalf of farmers.

Results of experiments made at Auburn were of such value to nearby farmers that those of the Black Belt, or prairie canebrake as it was then known, clamored for a branch experiment station to learn to cultivate their stiff, clay soil. In 1886 the Canebrake Experiment Station was established.

Cooperative fertilizer experiments with farmers on different soil types were started in 1888. The "Local Experiment Law" passed by the Alabama Legislature in 1911 made possible a vastly expanded program of field experiments throughout the State in cooperation with farmers. In 1927 the Legislature provided for establishment of 5 substations, 1 in each of the major soil regions and experiment fields on the less extensive soil types.

Work was started at once to determine suitable sites for the substations. In operation by 1930 were Gulf Coast Substation in Baldwin County, Black Belt Substation in Dallas County, Sand Mountain Substation in DeKalb County, Wiregrass Substation in Henry County, and Tennessee Valley Substation in Limestone County. Experiment fields were located at Alexandria, Prattville, Tuskegee, Monroeville, Brewton, Aliceville and Lafayette. The latter two were discontinued.

Five additional substations were provided by the Alabama Legislatures of 1943 and 1947 – the Upper Coastal Plain, North Alabama Horticulture, Piedmont, Chilton Area Horticulture, and Lower Coastal Plain substations. Forestry units were added to the system, plus a seed stocks farm and a plant breeding unit. The Ornamental Horticulture Field Station, officially established in 1951, was an outgrowth of the Spring Hill Laboratory, started in 1928. The Auburn Agricultural Experiment Station System today is comprised of the Main Station and 23 outlying research units, a far cry from the 16-acre farm first cultivated at the College.

Agricultural research recommendations were accepted slowly at first by farmers, but in the last 25 years an agricultural revolution has been in progress in Alabama. From this System have come to farmers better varieties of crops; more economical methods for food, feed, and fiber production; effective insect and disease controls; improved breeding and feeding for more economical production of beef, pork, poultry, milk, and eggs; better methods of weed control; and farm mechanization that now enables one man to do the work of many – to name a few.

Thus, today's farmer has become a highly skilled individual who provides food and fiber for many people off the farm.

FREE Bulletin or Report of Progress
AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
E. V. Smith, Director
Auburn, Alabama
Permit No. 1132—2/62-10M