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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. 319. Problem Recognition in Agriculture points up the importance of problem recognition in adjusting to a changing agriculture.

Bul. 320. Fertilizer Use and Practices by Alabama Farmers presents information obtained in a study of 463 farmers in 16 Alabama counties.

Bul. 321. Meats and Eggs Preferred by Alabama Consumers reports results of a market study of 436 Alabama families.

Bul. 322. Residual Value of Phosphates reveals residual value of accumulated phosphorus for crop yields as shown by 30 years of research.

Cir. 136. Nitrogen for Dallisgrass Pastures in the Black Belt shows value of nitrogen for Dallisgrass pastures.

Prog. Rept. 77. Systemic Insecticides for Thrips Control on Peanuts covers 5 years of tests with phorate.

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

SILAGE CROPS *for northern Alabama*

E. M. EVANS, *Associate Agronomist*
JOHN K. BOSECK, *Supt., Tennessee Valley Substation*

These are two silage crops being tested, Sart Sorgo, left, and Dixie 18 corn, right.

GOOD QUALITY roughage is a must for successful livestock feeding!

For most efficient production of meat and milk, rations must include the maximum amount of roughage. Silage can help assure an abundant supply of roughage when other sources fail.

Growth of winter crops is often limited by weather and ravages of insects and diseases. In some years it is difficult to produce and cure enough good hay. Land available for forage production may be restricted on some farms, making a high yield per acre desirable. These facts, coupled with ease of mechanization and superior performance of cattle on good silage, further emphasize the need for silage on many farms.

Silage Crops

With proper handling, a great variety of crops can be made into silage. Hay crops, both grasses and legumes, and small grains have been used. Generally yield per acre from hay crops and small grain is rather low and silage quality is highly variable because of improper preservation. Since it is more economical to store these crops as hay, storage as silage is resorted to as an emergency measure to prevent loss of a cutting because of bad weather. However, crops are available that will produce higher yields and are easier to store as silage than are the usual hay crops.

A summer silage crop experiment has been underway at the Tennessee Valley Substation, Belle Mina, since 1955 to determine potential for a wide variety of silage crops. These included four sweet sorghums, two grain sorghums, two corn varieties, and three hay crops. Varieties tested were selected as being representative of the type of crop.

The test crops were grown in four replications, with two replicates receiving irrigation. Rainfall was generally adequate, so there was not an important response to irrigation. Results are shown in the table as averages for 1956-58.

Soil in the test fields was a gray bottom land Humphries silt loam underlain by a compact chert layer at 25 to 30 in. deep. The field was limed first and liberally fertilized with phosphorus and potassium. The crops were sidedressed or topdressed with 80 lb. of nitrogen from ammonium nitrate each year.

The summer crops followed a winter crop of oats and crimson clover that was removed for silage. Yields of oats and crimson averaged about 7 tons of green weight per acre annually. Following removal of the winter crops, the land was turned and prepared for the summer plantings. These crops were planted about the last of May.

PERFORMANCE OF SEVERAL SUMMER SILAGE CROPS, TENNESSEE VALLEY SUBSTATION, 1956-58 AVERAGE

Crop	Dry forage per acre	Time to silage maturity	Dry matter content
	Tons	*Days*	*Pct.*
Sweet sorghums			
Sart sorgo	7.98	110	25
Tracy sorgo	7.27	97	31
Sumac 1712	6.36	92	30
Atlas sorgo	5.96	92	28
Corn varieties			
Dixie 18	6.98	88	31
Pfister	6.32	88	32
Grain sorghums			
Standard Hegari	5.92	84	31
Martin Combine	3.26	84	33
Hay crops			
Starr millet	5.26	40[1]	17[2]
Sorgo-Johnson-grass cross	4.46	40[1]	26[2]
Sweet sudan	3.26	40[1]	24[2]

[1] Time to first harvest. Two to three harvests each year, at about 40-day intervals.

[2] Dry matter was highly variable between harvest dates.

Forage Production

Forage yields, dry matter content, and time from planting to harvest are given in the table. The variation because of type of plants, time of harvest, and weather conditions at harvest make it desirable to report the yields in dry matter rather than green weights. The highest green weights were in excess of 30 tons per acre.

These results show that large tonnages of feed can be produced in a relatively short time if a suitable crop is grown and harvested for silage. The newer varieties of sweet sorghums and the hybrid corn varieties were outstanding in this respect. Grain sorghums and hay crops were somewhat less productive.

Corn and sorghum were cut when seed was in the dough stage and hay crops at bloom stage. Results show that a dry matter content of about 35% is best for proper ensiling of most crops. The hay crops were usually much wetter than this and wilting is needed to permit loss of moisture before storage. The corn and sorghums were too moist for direct chop and storage without using a small amount of absorbent additive or a preservative.

Corn is the preferred silage crop on highly productive soils. It is usually easier to preserve and make silage with corn than with sorghum, and quality of corn silage is generally better. On less fertile soil or for livestock for which roughage quality is not especially critical, the giant sorgos (Sart and Tracy) are preferred because of their higher yield.

What is VALUE *of* SOIL FERTILITY?

R. D. ROUSE and C. E. EVANS
Department of Agronomy and Soils

DEPLETED SOILS cannot be restored in 1 year, regardless of the amount of fertilizer applied. Fertility level of soil at beginning of the season has considerable effect on crop yields.

Results of three experiments by the Auburn Agricultural Experiment Station in different areas of Alabama has shown that the fertility level of soil potassium has considerable effect on cotton yield.

Results obtained on Kalmia sandy loam at the Brewton Experiment Field are shown in Figure 1. This gives 1957-58 yields where 0, 32, 64, and 96 lb. of K_2O per acre was added to soils having two different potassium levels. This difference in soil level resulted from applying 32 lb. of K_2O per acre to one series of plots and 80 lb. to the other for the preceding 5 years. All plots were uniformly fertilized annually with nitrogen and phosphorus.

Yield Effected

In 1952, when the study was begun, all plots were low in potassium. The 32-lb. annual application gave no buildup and test was low in 1957. The 80-lb. rate resulted in a buildup and a medium soil test for potassium.

Although yields were not high at this location in 1957 and 1958, the soil that tested medium yielded 18% more seed cotton than the low-testing soil, even when 96 lb. of K_2O was applied. Previous studies had shown that application of more than 96-lb. per acre would not increase yields on this soil.

A similar study on Hartsells fine sandy loam at the Sand Mountain Substation gave results presented in Figure 2. This is a comparison of 1957-58 yields on soils testing low and medium potassium with 0, 25, and 50 lb. per acre of K_2O applied. At the 50-lb. rate, yields were 11% higher on the medium- than on the low-potassium soil. Differences in soil level resulted from applying different amounts of potassium to cotton during the preceding 4 years. The 50-lb. rate was the highest included, because higher rates had not increased yields on this soil in previous studies.

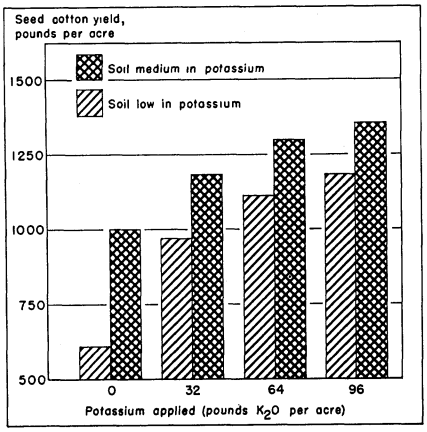


FIG. 1. Effect of soil potassium level on yield of cotton grown on Kalmia sandy loam at Brewton Experiment Field in 1957-58 is shown above.

A study was conducted at Auburn to find a method of applying potassium to overcome effect of low soil potassium. It was on Chesterfield sandy loam that had been severely depleted by alfalfa that was not fertilized with potassium for the previous 3 years.

Buildup Valuable

In 1957, cotton yields were increased by use of up to 120 lb. of K_2O per acre. Higher rates did not further increase yields. Similar results were noted in 1958 on plots that did not receive potassium in 1957. However, plots that got potassium in 1957, which resulted in some buildup, produced higher yields than comparison plots receiving the same total potassium all in 1958, see table.

YIELD OF COTTON AS AFFECTED BY ADDITIONS OF POTASSIUM IN 1957 AND 1958, CHESTERFIELD SANDY LOAM, MAIN STATION, AUBURN

K_2O applied per acre		1958 yield of seed cotton
1957	1958	
Lb.	*Lb.*	*Lb.*
0	0	410
0	30	1,090
0	60	1,660
0	120	2,200
0	180	2,270
120	60	2,400
0	300	2,260
240	60	2,790

For example, plots receiving 240 lb. of K_2O in 1957 and 60 lb. in 1958 yielded 2,790 lb. of seed cotton. This compares with 2,260 lb. of seed cotton on plots that got no potassium in 1957 but 240 lb. broadcast plus 60 lb. in the row in 1958.

All three of the studies reported show the importance of building and maintaining soil potassium.

Fertility levels of soils for calcium, phosphorus, and potassium are included in reports of farmers' soil samples, along with lime and fertilizer recommendations. These fertility ratings can serve as a valuable indication of how past fertilization practices have affected fertility levels and indicate changes that are needed.

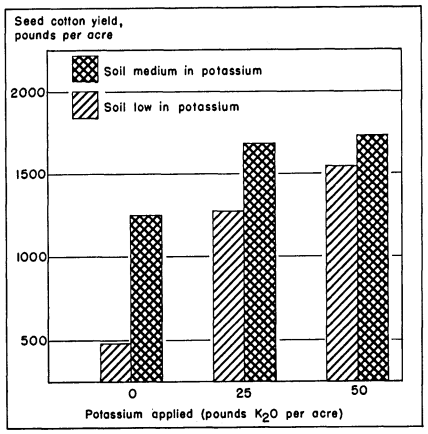


FIG. 2. Effect of soil potassium level on yield of cotton grown on Hartsells fine sandy loam at Sand Mountain Substation in 1957-58 is shown above.

New insecticides for EXTERNAL PARASITE CONTROL

KIRBY L. HAYS, *Assistant Entomologist*

FROM INEFFICIENT to highly effective compounds is the development story of insecticides for control of external parasites of livestock.

When Alabama's livestock production was in its infancy, few materials were available that would control lice, ticks, and flies on animals. Control usually was poor and of short duration. As a result animals suffered from external parasite (ectoparasites) attacks.

Early Research

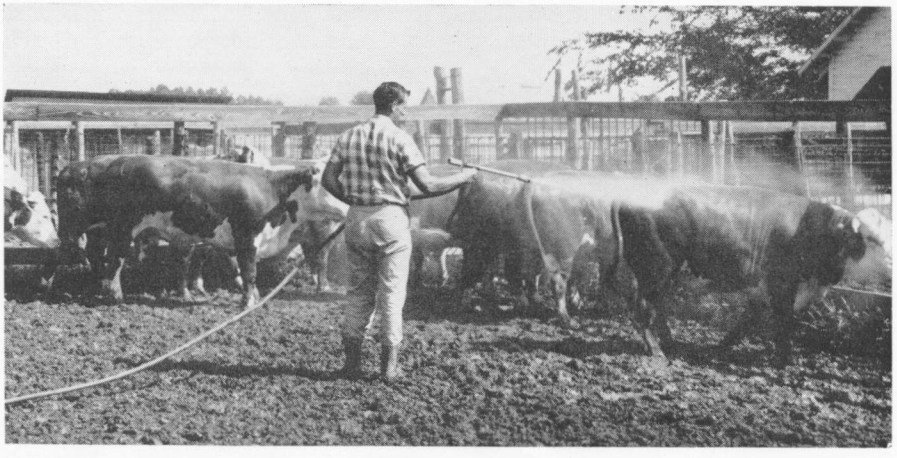
As the industry grew, the Auburn Agricultural Experiment Station expanded its work on ectoparasite control. In 1946 DDT was released to the public. It was found to be a very effective control for external parasites of livestock. Then followed compounds that would also give relief, such as lindane, toxaphene, methoxychlor, chlordane, and BHC. It was soon found that lindane, BHC, and chlordane were highly toxic to warm blooded animals. The possibility of killing animals by overdosing seriously limited their use.

Later studies showed that the chlorinated hydrocarbon insecticides, such as DDT, toxaphene, and others are absorbed through the skin of cattle, stored in fatty tissue, and excreted in milk. The fat-stored chlorinated hydrocarbons are slow to break down and be excreted by animals. The Pure Food and Drug Act prevents movement of contaminated food and feed in interstate commerce. Furthermore, most persons hesitate buying foods containing toxic insecticide residues. Thus, by 1955-56 most of the proved insecticides could not be used on cattle. Methoxychlor alone remained because of its low toxicity to man and warm blooded animals.

Recent Research

In the early 1950's new materials called phosphates were developed. The first were more toxic to animals than the chlorinated hydrocarbons. Newer phosphate compounds have proved relatively safe to animals, have moderately long lasting effectiveness, are highly active against ectoparasites, and are readily excreted once absorbed by an animal. These compounds now provide the most effective external parasite control.

Since 1957 a number of phosphorus and other compounds have been tested by the Agricultural Experiment Station. Many of these have proved to be effective, leaving little or no residue in meats. Extensive studies are now underway to determine the residues of certain compounds in milk.



To save labor beef cattle are sprayed for control of external parasites in a holding lot. The spray should be applied during the period of April through October at 3-week intervals. Malathion, Korlan, Co-Ral, and methoxychlor have been found highly effective in controlling horn flies, ticks, lice, and stable flies.

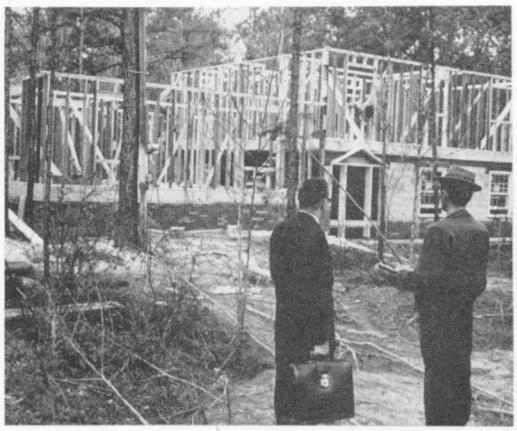
Malathion was one of the first phosphorus compounds found to be relatively safe to animals. Sprays of 1½ gal. of 57% emulsifiable malathion in 100 gal. water will control the horn fly for 2 to 3 weeks on beef cattle and at the same time control cattle lice, stable flies, and ticks. One-half that rate will also control lice, fleeceworms, and keds on sheep or goats.

Korlan is a newer phosphate insecticide that is also safe to use. A spray of 16 lb. of 25% wettable Korlan in 100 gal. water will control horn flies for 3 weeks as well as cattle lice, stable flies, ticks and fleas. It is also effective against most ectoparasites of sheep.

Trolene is a purified type of Korlan that is given as a bolus (capsule) or drench. One 37.5-gm. bolus per 300 lb. body weight given in July, August, or September will control cattle grubs before they move to the animal's back and cut holes in the hide. This treatment will also control certain internal parasites.

Co-Ral is a "spray-on" type of systemic insecticide for controlling cattle grubs. If applied in July, August, or September, it will kill grubs before they damage the hide. It will also control cattle lice, horn flies, and ticks. The spray is a mixture of 16 lb. of 25% wettable Co-Ral in 100 gal. water.

The foregoing three compounds, as well as methoxychlor, may now safely be used on **beef cattle,** but not on milking dairy cows. One tablespoon of 50% wettable methoxychlor or 3 tablespoons of 5% malathion dust may be applied to milking dairy cows as a dust over the back. Other materials that show promise for external parasite control, but use of which has not yet been approved by Federal authorities include: Sevin, Diazinon, Dipterex, Ruelene, and Bayer 22408.



Financing RURAL HOMES

J. R. HURST and BOYD B. ROSE
Department of Agricultural Economics

SPECTACULAR CHANGES have occurred in rural areas since World War II.

The number of full-time farmers has declined, but there are more part-time farmers and rural non-farm residents. Despite a general decline in proportion of total population living in rural areas, the greatest change has been in the way rural people make their living and where they work.

These population changes have altered the need for rural housing. Because of this, a study is being made by the Auburn Agricultural Experiment Station to learn sources of home financing available to rural residents and whether it is more difficult and costly to finance rural than urban homes.

The study is being conducted in Alabama, Georgia, Mississippi, and South Carolina, and financed by grants from the Housing and Home Finance Agency pursuant to authority of Section 603 of the 1957 Housing Act. Representatives of 170 private and governmental lending agencies were interviewed in the summer of 1959. Some of the data obtained is given in the table.

Private Lending Agencies

Of 1,054 commercial banks in the area, 820 made home mortgage loans since January 1957. Officers of 48 banks reported an average of 56 home loans made in 1958, with 31 for rural homes. As a group, banks made more rural home loans than any other institutional lender. However, many were short-term loans for home improvement or for temporary financing for construction until long-term credit could be obtained. Average terms of housing loans were generally the same for both rural and urban homes.

Since January 1957, 38% of 363 life insurance companies operating in the four states made home loans. The majority of these was for urban homes, but terms were the same for rural and urban loans.

Savings and loan associations invest most of their assets in home loans. Thus, all 189 associations in the four states were active in the home loan business. They made an average of 259 loans each in 1958, of which 38 were on rural homes. The percentage of appraised value loaned was less for rural than urban loans.

Governmental Lending Agencies

The Farmers Home Administration made about 3,000 direct loans in the four states in 1958 for constructing or improving farm homes and buying farms. In 1958 about 1,500 direct housing loans were made to residents in rural areas and in towns of less than 2,500 by the Veterans Administration in the area. Federal Land Bank Associations made about 2,100 loans for farm homes or for buying farms with homes on them.

Production Credit Associations are a source of production credit primarily and made few home loans. In many cases, part of funds loaned was used to improve farm homes.

In addition to making direct home loans, Farmers Home Administration and Veterans Administration insured loans made by private lenders. Under certain conditions farm or rural home loans are also eligible for insurance by the Federal Housing Administration. It was found that few insured loans were made in rural areas. Low interest rate limited use of Farmers Home Administration insured loans. Few Federal Housing Administration and VA insured or guaranteed loans were made in rural areas because lenders preferred urban loans.

Limiting Factors

A majority of lenders who made rural home loans considered only applicants who had additional land for security. Consequently, farmers and rural non-farm residents with small acreages were considered poorer credit risks than farmers with larger holdings and urban residents.

Appraisal was another limiting factor to flow of credit to rural residents. Lenders generally appraised rural homes considerably lower than comparable urban homes. The expected resale value in event of foreclosure, rather than present market value, accounted for this difference. Therefore, the rural resident with a small acreage could not borrow as much of the actual cost of the home as could the urban borrower.

CHARACTERISTICS OF HOUSING LOANS MADE BY PRIVATE AND GOVERNMENTAL AGENCIES, SOUTHEASTERN U. S., 1958

Lending agency	Characteristics, average			
	Annual interest rate	Pct. of appraised value loaned	Length of loans	Pct. of loan applications approved
	Pct.	*Pct.*	*Year*	*Pct.*
Commercial banks	6.2	60	4.2	72
Life insurance companies	5.8	65	16.0	78
Savings and loan associations	6.1	73[1]	14.0	69
Farmers Home Admin., farm housing	4.0	100	33.0[2]	60
Veterans Administration	4.75	100	25.0	73
Federal Land Bank	5.5	65[3]	22.0[4]	58

[1] 68 per cent for rural home loans.
[2] Maximum length of loan.
[3] Based on normal agricultural value of the farm.
[4] Maximum length, 40 years.

Managing JOHNSONGRASS *for* DAIRY COWS

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Cows grazing the 1-day strip grazed plots selectively ate leaves in preference to stems of Johnsongrass. This resulted in higher intake than from the green-chop plots. The same thing was true for cows assigned to continuous grazing.

JOHNSONGRASS is "right at home" in the Black Belt. And, reseach has shown it to be equal to annual summer grasses in milk production.

Like other forages, productivity and nutritive value of Johnsongrass is affected by management. One-day strip grazing and continuous grazing are equally satisfactory methods of management. Both methods proved far superior to green-chopping in tests at the Black Belt Substation.

Methods Compared

To determine effects of management methods, milk production and forage intake, digestibility, and yields were measured for Johnsongrass (1) continuously grazed, (2) 1-day strip grazed, and (3) green-chopped. Six cows were used on each system, with most in late stages of lactation.

Cows on continuous grazing had access to the entire paddocks at all times. Those assigned to strip grazing were confined to an area they would graze down in 24 hours and then moved to another strip. Green-chopped Johnsongrass was cut daily with a forage harvester and fed in a dry lot.

Average amount of Johnsongrass eaten daily was the same for cows on continuous and strip grazing, 2.8 lb. per 100 lb. body weight. This compares with 2.6 lb. for cows on green-chopped forage. Intake was measured during the fourth and fifth weeks of the test. There was considerable variation within each management system.

Digestibility Measured

Digestibility was low on the green-chopped forage, 56.7%. It was about equal for the other two systems, 65.0% for continuous and 65.4% for strip grazing. This was determined at the same time as intake.

Several factors probably contributed to the relatively low intake and low digestibility of green-chopped forage. The chopped material contained stems as well as leaves. Short length of cut of the green-chopped forage permitted little selective eating. In contrast, cows on 1-day strip grazing (see photo) and continuous grazing ate leaves in preference to stems.

Maturity A Factor

Stage of maturity also affected intake and digestibility. Five weeks were required for the green-chopped areas to make enough regrowth for the second chopping. Thus, the green-chopped forage consumed during the fourth and fifth weeks was very mature. Average amount of green-chopped forage eaten out of amount fed decreased about 50% from the second through sixth week, then increased during the seventh and eighth weeks. Regrowth on continuous and 1-day strip grazed areas was relatively rapid and supplied more immature forage at all times than did green-chopping.

More forage dry matter was used per acre on the strip grazed, 2,426 lb., than under the other systems. Green-chopped was second with 2,163 lb. per acre and continuous grazing was last with 1,421 lb. More forage was wasted when continuously grazed because of tramping by cows. However, both continuous and strip-grazed areas were stocked to capacity.

Milk Production

Daily milk production per cow on continuous (23.7 lb.) and strip grazing (23.2 lb.) was about the same, figured on 4% fat corrected basis. Cows on green chop averaged 18.8 lb. daily.

Another indicator of the low quality of the chopped forage was that cows lost an average of 5 lb. of weight each during the test. Cows on the other systems gained, 10 lb. per cow on continuous and 21.5 lb. on strip grazing.

These results indicate that green-chopped Johnsongrass is unsatisfactory for milking cows. One of the major problems with this system is maintaining an immature and high quality forage.

Continuous and 1-day strip grazing proved equally satisfactory from the standpoint of cow performance and forage quality. Strip grazing had the advantage of more forage being utilized per acre. However, this was partially offset by the labor and material requirement for managing strip grazing.

The studies are being continued to further evaluate the different management systems.

The WIREGRASS SUBSTATION—*A report of progress from farm research*

E. L. McGRAW, *Associate Editor*
C. A. BROGDEN, *Superintendent*

LARGE ACREAGES of field crops . . . improper fertilization . . . low yields . . . and poor income summarize agriculture in the Wiregrass before 1930.

Farmers were growing some 1,640,000 acres of cotton, corn, and peanuts. They were investing a lot of money and family labor in these enterprises. The return was low. Corn yields were slightly over 10 bu. per acre, cotton yields ranged from 100 to 161 lb. of lint per acre, and peanuts were producing about 600 lb. per acre.

Research Program Expanded

Real changes in a farm program come as a result of agricultural research and educational programs. Recognizing the need for much more agricultural research, the Alabama Legislature in 1927 passed an act providing for five branch stations to be located on the major soil areas of the State. One of these stations, as a part of the Auburn University Agricultural Experiment Station, was located near Headland in Henry County.

A purebred Duroc sow shown with a part of her litter is one of 20 sows used at the Substation in research of cross breeding as a means of developing better meat type hogs.

There is a vast range in the soil types to be found in the Wiregrass Area. Heavy clays of the Susquehanna or similar types are found in a number of counties. However, most of the total soil area is made up of relatively light sandy soils, with such classes as sands and sandy loams predominating the upland areas.

Fully mechanized peanut and cotton production, better yields, peanuts slowly climbing to the top spot as the leading farm enterprise, and beef cattle occupying a favorable position in competition with production in the Corn Belt are some of the accomplishments of research at the Wiregrass Substation since its establishment in 1930.

Field Crops Research Results

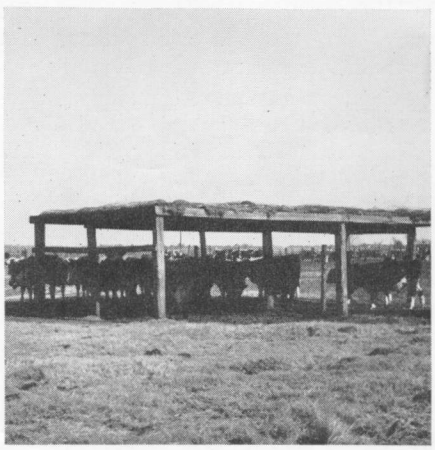
Soon after the substation was established, it was shown that good yields of cotton could be obtained in most years by following a fertilizer program proved best by experiments at Headland and elsewhere in southeastern Alabama. Cotton variety tests enabled researchers to find and recommend the best wilt-resistant, high yielding good quality cottons. Experiments also showed that boll weevil damage could be reduced by following research-proved control measures.

Results of experiments with peanuts pointed up the need for large amounts of potash on many soils for good yields. These experiments also showed that calcium in some form was also frequently needed, and that it could be supplied by adding either ground limestone or gypsum to the land.

In liming peanuts one of three methods is used. One ton of lime broadcast per acre prior to planting; 500 lb. of gypsum per acre applied annually at blooming time; or 1,000 lb. of basic slag per acre broadcast annually prior to planting.

For many years worms, insects, and diseases took a heavy toll of the peanut crop. Experiments since then have proved that much of the crop damage from such causes can be avoided by using an approved spray or dusting controls. An average of 6 years' tests from one of the controls showed an increase of 575 lb. of peanuts.

Phorate, a systemic insecticide, applied as a soil treatment at 1 lb. technical per acre at or just before planting resulted in effective thrips control on peanuts; yields were increased as much as 300 lb. per acre. Phorate granules, 20 lb. of 5% per acre put in the row at planting was found to be a good method of application. There were practically no phorate residues in foliage or nuts



Steers from the 45-brood-cow herd are fed a basal ration and fattened for slaughter. This is a part of research to determine the best time to sell long-yearling steers.

during the growing season or at harvest following application of 1 or 2 lb. of phorate per acre as soil treatment.

Good seed have also played a very important part in the development of a sound peanut program. Year after year, the substation conducted variety and strain tests to find better yielding, more disease resistant seed. Included in these tests were the Dixie Runner and Early Runner, products of the peanut breeding program of the Florida Agricultural Experiment Station. These varieties proved to be higher yielders and also quite resistant to "concealed damage," a disease of the nuts that had caused severe losses to farmers. The substation grew many tons of seed of these varieties in agreement with the Florida Station and made them available to farmers of the area.

Experiments have proved that good yields of corn may be made in the Wiregrass by (1) the use of adequate amounts of the right kind of fertilizer; (2) by turning winter cover crops; (3) using the best varieties of hybrids; and (4) planting at proper time. Experiments with proven fertilizers and hybrid varieties show average yields of about 40 bushels per acre.

Livestock Experiments

A brood herd of 45 cows is maintained at the substation. Calves are produced from a performance tested bull and grown out mainly on Coastal Bermudagrass.

An experiment testing rates of nitrogen on summer grasses in a beef grazing study was begun in 1952. The three grasses tested were Coastal and common Bermudagrass, and Pensacola Bahia. Coastal Bermudagrass gave the best beef gains per acre of the three. Total gains per acre were as high as 707 lb. from an application of 320 lb. of nitrogen.

In the fall of 1957, vetch was seeded in the sods of the three grasses. Coastal Bermudagrass gave the best gains per acre. On the plot receiving 160 lb. of nitrogen in addition to the vetch the yield was 773 lb. of beef per acre.

After summer grazing, in 1958, long-yearling steers were fattened for slaughter. The base ration was snapped corn, 54.45%; cane molasses, 15%; cottonseed meal, 9%; ground peanut hay, 20%; dicalcium phosphate, .5%; common salt, 1%; trace minerals, trace; and Stilbosol Premix, 1 lb. per ton of mixture, Group 1. Test rations were Dynafac additive, Group 2; urea to replace cottonseed meal, Group 3; coastal Bermudagrass hay to substitute for peanut hay, Group 4; and hay content of mixture reduced as the feeding trial progressed, Group 5. There were 2 lots of cattle fed each mixture. The test period was 105 days. Daily gains (lb.) for groups 1 to 5 were 2.73, 2.63, 2.55, 2.88, and 2.95 respectively. Amounts of feed consumed per cwt. of gain for groups 1 to 5 were 1,224, 1,250, 1,237, 1,134, and 1,092 respectively.

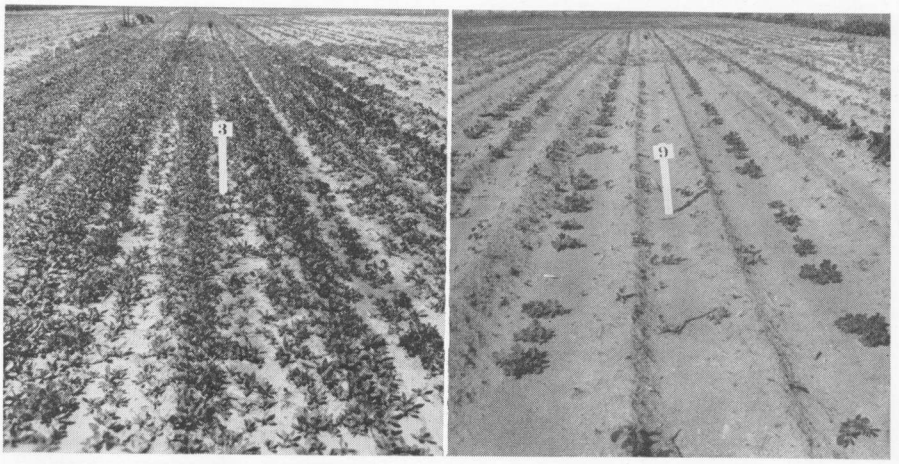
Research on hogs includes an evaluation of cross breeding, as a means of developing better meat type hogs. Tests were started with 20 purebred Duroc sows, divided into two groups of 10 each. In one group, selected meat-type Duroc boars will be used continuously. In the other group, a sire rotation program will be followed. Selected Landrace, Hampshire, and other meat-type boars will be used and crossbred gilts saved as replacements.

Need for hand hoeing peanuts has been almost eliminated in experiments by a pre-emergence application of dinitro compounds at rates of 2½ to 3½ lb. (active material) per acre applied in a 12-in. band over row in 36-in. rows.

Research at the substation for several years has shown that most annual weeds in peanuts can be controlled for a period of 4 to 8 weeks. The dinitro chemicals have been the most consistent of many chemicals tested when considering weed control, yield, and non-injury to the peanut plant.

In its 29 years of service as a large outdoor research laboratory, the Wiregrass Substation of Auburn has been responsible in a large measure for the changes for a more efficient and profitable agriculture.

Mechanization of row crop production has been an important phase of research at the Wiregrass Substation. Peanuts have become the No. 1 money crop of the area as a result of efficient production. Digging and shaking by machinery in one operation, shown above, and combining have done much to bring about efficiency.



Weeds in peanuts have always presented a problem to the farmer. Research in use of chemicals for weed control has practically eliminated the need for hoe labor. Shown left is plot with no control, at right is plot treated chemically.

Steers are shown grazing oats and crimson clover in the winter grazing research at the Gulf Coast Substation.

FINISHING BEEF STEERS *in Gulf Coast Area*

TROY B. PATTERSON, *Assoc. Animal Husbandman*
HAROLD YATES, *Supt., Gulf Coast Substation*

WINTER GRAZING in the Gulf Coast Area is almost a certainty every year.

To use this grazing to the best advantage, farmers of the area needed information on methods of finishing quality steers of different ages. The Auburn Agricultural Experiment Station designed feeding tests at the Gulf Coast Substation to furnish this information.

All Systems Profitable

Experiments included 79 steers in 4 lots. Three lots had 20 steers each and one lot 19 steers. The most profitable system utilized steer calves that had been dropped during the previous fall months. These calves (Lot 2) were placed on approximately 1 acre per steer of oats-crimson clover pasture about mid-November. The grazing season averaged 164 days. During this time the steers gained 1.78 lb. per day. At the end of the winter season, the steers were placed on full feed in the feedlot. Approximately 100 days were required for the steers to reach 1,000 lb. and grade Good and Choice. The average daily gain in the feedlot was 1.92 lb. These gains were made during the summer months and following a period of excellent gains on winter pasture. Time required for growing and finishing was 262 days. Total gain averaged 479 lb. per head.

Steers in Lot 1 graded high Standard and low Good at the end of the winter period and were sold as feeder steers. The majority of the post-weaning profit had been realized, $72 out of $93 as was indicated when Lot 1 was compared with Lot 2. This system offers an opportunity for cattlemen who produce good winter pastures but have inadequate feedlot facilities.

Young Steers Desirable

Lots 3 and 4 were composed of steers that had been dropped the previous spring. They were weaned just before the winter pasture period. These steers were younger and lighter in weight than the other lots. Normally steers marketed at this time of year weigh less and bring less per pound. Any system, therefore, that will increase returns from spring dropped calves would be desirable.

Steers in Lots 3 and 4 were placed on oats-crimson clover grazing in November at a stocking rate of 1 steer per acre. They gained 1.65 lb. per head per day for 164 days. Starr millet furnished an average of 84 days grazing during the late spring and summer months. Lot 3 steers were supplemented with ground shelled corn at a daily rate of 1% of body weight. Slightly higher average daily gain (1.35 vs. 1.49 lb.) resulted from the additional feed on pasture. However, the Lot 4 steers gained faster (1.93 vs. 1.74 lb. daily) after being placed on full feed. Therefore, the average daily gain for the entire period of 185 days was the same for both lots, 1.57 lb. The increased gain on pasture for Lot 3 brought slightly more per head than the Lot 4 steers, $243.48 vs. $235.19. However, this increase in value was offset by the cost of the supplemental feed. Because of low daily gains, the practice of grazing steers on temporary summer pasture, with or without supplemental feed, is of doubtful value.

Post-Weaning System

Regardless of the system used, additional profit may be obtained by carrying steer calves through a post-weaning system of growing and fattening. This profit is often greater than can be realized from production of the feeder calf. An excellent winter pasture is the most important segment of this system. The finishing period in the feedlot is needed, however, to produce carcasses of the weight and grade necessary to meet consumer demand.

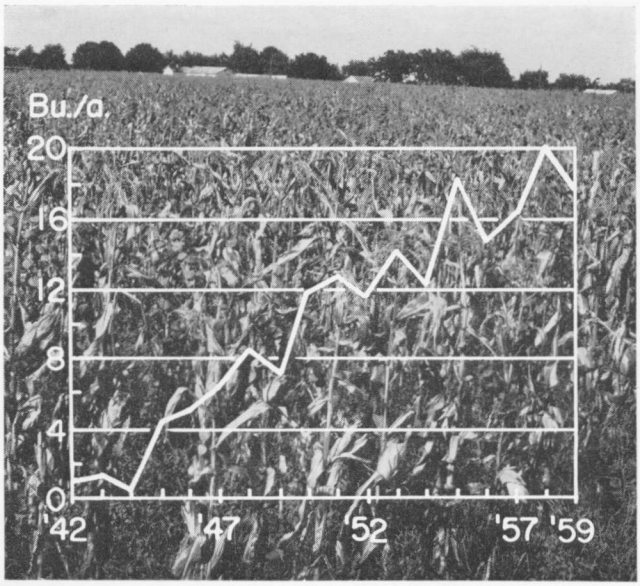
PERFORMANCE OF STEER CALVES ON WINTER PASTURE, SUMMER PASTURE AND FEEDLOT AVERAGE TWO YEARS (1956-57 AND 1957-58 SEASONS)

Per steer	Fall dropped calves		Spring dropped calves	
	Lot 1[1]	Lot 2	Lot 3	Lot 4
	Dollars	*Dollars*	*Dollars*	*Dollars*
Initial value	90.45	90.00	74.49	75.48
Winter pasture cost	27.50	27.50	27.50	27.50
Summer pasture and feed cost	----	----	25.42	15.50
Feedlot cost	----	42.48	39.04	39.46
Total cost	117.95	159.98	166.45	157.94
Sale price	190.10	253.56	243.48	235.19
Return to labor and investment	72.15	93.58	77.03	77.25

[1] Lot 1 steers winter pasture only; Lot 2 steers winter pasture plus full feed; Lot 3 steers winter pasture, summer pasture and supplement plus full feed in the feedlot; Lot 4 steers winter grazing, summer grazing and full feed in the feedlot.

HYBRID vs. OPEN-POLLINATED *corn varieties*

COOPER KING, *Assistant Agronomist*



After 18 years of testing, hybrids have steadily climbed in yields over selected open-pollinated varieties. The chart shows a difference of approximately 20 bu. between the two types of corn.

HYBRID CORN VARIETIES are good and are getting better!

A study of data obtained from the Alabama corn variety tests shows that the trend in yield that started 18 years ago continues upward with no sign of leveling.

Early Research

In 1935 the first hybrid varieties were tested by the Auburn Agricultural Experiment Station. At that time only open-pollinated varieties were recommended, with Mosby's, Neal's Paymaster, Douthit, Indian Chief, Locker's Yellow, Whatley, Hastings, and Cock's Prolific leading the list. The first hybrids tested were mostly those that had been developed in the Corn Belt States. In most cases they were no better than recommended open-pollinated varieties.

However, adapted hybrids were not to be denied Alabama and other southeastern growers. Plant breeders recognized the potential for improvement of corn grown in the South through development of adapted hybrids and initiated corn improvement projects. Development and testing of the products from these breeding projects is a time-consuming process.

Hybrids Recommended

By 1941 hybrids were recommended on a trial basis and in 1945 they were recommended for general planting by the Auburn Station. The time had not arrived however, for the open-pollinated varieties to be discarded. They remained on the recommended list until 1950. In 1949 and 1950 they were recommended only if seed of a first choice hybrid were not available. In 1949, 85% of corn acreage in Alabama was still planted to open-pollinated varieties.

Open-pollinated varieties were retained in the variety tests for two purposes. One was to obtain yearly evidence that the recommended hybrids were superior to the open-pollinated varieties. The other was to have a "yardstick" with which to compare new hybrids being added each year. Mosby, one of the best open-pollinated varieties, was chosen.

Yield Comparisons

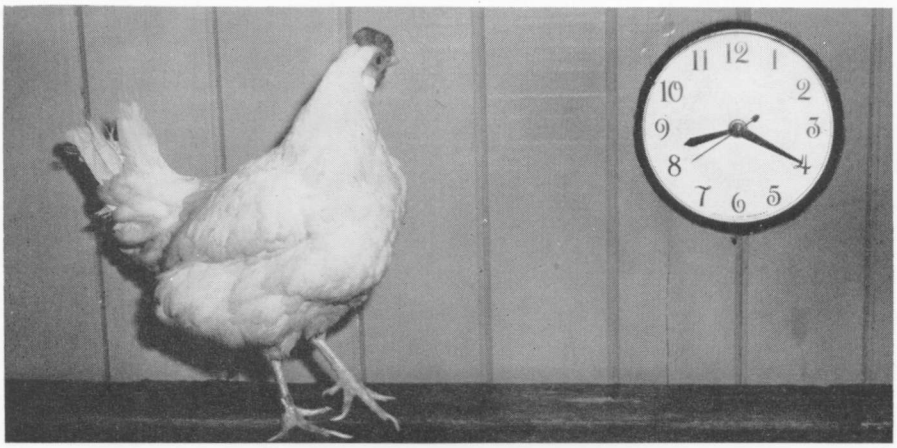
To make yield comparison of hybrids with Mosby, it was necessary to obtain yearly average yields of a group of hybrids. This group was composed of the three highest yielding recommended hybrids from each of the three regions (northern, central, and southern) of the State. These yields were compared with the average yield of Mosby. During the 18-year period, the number of variety tests conducted each year averaged about 12 and varied from 8 to 15. The hybrids used in obtaining yearly averages changed periodically, since new and better hybrids were constantly replacing old ones. Average yields of the hybrids and Mosby for the years 1942 to 1959 from all experiments in the State showed large seasonal variations. This was caused primarily by weather conditions. The yield level in the experiments has increased over the 18-year period because of improved production practices. However, each year the hybrids yielded more than did Mosby.

The yield advantage of the hybrids over that of Mosby has steadily grown over the 18-year period. In 1942 the hybrids yielded only slightly better than Mosby, but now they outyield Mosby by about 20 bu. per acre, or about 30%.

Improvement Made

In addition to upping yields, plant breeders have made notable improvement in perfecting southern hybrids that resist lodging and insects, and that have better quality ears and grain. For example, the hybrids that outyielded Mosby 20 bu. per acre in 1958 also lodged less than half as much, had 25% fewer kernels damaged by insects at harvest, and had a good quality rating whereas Mosby was rated only fair.

While improvements have been made by breeding adapted hybrids, there is still room for improvement. Yes, corn hybrids are good, but they will get better.



WHAT'S TIME *to a hen?*

C. H. MOORE, *Head*
Dept. of Poultry Husbandry

AVERAGE TIME lapse between successive eggs is reported to be 26 hours. But, some hens require 32 hours, others as few as 23 hours.

Thus, the average hen (26-hour-interval) might lay at 7, 9, 11 a.m. and 1 and 3 p.m. on successive days and end the clutch by skipping a day.

Early Research

Egg formation is somewhat of a continuous process. The hen taking 28 hours to package her product should produce 12½% more eggs in a given period than hens requiring 32 hours. Likewise, those with time intervals of 23 hours should produce more eggs than hens with 28-hour intervals.

Most of the difference in interval length between eggs is caused by the time spent in the shell gland. This takes up about 21 hours of the total time required to produce an egg after ovulation. Also, only about 8 of the 21 hours are necessary for the actual process of egg shell formation. Obviously, this leaves some 13 hours in which hens might vary in length of time from one egg to the next.

Auburn Experiments

The range in time interval and the theoretical 13-hour holding after egg formation provided a lead to possible improvement in egg production. Thus, the Auburn Agricultural Experiment Station began to explore the possibility of selecting for interval length from ovulation to lay and thereby change production rate.

Interval lengths were determined on 400 White Leghorn hens. These were based on all eggs laid in a 6-week period. Continuous lights were used in order that a hen might lay at any time without the inhibiting effect of darkening periods.

From these determinations, 40 hens each with the shortest and longest intervals were selected as foundation breeders. These two groups were used to establish short- and long-interval populations of 200 hens each. Establishment of the two interval populations by parent stock selection made it possible to more fully evaluate effects of interval length on egg production, body weight, egg size, and hatchability. Major differences in these four characteristics over generations and between populations could be attributed to the effect of interval length selection.

Results

Although selection has been practiced for only two generations, there are some striking differences in the populations. It is again pointed out that selection was for interval length from ovulation to lay only and that individual and not family selection was followed.

The first generation of the short-interval group had 8/10 hour shorter interval than the parent or foundation stock. However, by the second generation interval difference was 2 hours (24.9 vs. 26.9 hours). The two generations likewise outdid the parent stock in egg production. They averaged 19 and 22 more eggs per hen per season, respectively, than did the parent stock.

Quite the opposite occurred in the second generation of the long-interval hens. Although this group had a half hour shorter interval, it averaged 22 fewer eggs per season than the parent stock. Either selection had a negative effect or some environmental factor caused a shortening of the interval in the second generation. In view of these variations, it is believed that the methods of interval determination and selection used did not adequately evaluate long-interval hens.

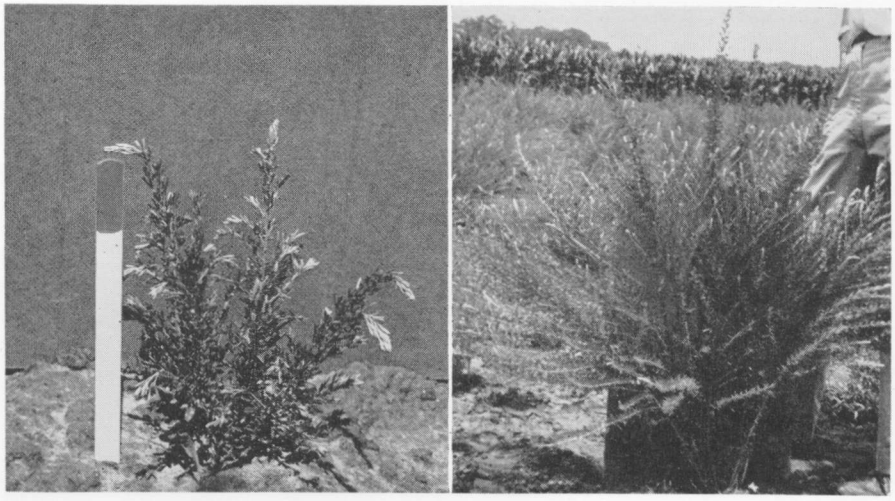
Annual egg production apparently has been changed by interval length selection. For instance, annual production of the first and second generations of short-interval hens averaged 221 and 224 eggs, respectively, or 35 and 44 more eggs than the averages of the first and second generations of the long-interval populations.

Effects on adult body weight, maturity age, and hatchability were also determined for each generation. There seemed to be a negative relationship between body weight and interval length. This is contrary to most reports. Possibly this may mean that there is a lower limit beyond which reduction in body weight should not be attempted. Maturity age was affected little or none by interval length. However, there was a reduction in hatchability of eggs from the short-interval population.

Modified selection procedures are now being used so that subsequent generations can be more accurately evaluated. The results thus far give promise that rate of egg production may be changed by interval-length selection.

EGG PRODUCTION OF FIRST AND SECOND GENERATIONS OF SHORT- AND LONG-INTERVAL POPULATIONS OF WHITE LEGHORN HENS AS COMPARED WITH PARENT STOCK

Item	Populations		Parent stock
	Short-interval	Long-interval	
Interval length, hours			26.9
Generation No. 1	26.1	27.4	
Generation No. 2	24.9	26.4	
Egg production, average number			202
Generation No. 1	221	186	
Generation No. 2	224	180	



The 10-in. sericea plant, left, and the 4-ft. plant, right, are results of atomic radiation used in sericea breeding research at the Auburn Station. These plants show the variations to be expected from irradiated seed.

ATOMIC RADIATION
for better plants

E. M. CLARK, *Assistant Botanist*

ATOMIC POWER can be not only destructive but also constructive.

The destructive side of the atom is well known throughout the world. The tremendous power of atomic weapons is almost beyond understanding. However, constructive uses of the atom are often overlooked. Possibilities for peaceful use of atomic power are almost unlimited.

Nuclear reactors are being used to power ships and trains. They provide energy to drive generators for the production of electricity in some regions where cheaper fuels or water power is not practical. In medicine, radioactive isotopes produced in atomic piles are helping track down and cure diseases.

Atomic Power in Agriculture

Is the power in the atom being used to help farmers? In 1956 an irradiation service was established by the Atomic Energy Commission at the University of Tennessee. This center uses the irradiation facilities of the Oak Ridge National Laboratory. The southern plant breeder can send material to this center to be irradiated with neutrons in the nuclear reactor or with gamma rays from a radioactive cobalt-60 source.

Research Conducted

Radioactive materials are used in many ways by the Auburn Agricultural Experiment Station as research tools. Irradiation of seed is another way of utilizing atomic power.

To speed up its sericea breeding program, the Auburn Station has made use of the irradiation facilities at University of Tennessee for increasing variation within the species.

Planted irradiated seed from an improved line of sericea resulted in a number of unusual types of plants: dwarf, giant, prostrate, upright, early, late, and other variations. Since much more variation could be expected in the next generation, seed were gathered from individual plants. This spring these will be planted and 20,000 seedlings grown in the field. Plants with higher forage production, lower tannin content, lower lignin, higher percentage of leaves, higher percentage of digestible protein are needed to combine with present fine stem varieties. The 20,000 plants will be studied carefully and those with desirable traits will be used in the development of an improved sericea variety.

If some useful hereditary changes or mutations are found, the farmer will not immediately have a new variety. Irradiation is not a method of plant breeding but merely a tool that the breeder can use to bring about variation in a species. Radiations will change the genes, the hereditary material in plants. However only a few of the changes will be desirable. When seed or other plant parts are irradiated, there are thousands and thousands of ways the species can be changed. For this reason very large numbers of plants must be grown to find a few that have the desired traits.

Other Research

This has been the case in other breeding work using mutations. In Sweden a short, stiff-strawed, compact head variety of barley was developed. It proved to be superior in some areas to the varieties that were commonly grown. In Michigan the widely grown vining type Michelite pea bean was unsatisfactory. From irradiated material an early upright bush type mutant plant was selected that was crossed with bean anthracnose-resistant varieties. From the progeny Sanilac an early, bush type, disease-resistant variety with higher yield than Michelite was developed. Disease resistance induced by irradiation include: in oats, resistance to Victoria blight, stem rust and crown rust; in wheat, resistance to stem rust and stripe rust; in peanuts, resistance to stem rot and leaf spot.

It is a long step from the mighty forces within an atom to a new improved strain of Dixie Runner peanut or sericea lespedeza but atomic power is being used and will be used more in the future as a tool for the development of superior crop varieties for the farmer.

INSURANCE COVERAGE *of Alabama farmers*

O. D. BELCHER and
J. H. YEAGER, *Dept. of Agricultural Economics*

INSURANCE CAN protect you against business and personal risks. And there are many risks or perils that cause losses to farmers – fire, lightning, hail, windstorm, accident, sickness, disability, and death.

An adequate insurance program is important to farmers. With increased investment in land, buildings, machinery, livestock, and crops, dollar losses can be greater than ever before. In addition, more machinery and livestock on farms have increased chances for accidents and losses.

These chances for losses point up the need for farmers to check their insurance coverage to determine their situation and needs.

Kinds of Insurance

In a 1955 study, 250 farmers in Madison, Limestone, and Lauderdale counties were asked about kinds and amounts of insurance they had. Eighteen farmers (7%) said they had no insurance. Of the 232 who had insurance, burial insurance was the most popular, as shown below:

Kind of insurance	*Farmers reporting*
Burial	72%
Fire (including windstorm) on buildings	49%
Auto and/or truck	44%
Life	38%
Hospital or medical	19%
Fire on house contents	18%
Other	8%

Average annual premium paid on burial insurance was $26 and policy value averaged $309.

Fifty-eight out of the 232 farmers had only one kind of insurance – burial insurance for 36 of the 58. No farmers were found to have all the kinds of insurance listed. Forty-one per cent had three or more kinds of insurance coverage and 20% had four or more kinds.

Only 44% of the farmers who had a truck and/or automobile had insurance on either. The largest percentage had liability coverage. Average annual premium paid on truck and/or automobile insurance was $54. Only six reported any insurance on farm machinery. Two had coverage on livestock. One farmer reported having employer's liability insurance on hired workers, but none had comprehensive personal liability coverage. Crop insurance coverage was reported by one.

Life Insurance

Almost two out of five farmers had life insurance. Of these, 51% had ordinary life policies, 28% limited-pay life, 17% term insurance, and 4% endowment. Life insurance coverage per insured farmer averaged $5,059. Ordinary life policies were larger in amount than the average, and limited-pay, term, and endowment policies were smaller.

The annual premium paid by farmers with ordinary life policies ranged from $7 to $1,802. Median annual premium (middle premium when all arranged in order from smallest to largest) was $47. Annual premiums on limited-pay policies ranged from $7 to $300. Almost one-third of the farmers with limited-pay life reported they were "paid up." All these were of the 20-year pay type.

Insurance on Buildings

Almost half of the farmers had fire and windstorm insurance on buildings. In most cases they had an extended coverage rider on the policy. This normally included coverage of losses from damage by vehicles, explosion, riot, smoke, or aircraft.

Average amount of insurance on farm buildings, including the farm home, was $3,899. The average value of insured buildings on a cost less depreciation or replacement cost depreciated basis was $5,856 per farm. Therefore, farm buildings were insured for an average of 67% of value.

Fire insurance policies ranged in value from $500 to $15,000, with 72% below $5,000. Average annual premium paid was $46.

Relationships

As average age of farmers increased, the percentage with life insurance decreased but average amount of coverage increased. Average age of all farm operators was 49 years. Proportion of farmers having life insurance and average amount per farmer are shown below by age groups:

Age, years	*Pct. having life insurance*	*Average amount*
Under 34	48	$4,021
35-44	40	3,476
45-54	42	4,683
55-64	35	7,175
65 and older	31	7,571
AVERAGE	38	$5,059

A higher percentage of full owners and part owners than tenants carried life insurance. Policy value averaged more for owners than tenants.

Insurance coverage also varied according to size of farm. The larger the farm the greater was the percentage of farmers with life and fire insurance. The same relationship existed between net farm income and percentage of farmers with life and fire insurance.

Many farmers and farm laborers are now covered by Social Security. Generally Social Security coverage has decreased the need of investment as compared to protection.

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Adapted POPCORN VARIETIES *for Alabama*

C. L. ISBELL, *Horticulturist**

FOR MORE THAN a half century, Alabama gardeners have grown popcorn for home use. Yet only a few have recognized its potential as a commercial crop and as a grain crop for livestock. And, that has taken place only in the last 15 years or so.

In nutritive value popcorn is equal to or slightly better than field corn, but it must be cracked or ground before feeding to livestock or poultry. According to the U.S. Census, Alabama plantings of popcorn increased from 49 acres in 1950 to 1,289 acres in 1954.

Early Research

Experiments have been conducted by the Auburn Agricultural Experiment Station for several years, beginning in 1942. Additional experiments were begun in 1956 at outlying substations. The earlier experiments included 18 of the most commonly cataloged varieties and 7 unnamed Alabama farmer strains. Comparisons were made of plant size, pest injury, earliness, yields, size of ears and grains, popping quality, and retention of popping quality after storage.

Plant height ranged from 3 to 7 ft.; suckers per plant, 1 to 5; tassels, small with inadequate pollen to large with abundant pollen; ears, 1 to 2 per stalk; ear length, about 3 to 7½ in. with ears of ornamental variety, Strawberry, about 1 in.; ear diameter, about 1 to 1½ in.; grains per lb., 2,616 to 6,324; acre yields, 4 to 30 bu.; popping, 60 to 90%, with volume increase of 10 to 21 times.

Varieties varied widely in crispness, texture, and flavor. Corn Belt varieties tended to produce short plants with short ears, but with large diameters and small pointed grains that popped well. However, these varieties for the most part had poor shuck cover and were susceptible to bird and insect injury. All varieties retained popping quality 10 or more years if properly stored.

* Retired.

Recent Experiments

Experiments beginning in 1956 included some of the most promising new varieties, especially hybrids that produce good plants and relatively large ears, and grains that pop well and have good quality. Yields from this group are given in the table. Minnesota Hybrid, an old variety, is the basis of comparison.

Most of these newer varieties and hybrids yield somewhat better in the Corn Belt than they did at the four locations. However, some of them on better soils have yielded up to 75-85 bu. per acre. In general, they have good popping and table qualities. The results indicate that good yields of adapted popcorn can be produced in Alabama.

Commercial popcorn is produced under contract. Thus, the marketing problem is answered before the crop is planted. Methods for growing popcorn are similar to those for field corn. Popcorn should be planted on well drained fertile soils and fertilized according to recommendations for field corn.

Since popcorn is particularly tasty to weevils, considerable care must be used in harvesting and curing. Farm storage is likely to be much more of a problem than in the case of field corn. For these reasons, most farmers who grow popcorn prefer to sell or eat it and use other grain as livestock feed.

POPCORN VARIETY TEST, FOUR LOCATIONS, 1956-58

Varieties	Yield per acre				
	Cullman 1956	Clanton 1957	Auburn 1958	Headland 1958	Average shelled
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*
K_4 Kan. College	43	44	35	----	40.7
Dynamite Hast.	38	26	34	51	37.3
Minnesota Hybrid	20	7	7	----	11.3
Purdue 31	49	45	42	----	45.3
Purdue 32	42	36	32	53	40.8
Purdue 213	55	61	47	59	55.5
Purdue 303	44	47	36	----	42.3
Purdue 406	46	47	45	61	49.8
Purdue Expt. #42226	44	44	34	----	40.7
Iopop	29	24	23	----	25.3
Iopop 5	24	22	22	----	22.7
Iopop 6	51	52	41	60	51.0
Iopop 7	26	18	21	----	21.7
Iopop 8	40	46	46	59	47.8
Iopop 4258	48	49	39	----	45.3
Iopop Hybrid 882	25	21	19	----	21.7

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