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In this issue . . .

On the cover. Starr millet has become a mainstay on Alabama dairy farms, since it provides good quality forage during summer when other pasture crops are not highly productive. However, selecting the best management system for millet has been difficult. Now there is research information available that shows relative merits of green-chopping and grazing of this summer forage. As reported in the story on page 3, grazing resulted in higher milk yield per cow, whereas production per acre of millet was higher when the forage was cut and fed as green-chop. Shown on the cover grazing high quality millet is part of the research herd at the Gulf Coast Substation, where the study was done.

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Auburn, Alabama

New and Timely PUBLICATIONS

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

Bul. 344. Effects of Deep Turning and Non-Dirting Cultivation on Bunch and Runner Peanuts.

Bul. 346. Effect of Seed Size on Vigor and Yield of Runner Peanuts.

Bul. 347. Coastal Bermuda Pasture vs. Other Forages for Dairy Cows.

Bul. 355. Grain Movements in Alabama: Firms, Volumes, and Transportation Used.

Bul. 356. Rural Land Ownership and Use in Alabama.

Cir. 145. Christmas Tree Production in Eastern Redcedar and Arizona Cypress Plantations.

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

Leaf. 68. Spider Mites on Cotton in Alabama.

Prog. Rept. 62. Commercial Fishworm Production.

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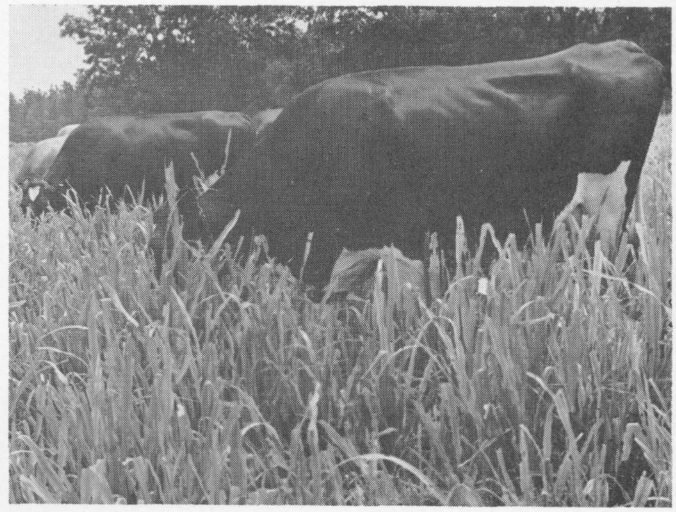


GRAZING BEST —

Managing Starr Millet for Dairy Cows

K. M. AUTREY, *Dept. of Dairy Science*
J. H. BLACKSTONE, *Dept. of Agricultural Economics*
HAROLD YATES, *Gulf Coast Substation*

DAIRY cows produce more milk when grazing millet than when it is fed green-chopped.

This was the main conclusion from forage management studies at the Gulf Coast Substation during 1959-62. The variety of pearl millet tested was Starr, a high yielding, leafy, disease resistant crop that thrives in the Gulf Coast and most other sections of Alabama.

Since permanent pasture in the Gulf Coast area frequently is inadequate or produces low quality forage, dairymen have sought a suitable forage for the warm seasons. Starr millet has shown promise, but information was needed on the value of this forage for milk production and on the economy of using millet as the only forage.

With increasing herd size many dairymen have mechanized for silage production. Silage harvesting equipment is also suitable for green-chopping forage. Since equipment was already available and trampling of millet was a grazing problem, green-chopping appeared to offer advantages.

To evaluate green-chopping, the dairy herd at the Gulf Coast Substation was divided into two, or sometimes three, comparable groups for the various summer tests. This herd, mainly Holstein, averages more than 10,000 lb. of 4% milk.

During the summers of 1959 and 1960, Starr millet pasture was compared with green-chopped millet for dairy cows. Concentrate rations were the same for both groups of cows, except in 1960 when a third group of cows on green-chop was fed a higher level of concentrates.

In 1961 and 1962 all cows grazed Starr millet during summer. They were divided into groups for feeding different levels of concentrate (concentrate to milk ratio varied from 1:2.5 to 1:4).

Cows on green-chop declined in milk production faster than grazing cows in four of five test periods. Apparently cows on pasture consumed high quality forage by selective grazing. Average daily production of grazing and green-chop fed cows during the five tests is given in the following table:

Period no.	*Daily milk production, pounds*	
	Grazed	*Green-chop*
1	35.9	31.6
2	28.4	28.7
3	27.0	24.3
4	24.8	24.3
5	27.7	20.8
AVERAGE	28.8	25.9

Although cows on green-chop produced less milk per cow, this system resulted in higher milk yield per acre of feed crops. About one-third more acres of millet was required for grazing than for green-chopping.

Judging by serious fluctuations in milk production levels, nutritive quality of Starr millet varied greatly. During certain periods in 1961-62 quality was seriously low and production declined rapidly even with feeding of a high level of concentrate – 1 lb. to 2.5 lb. milk. On the other hand there were test periods in which millet quality was such that even normal levels of grain feeding (1:4 or 1:3 grain to milk ratios) were not needed.

Not only did milk production fluctuate according to millet quality and level of concentrate fed, but cows also gained or lost body weight as forage quality changed. And quality changes occurred rapidly at times.

An example of forage quality effects on production and weight changes is shown by 1961 test results. With good quality millet, there was no difference in milk production between high and low concentrate levels (average was 33 to 35 lb. daily). However, cows on higher concentrate feeding gained an average of 1.5 lb. per day, twice the gain of those on low concentrate levels.

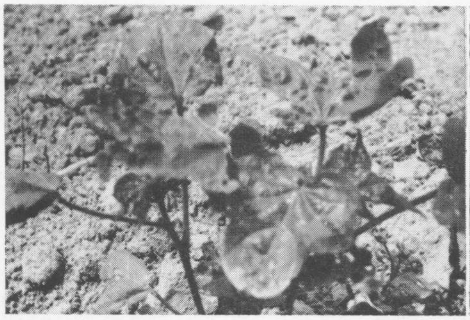
Four conclusions resulted from the Gulf Coast test:

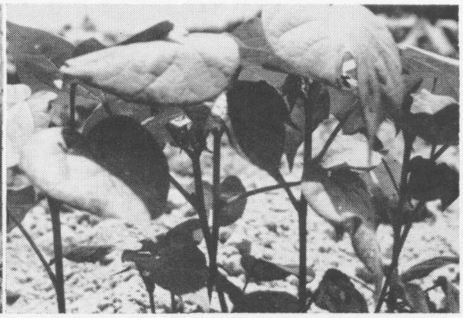
(1) Cows produce more milk when grazing Starr millet than when the same forage is fed as green-chop.

(2) Green-chopping apparently is not economical for a herd of less than 60 cows. For larger herds, green-chopping plus relatively high levels of concentrate may be feasible, especially if grazing land is scarce.

(3) Starr millet often is expensive to grow. Three or four plantings are needed each year to provide high quality grazing. Cost of producing high quality millet pasture varies from about 25-35¢ per cow per day under adequate moisture conditions to 50-60¢ under adverse conditions. Even so, millet appears to be the lowest cost summer forage now available in the Gulf Coast area, except where high yields of corn silage can be produced.

(4) The high variability in quality of millet presents a management problem. In some cases where millet quality is low, it will pay to feed extra grain to avoid a milk loss. When millet quality is extra good, grain feeding can often be reduced for most cows. This requires close supervision of cows while on millet to permit concentrate feeding adjustments to cash in on millet quality.





(L) Thrips damage to young cotton plants. (R) Plants in thrips-controlled plot. Injury usually disappears by time plants are 4 to 6 weeks old.

COTTON YIELDS–
Thrips control vs. none

T. F. WATSON, *Zoology-Entomology Dept.*

CONTROL OF THRIPS in Alabama does not necessarily mean more cotton per acre! In fact, untreated plots in numbers of experiments outyielded treated plots.

Value of controlling thrips on cotton has been investigated by Auburn University Agricultural Experiment Station at a number of locations in Alabama for several years. Testing insecticides for effectiveness has been of little concern since most of those recommended for control of other cotton pests also control thrips. In addition, systemic insecticides, such as phorate and Di-syston, applied at planting time effectively protect young plants from thrips injury for several weeks. The main consideration has been the value, if any, derived from thrips control.

Nature of Damage

Heavy infestations may cause severe damage to seedling plants. Feeding of both adults and immature forms causes the damage by destroying leaf tissue, which results in ragged, crinkled leaves (see photos). Severe infestations destroy leaf buds and cause plants to become excessively branched and distorted. Normally, injury is outgrown in 4 to 6 weeks.

Control Experiments

Many experiments, using various insecticides and different application methods, have demonstrated two important points with regard to thrips control in Alabama. First, in many instances thrips populations are so negligible as to be of little or no consequence, and second, even where infestations are sufficiently dense to cause severe plant damage total yields are not adversely affected. In many cases, yields were slightly greater where thrips were not controlled. This has also been found in a number of other cotton-producing states.

TABLE 1. NUMBERS OF THRIPS AND YIELDS OF COTTON FROM SEVERAL EXPERIMENTS

Location and treatments		Thrips/ 100 plants	Yield of seed cotton/acre
		No.	*Lb.*
Auburn	Check	73.8	1,621
	Phorate	18.8	1,488
	Di-syston	16.2	1,481
Headland	Check	6.9	1,990
	Phorate	6.6	1,923
	Di-syston	11.5	1,971
Prattville	Check	11.3	1,713
	Phorate	4.0	1,567
	Di-syston	9.3	1,626
Sand Mountain	Check	94.7	1,595
	Phorate	11.0	1,448
	Di-syston	14.3	1,645
Tallassee	Check	20.0	2,893
	Phorate	12.0	2,915
	Di-syston	9.3	2,847
Tennessee Valley	Check	56.0	2,148
	Phorate	30.0	1,835
	Di-syston	45.7	2,142

TABLE 2. AVERAGE NUMBERS OF THRIPS AND YIELDS IN SIX CONTROL EXPERIMENTS IN ALABAMA

Treatments[1]	Thrips per 100 plants, av.	Av. yield seed cotton per acre	Difference
	No.	*Lb.*	*Lb.*
Check	43.8	1,993	.....
Phorate	13.7	1,863	−130
Di-syston	17.6	1,952	− 41

[1] Each treatment is average value of six different experiments.

Treatments common to a number of experiments are given in Tables 1 and 2 to show results of thrips control. Both phorate and Di-syston insecticides give good control of thrips on seedling cotton. Results, as shown in these tables, indicate that thrips control does not necessarily mean an increase in yields. In four of the six experiments, treatments with phorate and Di-syston resulted in lower yields than the untreated checks. The phorate treatment resulted in a slightly greater yield in one of the experiments, while Di-syston resulted in the top yield in the remaining test. In none of these was there an important difference in yields between treated and untreated plots.

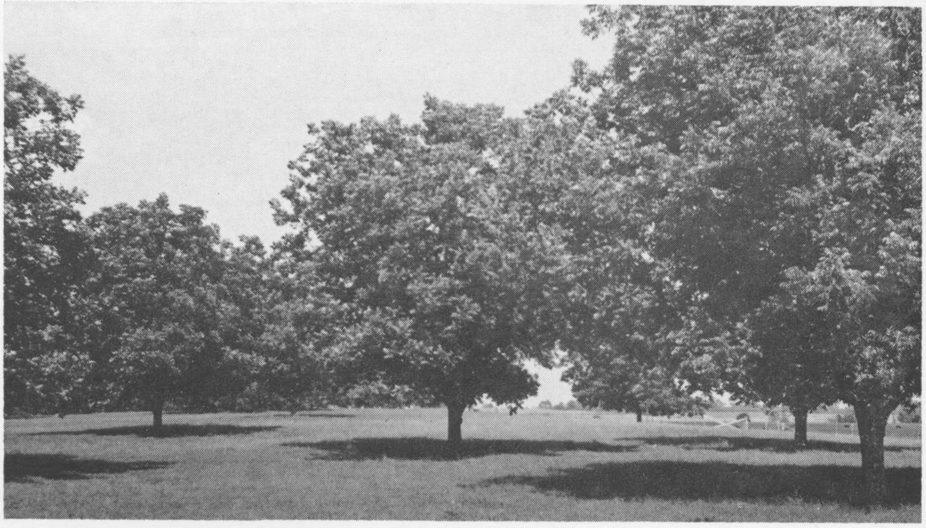
Conclusions

It is concluded from the results of these experiments that the disadvantages arising from the control of thrips far outweigh any advantage that may be gained. The main benefit results from a more uniform, vigorous growth of the young plants. However, visible differences in growth between injured and uninjured plants have usually disappeared by the time the cotton is 4 to 6 weeks of age.

The disadvantages from controlling thrips are: 1) increases cost of cotton production; 2) results in no increase in yield; and, 3) destroys beneficial insect populations that aid in the control of a major pest, the bollworm.

PECAN INDUSTRY in ALABAMA

E. E. KERN,
Department of Agricultural Economics



Although many of the 200 pecan growers interviewed in the study had groves such as the one above, results showed that only 3% received a major portion of their income from pecans.

THE PECAN INDUSTRY is taking its place as an important source of income in Alabama, and as a major contribution toward meeting consumer demand for tree nuts.

Gross returns to farmers of the State from pecans in 1963 amounted to 9.5 million dollars. This was more than that received from any other single vegetable, fruit, or nut crop that year. Unfortunately, however, the income experienced in 1963 demonstrated a potential rather than a steady realization since annual fluctuations in income from the average have been considerable.

Production

Alabama is second to Georgia in being the most important producer of pecans in the nation. Pecans are native to the State and area. Originally growing wild in its habitat along streams and river bottom lands, the pecan tree is found to be well adapted throughout the State to sandy loam soils with adequate moisture-holding capacity. Research has resulted in improved varieties when compared with original wild varieties. In 1963, about 85% of the Alabama crop sold consisted of improved varieties as compared with less than 20% in certain Western States.

Although improvements have been made in production, pecans are typically a sideline business on many farms. Research by the Auburn University Agricultural Experiment Station involving 200 pecan growers in Alabama during 1962 revealed that only 3% received a major portion of their income from pecans.[1] Only 34% received half or more of their income from farming, although farmers produced 60% of the volume reported. Forty-four per cent of the growers had less than 100 trees, while only 5% had 1,000 or more trees. Diversity among growers has resulted in differences in marketing procedures. The effect has often been disorganized marketing and reduced prices to producers.

Production instability from one year to the next constitutes a major problem to the industry. About 61 million pounds of pecans were produced in Alabama in 1963 as compared with a yearly average of 22 million pounds from 1949-63. The variation from year to year during the 15-year period was 51% of average production. Variation among states in the Southeast was greater than that experienced in the West. Instability of production in the Southeast as compared with that of the West appears to be related to differences in varieties, diseases, and insects, cultural practices, and climatic conditions. Control of irregular production constitutes a major area of research by scientists at Auburn.

Marketing

About 70% of the commercial pecan crop in the State is produced in 25 southern counties. Likewise, about 100 buyers, exclusive of some small wholesale and retail outlets, are primarily in southern counties. Of these, there are about 15 shellers and 11 major dealers and processors. A sheller, as the name implies, shells, whereas a processor cleans, bleaches, polishes, and sometimes dyes in-shell nuts. Procurement and disbursement of pecans by these agencies are located primarily in the pecan belt, including Alabama. Data have been obtained from almost all of the 80-90 firms existing in the U.S. during 1960-61 season.[2] The 8 largest accounted for about one-half of the industry sales in the period studied, while 37 accounted for 90% of the volume. A trend toward fewer and larger firms has occurred in recent years. Increased plant capacity has resulted in increased procurement problems of firms, including higher costs. Accumulators play an important part in supplying firm requirements as distant production areas are needed in order to achieve plant efficiency.

About 94% of the volume sold by shellers and processors during the period considered went to the shelled market. Bakery and confectionery outlets were the most important. Improved varieties supplied from Alabama and the Southeast were preferred by food processors for making resale items, while seedling pecans from western areas were used as an ingredient for candy and baked goods. The former represents somewhat higher valued uses for pecans than does the latter.

Economic Research

Economic research at Auburn seeks to gain fuller understanding of procurement procedures and problems of major pecan buyers. Opportunities for adjusting the present marketing system to achieve greater efficiency is a major goal sought.

[1] Jones, Ronald E. and Danner, M. J., *Farm Handling and Marketing of Pecans in Alabama*, Circular 148. p. 8. Auburn University Agricultural Experiment Station, 1964.

[2] Powell, Jules V. and Reimund, Donn A., *The Pecan Shelling and Processing Industry—Practices, Problems, Prospects*, USDA, ERS, Marketing Economics Division, Agr. Econ. Rep. 15. Washington: Superintendent of Documents, 1962.

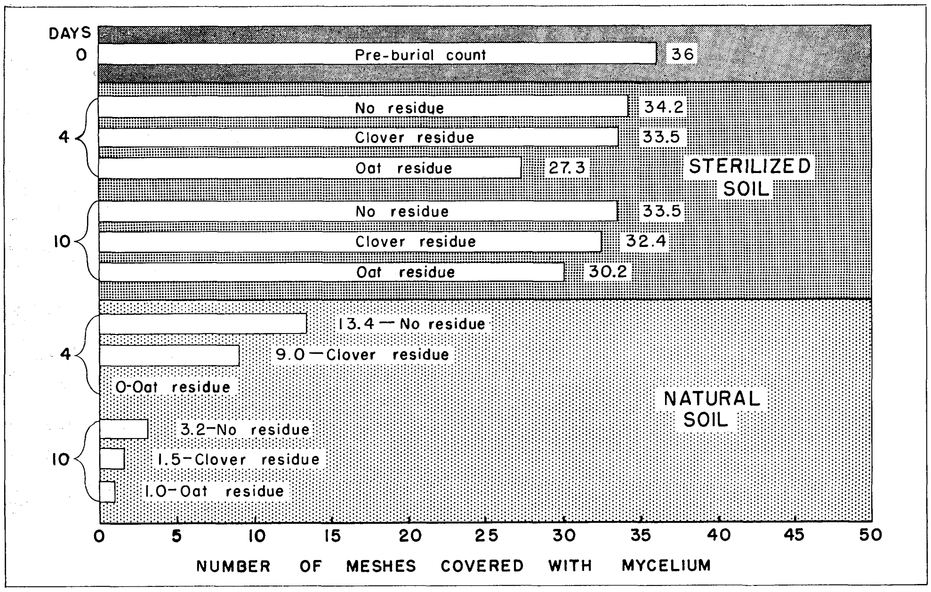


FIG. 1. Illustrated here is survival of S. rolfsii mycelium on nylon mesh cloth buried in soil amended with dry plant residues, both sterilized and natural soils.

SOUTHERN BLIGHT DISEASE OF PEANUTS REDUCED BY OAT RESIDUE IN SOIL

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Department of Botany and Plant Pathology

SOUTHERN BLIGHT, or "White Mold," is a destructive disease of peanuts in Alabama and other peanut-growing states. The blight is caused by a soil fungus (*Sclerotium rolfsii*), which attacks roots and soil-level parts of peanuts and many other plants.

A wide range of plants serves as host for the blight fungus, and it has the ability for long survival in the soil. For these reasons, control measures have been restricted to cultural practices.

The disease is usually most severe where peanuts are planted following peanuts or other legume crops, and less severe where oats, corn, or other grain crops are planted in rotation with peanuts. Oats appeared to give best control of the fungus in studies by Auburn University Agricultural Experiment Station.

Fungus Control Studied

How grain crops help control the fungus and reduce disease severity is not clearly understood. One possibility is that decomposition of plant residues by microbes in the soil creates conditions unfavorable for the Southern blight fungus. This was one possibility investigated in the laboratory and greenhouse studies at Auburn.

In initial laboratory studies, S. *rolfsii* was grown in sterilized water extracts of dry plant residues. Rate of fungus growth is indicated by the following dry weights of the fungus:

Extract source	*Dry weight, mg.*
Clover	84.1
Peanuts	64.7
Vetch	52.7
Corn	47.1
Oats	35.3

Growth of the fungus was considerably less in cultures of oats or corn than in clover or peanut extracts. This suggests that oat and corn residues may contain substances that directly retard growth of the parasite.

Survival of Fungus in Soil

Effects of plant residues on survival of the disease organism in soil was investigated. The fungus was allowed to grow over small squares of nylon fine-mesh gauze. These were then buried in sterilized soil and in natural soil containing dry, chopped residues of clover or oats, and in soil without residue.

Microscopic examination revealed that the fungus disappeared most rapidly in soil containing oat residues, Figure 1. Reduction was much greater in natural soil. This was expected because of the suppressive and destructive action of other soil microorganisms. Such rapid destruction of the fungus in the presence of the oat amendment might be expected to reduce the inoculum potential in soil, resulting in less disease severity.

Residue Effects on Stem Rot

A greenhouse study at Auburn was done to determine if amending soil with dry oat residue would reduce stem rot damage of peanut seedlings grown in fungus-infested soil. Seedlings were grown in rolfsii-infested soil that was amended with clover, peanut, or oat residues. A comparison treatment had no residue added. After 15 days, plants were removed and rated for stem damage. As shown by Figure 2, peanut seedlings suffered less stem-rot damage in soil amended with oat residue.

Results of the laboratory and greenhouse studies indicate that control of the Southern blight fungus by crop rotations involving oats might result from (1) water soluble substances that occur naturally in oats and have a suppressive effect on the fungus; and (2) unfavorable conditions for growth or survival of the fungus in the soil during oat residue decomposition by other soil microbes.

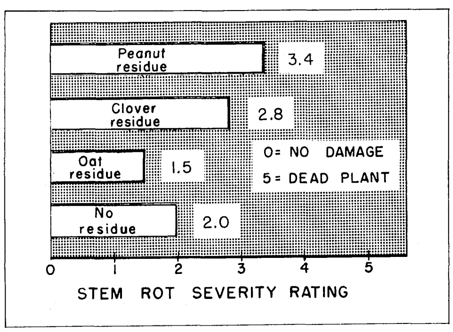


FIG. 2. Stem-rot severity ratings for peanut seedlings grown in fungus-infested soil amended with dry plant residues are shown.

* Cooperative, USDA Agricultural Research Service.

SKIP-ROW COTTON
May fit your farm

E. J. PARTENHEIMER and J. H. YEAGER, *Department of Agricultural Economics*

SKIP NONE, one, two or four. Alabama farmers aren't playing hop scotch in the cotton patch. However, they are going for skip-row cotton.

In 1964, 38,383 acres on 1,280 farms were planted in skip-row patterns. This was more than twice the farms and acres of skip-row cotton in 1963. Less than four rows were skipped on 98% of the acreage of skip-row cotton planted in 1964.

Experimental skip-row work was conducted at the Tennessee Valley Substation of the Auburn University Agricultural Experiment Station on Decatur clay soil for a 5-year period. A higher yield per acre of cotton allotment was obtained with skip-row than with conventional solid planting.

Skip-row cotton requires more land than solid planting. Is the increase in cotton yield sufficient to command the use of skip-rows or can this land be put to a more profitable use?

Two alternative uses of land were considered. They were corn and soybeans. Tests of leading varieties of these crops at the Tennessee Valley Substation over a 5-year period (1959-63) indicated that per acre yields of more than 800 lb. of lint cotton, 80 bu. of corn, and slightly less than 20 bu. of soybeans prevailed on Decatur clay soils. Costs were estimated using per acre yields of 700 lb. of lint cotton, 70 bu. of corn, and 20 bu. of soybeans. It was assumed that 4-row cultivators and 4-row planters were used, except for planting 2 x 1 and 2 x 2 skip-row cotton. Two-row planters were used for these patterns. All crops were assumed to be custom harvested.

Research work at the Tennessee Valley Substation indicated that 2 x 2 planting of cotton resulted in a 56% increased yield over solid planting. With 4 x 4 cotton, the increase was 31%. The experimental work did not include 2 x 1 plantings. Results of research work in the Delta of Mississippi indicated that 2 x 1 planting gave about the same increase in yield as 4 x 4. This was assumed applicable for comparisons presented here. With solid cotton yielding 700 lb. of lint per acre, estimated yields for 2 x 2 were 1,092 lb. and for 4 x 4 and 2 x 1 yields were 931 lb.

Increased yield and harvesting efficiency were obtained from skip-row cotton on the Station's Agricultural Engineering Farm.

Based on estimated costs for the three patterns of skip-row cotton, 2 x 2 planting gave the highest return to land, management, and fixed costs. This was 68% greater per acre of allotment than solid planted cotton. The 2 x 1 and 4 x 4 patterns gave about 35% more return per acre of allotment than solid planting.

Approximately half the differences in cost of producing skip-row and solid cotton resulted from picking and ginning the added yields. Most of the remaining cost differences resulted from increased tractor, equipment, and labor costs. Additional land preparation and cultivation of skips to control grass and weeds were required with skip-row cotton.

With cotton at 30¢ per lb, the return to land, management, and fixed costs per acre of cotton allotment ranged from $97.55 for solid planted cotton to $163.87 for 2 x 2 skip-row cotton, see table. However, skip-row cotton takes more land and the alternative uses of this land must be considered when choosing the planting method to be used. With corn and soybean prices at $1.15 and $2.50 per bu., respectively, the returns per acre to land, management, and fixed costs were $38.56 and $16.84, respectively. Even with favorable price and yield assumptions, soybeans are less than half as profitable as corn on these soils. Therefore, corn was used as an alternative on skip-row cotton land.

Returns are compared for different ways of using 2 acres of land and 1 acre of cotton allotment. The 2 x 2 pattern provides the highest estimated net return. If a farmer planted 4 x 4 instead of 2 x 2, he would be sacrificing $32.07 per acre in return to land, management, and fixed costs, as shown below:

Alternatives	*Return to 2 acres (1 acre of allotment)*
1 acre solid cotton and 1 acre corn	$139.49
1.5 acres of 2 x 1 and .5 acres corn	152.35
2 acres 2 x 2	163.87
2 acres 4 x 4	131.80

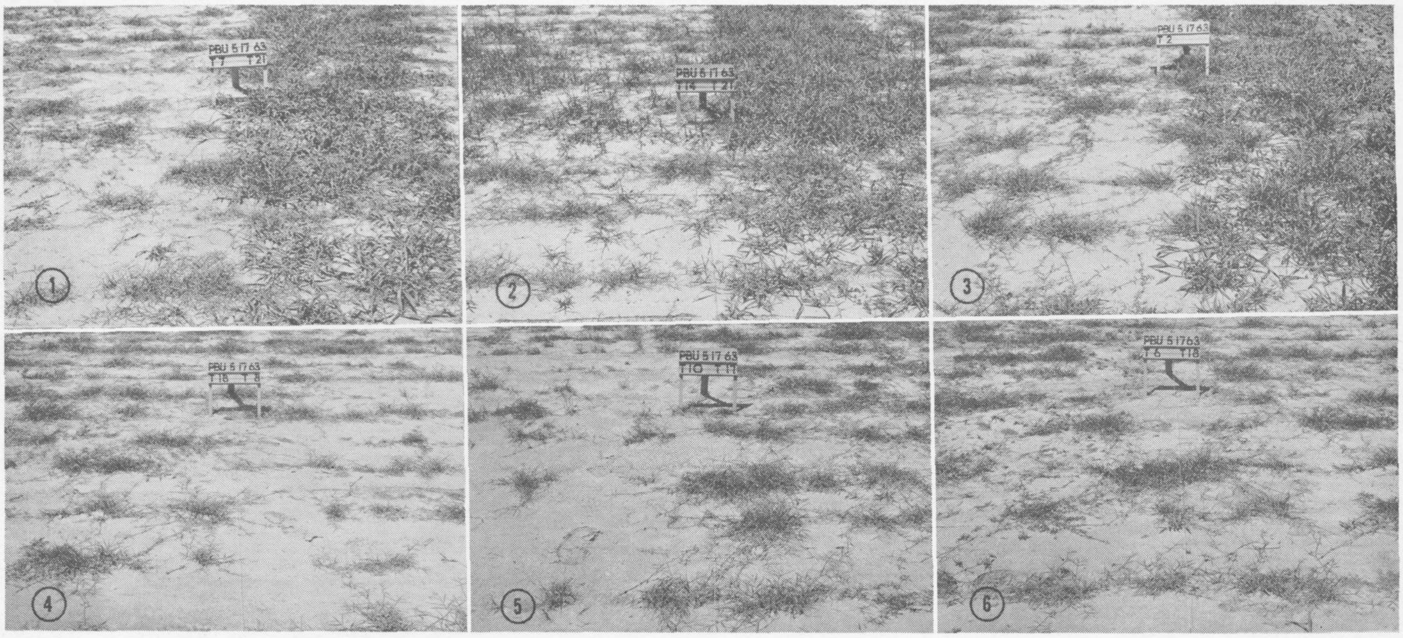
The second most profitable alternative is 1.5 acres of 2 x 1 cotton and 0.5 acre of corn. This alternative is almost $21 per acre better than 4 x 4 skip-row cotton.

If enough good cotton land is available, it appears profitable to plant cotton in the 2 x 2 skip-row pattern. If good cotton land is more limited, then the 2 x 1 pattern becomes the best alternative. When the acreage of good cotton land is too limited even for the 2 x 1 pattern, then solid planting methods would be used.

The foregoing figures are based on custom harvest costs. Had the assumption been made that acreage was large enough to fully utilize owned harvesting equipment, then the skip-row patterns would have given even greater returns over solid planting.

CROP COMPARISONS

Crop	Acres of land involved	Cash receipts	Expenses	Return to land, mgt., & fixed costs
Cotton				
Solid	1.0	$223.80	$126.25	$ 97.55
2 x 1	1.5	297.60	166.22	131.38
2 x 2	2.0	349.35	185.48	163.87
4 x 4	2.0	297.60	165.80	131.80
Corn	1.0	80.50	41.94	38.56
Soybeans	1.0	50.00	33.16	16.84



These tests plots illustrate effects of herbicides on Coastal stands, as well as weed control provided. Treatments shown (left to right in each photo) are: (1) CP 17029, 2 lb., and untreated check; (2) dacthal, 8 lb., and untreated check; (3) CP 31675, 1 lb., and weedy border; (4) diuron, 1½ lb., and CP 17029, 3 lb.; (5) simazine, 2 lb., and diuron, 1 lb.; and (6) DMA, 6 lb., and diuron, 1½ lb. per acre.

Controlling Weeds During Coastal Bermuda Establishment

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Department of Agronomy and Soils

ANYTIME A CROP is planted – whether row or sod – weeds are certain to follow. This is true even with hardy, fast growing plants like Coastal bermudagrass.

Annual weeds are serious problems in establishing Coastal. These pest plants compete with the newly planted grass for light, nutrients, and moisture. Dense stands of weeds often prevent the runners from rooting. Thus, weeds delay establishment and reduce amount and quality of the first few harvests.

It has been known for several years that broadleaf weeds can be controlled by using 2,4-D. Much less information has been available about chemical control of annual grasses in sod crops. Several materials have shown promise for this purpose in herbicide evaluation studies by Auburn University Agricultural Experiment Station.

Ten experimental herbicides (DCPA, simazine, diuron, CP 17029, CP 31675, CP 13396, DMA, DNBP, and C-2059) were used in the weed control study. They were tested on Independence loamy fine sand at the Plant Breeding Unit in 1963 and 1964. Another test was on a Norfolk sandy loam at the Lower Coastal Plain Substation in 1964.

Except for DMA and DNBP, the herbicides were applied immediately after sprigging the bermudagrass. DMA and DNBP were applied post emergent to the weeds and DNBP was also tried as a preemergence herbicide. Treatment effects were evaluated by comparing botanical composition and forage yields.

All of the herbicide treatments controlled annual grasses effectively, except CP 31675 at ½ lb. per acre of active material at the Plant Breeding Unit in 1963. In 1964, early weed control was good from all treatments except CP 17029 at 2 lb. and DNBP (preemergence) at 1½ lb. per acre. Broadleaf weeds were so sparse in all tests that herbicides could not be evaluated for their control.

When evaluated in late summer, control of annual grasses was satisfactory from the following herbicides and rates of active ingredients per acre: CP 17029, 2 lb.; simazine, 2 and 3 lb.; DCPA, 4, 8, and 16 lb.; diuron, 1, 1½, and 2 lb.; C-2059, 2, 4, and 6 lb.; CP 31675, 1, 1½, and 2 lb.; and DNBP, 3 and 6 lb. Effective control of annual grasses and nutsedge resulted from 1 to 3 post emergent applications of DMA at the rate of 4 lb. per acre each.

Coastal stands were reduced in 1963 by simazine at 2, 3, and 4 lb. per acre, and the 2 lb. rate of diuron. In 1964 some stand reduction occurred with all herbicide treatments except CP 17029 at 2 lb., DCPA, CP 31675, DNBP, and DMA. The photographs illustrate effects of herbicides on stands of Coastal, as well as weed control.

Yields of bermudagrass were closely correlated with weed control and lack of injury by the herbicide. Considering both weed control and stand of Coastal, these five herbicides appear promising: (1) DMA, 4 lb. per acre, applied at least twice; (2) simazine, 1 and 2 lb. per acre; (3) diuron, 1 and 1½ lb. per acre; (4) CP 31675, 1, 1½, and 2 lb. per acre; and (5) DCPA, 4 and 8 lb. per acre.

At present, simazine is the only one of these that is registered by USDA for this purpose.

* Resigned.

WEANED BEEF CALF PRODUCTION — *Costs and Returns**

TOM D. NOLEN
Department of Agricultural Economics

WHAT DOES IT COST to produce a weaned beef calf? This question has been asked by many cattlemen.

Costs vary among farms according to kinds of pastures, grain, protein and roughages fed, investment in breeding stock, and other factors. A study of major cost items, their relative importance, and why some producers achieve lower costs than others was made by Auburn University Agricultural Experiment Station.

In the fall of 1963, 47 producers of weaned beef calves in Montgomery, Marengo, and Sumter counties were interviewed as well as 67 others in northern and southern Alabama. Physical data, cost estimates, and production practice information were obtained.

Central Alabama Producers

The 47 central Alabama producers averaged 23 years experience in beef cattle production. Their average age was 53 years. More than one-third reported farming as the only source of income.

These farmers operated an average of 1,033 acres; 40% of the farmers rented a part of the land operated. Herd size averaged 141 beef brood cows, the largest consisting of 674 cows. Average weight of calves sold was 454 lb. at 8 months of age.

Farm land chargeable to beef averaged 4.5 acres per brood cow. Almost 90% of this land was in native grasses or native grasses plus clover. Very little use was made of temporary crops.

Costs Involved

Excluding a land charge, only 36% of all the producers interviewed had total costs of less than $25 per cwt. of weaned beef calves sold. The average cost was $26.63 per cwt. (See table.)

Pasture and feed were the major cost items for all groups. Low-cost producers had the lowest pasture costs per cow and as a proportion of total costs. This was achieved by a higher stocking rate and greater dependence on native grasses and native grasses plus clover.

COSTS AND RETURNS PER BROOD COW AS REPORTED BY 47 WEANED BEEF CALF PRODUCERS, CENTRAL ALABAMA, 1962

Items	Cost per cwt. groups: Less than $25.00	$25.00 to $34.99	$35.00 and over	Average all groups
Number of farms	17	19	11	47
Av. no. brood cows	165	124	132	141
Acres, land per brood cow	3.9	4.9	4.8	4.5
Costs per cow:				
Pasture	$20.37	$ 42.72	$ 46.35	$34.04
Feed	24.02	29.28	36.60	28.64
Interest on investment in beef animals	11.26	11.66	9.63	11.05
Marketing	2.10	2.68	1.92	2.27
Buildings	2.61	3.67	3.27	3.13
Other	11.52	14.73	14.70	13.36
	$71.88	$104.74	$112.47	$92.49
Less breeding stock sales and change in inventory	22.98	11.13	23.58	18.89
Plus purchases	15.44	13.15	7.01	12.78
Adjusted net cost per cow	$64.34	$106.76	$ 95.90	$86.38
Pounds of beef calves marketed per cow	364	365	182	324
Cost per cwt. of beef calves sold	$17.70	$ 29.24	$ 52.63	$26.63

Types and amounts of feed fed varied among the groups. Low-cost producers used a less expensive source of protein and produced hay cheaper than the other two groups. In general, low-cost producers fed less feed per cow. The average producer fed 5.2 bu. of corn, 1,584 lb. of hay, and the equivalent of 261 lb. of 41% cottonseed meal per cow. The average low-cost producer fed only 2.7 bu. of corn, 1,340 lb. of hay, and the equivalent of 260 lb. of 41% cottonseed meal per cow. Amounts of feed fed were probably above normal because of the severe winter of 1962.

Interest on investment per cow was lowest for the high-cost group. This group valued cows, bulls, and replacements at a lower price per head than producers in the other groups. Average value reported per cow was $165 by low-, $150 by medium-, and $135 by high-cost producers.

There were no great differences among groups in marketing and building costs per brood cow. However, building costs per cow were closely related to size of herd. As herd size increased, building costs per cow declined. Building investment averaged $26 per cow for low-, $37 for medium-, and $33 for high-cost groups.

Other costs included fencing, health, water, property tax, and labor charges. Labor cost averaged $4.22 per cow or $1.30 per cwt. of weaned beef calves sold.

Output and Returns

There is little difference in annual cost of keeping a brood cow regardless of whether she produces a calf. Therefore, output per cow in addition to level of costs is an important factor affecting profits. The amount of weaned beef calves sold is largely determined by percentage of calf crop, replacement rate if replacements are raised, and weight of calf sold.

Low- and medium-cost producers sold almost the same amount of weaned beef calves per cow, although their costs per cwt. were quite different. These two groups averaged almost 0.9 calf dropped per brood cow and sold almost 0.8 calf per brood cow. High-cost producers averaged 0.65 calf born per cow and sold only 0.43 calf per cow. Average weight of calves sold was 455, 463, and 426 lb., respectively, for low-, medium-, and high-cost groups.

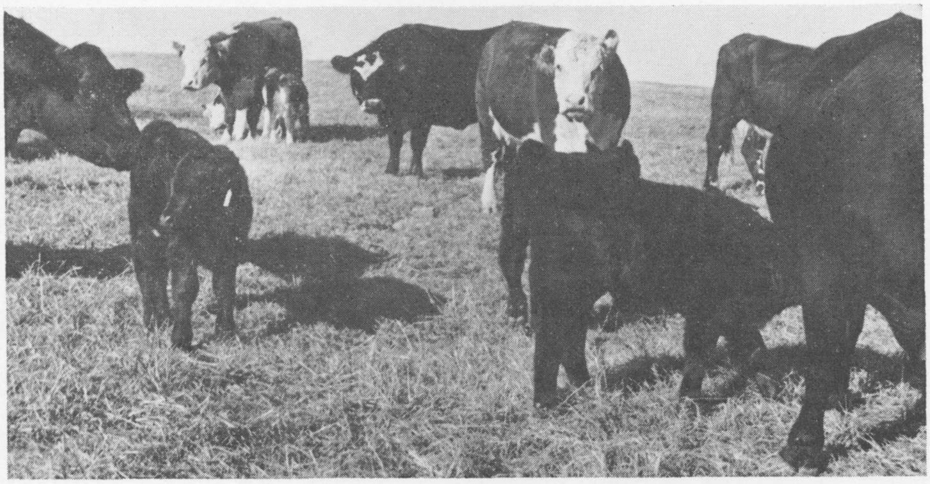
Fifteen producers had receipts above costs as calculated excluding a land charge. However 62% of the producers had returns that equalled or exceeded cash costs.

By analysis of both input and output phases of their cattle enterprises, beef calf producers can determine ways to make improvements that pay off in dollars.

* This report is a part of an overall contract study on the potential for beef cattle in Alabama supported in part by a grant from the Southern Railway System.

PASTURES for BEEF COWS NURSING CALVES

W. B. ANTHONY, R. R. HARRIS, and R. R. NIX,
Department of Animal Science and
J. G. STARLING and C. A. BROGDEN, *Wiregrass Substation*



This cow and calf herd is grazing Coastal at the Station's North Auburn Beef Unit.

ALABAMA has more than 400,000 acres in Coastal bermudagrass!

The acreage of Coastal in the southeastern and southwestern sections of this country is estimated to be more than 3.5 million acres.

In grazing experiments conducted by Auburn University Agricultural Experiment Station in southern, central, and northern Alabama to test the feed value of this crop, steer gains on Coastal have been greater than steer gains on other permanent pasture crops, such as Pensacola bahia, common bermuda, dallis, sericea, or orchardgrass. In these experiments, animal gain per acre has been generally high, but daily gain per animal has been low. This has raised the question of the adequacy of Coastal pasture as the sole feed for a beef cow nursing a calf.

From 1958 to the present time, beef cows nursing calves have been used as test animals for evaluating pastures at the Piedmont Substation. Calf gains for cows grazing Coastal have been equal or superior to gains for calves nursing cows grazing dallis, sericea, or Pensacola bahia. In this study milk production was measured and cows grazing Coastal produced about the same amount as those grazing other crops.

Another experiment at the Wiregrass Substation was to determine response in terms of increased milk production and increased calf growth when the cow was changed from Coastal to a feed superior to Coastal. Grain feeding cows and calves was used as a superior feeding program to Coastal grazing. Treatments tested were: (1) Coastal grazing alone, (2) Coastal grazing plus feeding cows 4 lb. of grain per head daily, (3) Coastal grazing plus creep feeding calves grain, and (4) Coastal grazing plus grain for cows and calves. Data for the 1963 grazing season are reported. The experiment was for the duration of the grazing season and the cows were milked at 28-day intervals. Stocking rate on experimental pastures was held constant at 2 cows and 2 calves per 1.75 acres. Experimental groups were rotated on pastures at 28-day intervals. Pastures were treated with mineral fertilizer and nitrated. There was adequate forage available at all times. The weight changes for cows are shown in Table 1. Although cows grazing Coastal without other feed gained

TABLE 1. WEIGHT GAIN OF COWS

Treatment	Season gain per cow	Season cow gain per acre
	Lb.	*Lb.*
Control	88	101
Cows fed	163	186
Calves fed	191	218
Cows and calves fed	193	221

88 lb. during the season, feeding them 4 lb. of grain daily almost doubled the season gain. Cow gain was also doubled by creep feeding calves. Under most situations a gain of 88 lb. for a cow nursing a calf would be adequate. Therefore, Coastal pasture furnished adequate feed for the cow nursing a calf. It is significant to note cow gain induced by creep feeding calves. This indicated that stocking rate on Coastal pasture might be increased if calves were creep fed. Calves consumed an average of 4.68 lb. of grain per head daily.

Calf gains are given in Table 2. Feeding calves or feeding calves and their dams increased calf gain. Feeding the cow had no beneficial effect on the calf. Milk production of dams was not increased by feeding grain in addition to grazing. Milk production of cows averaged about 10 lb. per cow daily and treatment differences were small. When calves were creeped their dam's milk production tended to be lowered.

These data reveal, therefore, that Coastal pasture is adequate as the sole feed for a beef cow nursing a calf. Milk production of beef cows is normal when the ration is Coastal grazing, and it is not increased by improving the diet with grain supplement. Calves on Coastal-grazed dams gain more when given grain by creep, but this has been shown to be true for almost any type grazing. Also, as shown in this test, beef cows make larger seasonal gain when supplied a ration superior to Coastal grazing. Although overall brood cow performance can be slightly improved by supplying a ration containing a better balance of nutrients than Coastal grazing, research shows that Coastal grazing is as good as other permanent pasture crops and has a higher yield potential than most other species.

TABLE 2. CALF GAINS

Treatment	Season gain per calf	Season gain per acre
	Lb.	*Lb.*
Control	305	349
Cows fed	277	317
Calves fed	338	386
Cows and calves fed	368	421

FERTILIZING farm fish ponds

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Dept. of Zoology-Entomology

METHODS OF POND fertilization developed by Auburn University Agricultural Experiment Station during the period 1934 to 1938 have been widely used throughout the Southeast with little change to the present time. Continued research at Auburn has developed better methods of application and cheaper fertilizer for older ponds.

It was originally recommended that fertilizer be applied by broadcasting over shallower water areas, or by pouring it in a line 15 to 20 ft. from the shoreline around shallower parts of the pond. Later it was found that less fertilizer was required and better results were obtained if fertilizer was placed on a platform about 1 ft. under water. (See photo.) Wind and waves were effective in distributing nutrients throughout the pond as they dissolved from fertilizer on the platform. Circulation of nutrients in top waters reduced the amount of fertilizer required annually by 20% to 40%.

For fertilization of older ponds where pond weeds had been brought under complete control, further economy in fertilization was found possible. Continued research on ponds that had received prior fertilization for 5 to 15 years indicated that these ponds did not require use of a complete fertilizer. Ponds that had received potash fertilization for as long as 2 years no longer needed additional amounts of this element. This was because a sufficient amount for maximum production was stored in organic and inorganic forms in waters and bottom muds of these ponds.

The accumulation of organic matter in bottom muds of ponds after 3 to 5 more years of fertilization also made possible increase in abundance of certain groups of nitrogen-fixing bacteria that live in pond muds to a point where they could furnish sufficient ammonia nitrogen for pond needs. These bacteria, using carbohydrate energy from organic deposits, are able to use atmospheric nitrogen dissolved in the pond water to construct their own body proteins. Upon their death and decay this "fixed nitrogen" is released into the pond water as ammonia, usable by microscopic plants. Also, certain microscopic algae are able to use the energy of sunlight to convert atmospheric nitrogen to ammonia for their own use. These algae become more abundant in ponds after several years of fertilization. On the average after 3 to 5 years of fertilization, sufficient nitrogen was being fixed annually within the pond so that further additions were usually unnecessary.

A single platform can be used to fertilize up to 15 acres of water. Here the pond has been drawn down to show construction details. Fertilizer is placed on top of platform, which is 1 ft. under water when pond is full.

Thus, after a few years of fertilization, a "complete" fertilizer is no longer necessary. Nitrogen and potassium can be omitted. However, continued use of phosphate is necessary. Even after ponds had received phosphate fertilization for 15 years, fish production declined when it was omitted. However, fertilization with phosphate costs only about 30% as much as an 8-8-2 or 20-20-5 fertilizer.

Therefore, older ponds can be fertilized with phosphate and the ponds will furnish their own potassium and nitrogen. However, since nitrogen fixation proceeds slowly in cold water, a pond receiving only phosphate in February and March may require a longer time to produce necessary amounts of ammonia for rapid increase in microscopic plants and fish feed organism than one receiving ammonia or nitrate nitrogen and phosphate. Unless microscopic plants develop rapidly, the water remains clear and pond weeds begin to grow. This is why phosphate fertilization alone should not be used except in ponds where pond weeds have been eliminated by systematic fertilization with 8-8-2 in prior years.

Where phosphate fertilization is used, either 40 lb. of superphosphate or 15 lb. of triple superphosphate per acre per treatment may be applied. First application is made about February 1, followed by two additional applications at 2-week intervals. Subsequent applications are made whenever microscopic green growth in water clears to the extent that objects underwater can be seen at depths greater than 18 in.

For new ponds or where weed control is necessary, best results would be obtained by using the 8-8-2 fertilizer at the rate of 100 lb. per acre per application at the times and frequencies as described.

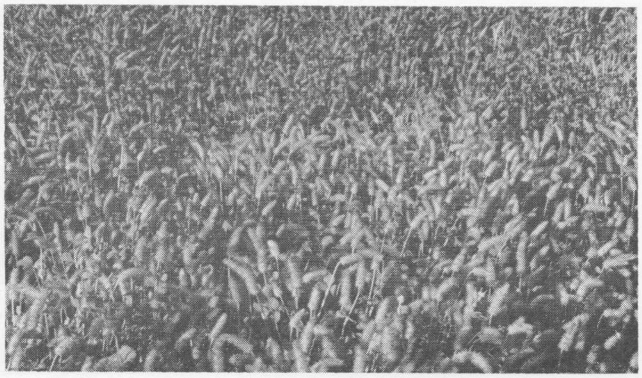


FIG. 1. This is a good growth of hardseeded crimson clover.

Persistence of Hard Seededness In CRIMSON CLOVER

E. D. DONNELLY, *Department of Agronomy and Soils*

CRIMSON is the most important winter annual clover in the South.

Prior to 1938 most crimson clover was imported from France and Hungary and had relatively few hard seed. Since that time reseeding varieties such as Auburn, Autauga, Chief, Dixie, and Talladega have been developed. Hard seedcoat is one of the most important characteristics of these varieties. This enables these varieties to reseed from year to year in the Southeastern United States. For this reason, seed certifying agencies have taken precautions to preserve hard seededness in reseeding crimson clover varieties.

A study by the Auburn University Agricultural Experiment Station was conducted to determine if the percentage of hard seed of reseeding varieties would diminish if new plantings were made with seed from nonvolunteer crops. During the period 1952-1961, 8 successive generations from continuous reseeding stands were compared with corresponding generations seeded annually on new land.

These tests were conducted in Alabama, Georgia, and Mississippi as part of a regional study. Results reported from the Alabama test are similar to those obtained at other locations.

Crimson Established

A stand of Dixie crimson clover was established in the fall of 1952 at the Station's Plant Breeding Unit, Tallassee, Figure 1. This area was allowed to produce reseeding or volunteer stands each year. In 1953 sufficient seed were harvested to establish a new area in the fall. Well-matured seed were harvested and threshed by hand to prevent scarification. The remaining seed were allowed to fall on the ground to produce a volunteer stand.

For 8 generations seed were hand-harvested from each successive non-volunteer stand and planted in new areas, Figure 3. Each new area was allowed to produce one volunteer stand. These new areas were destroyed after seed were harvested from the volunteer stand. All areas used in the study were ⅛ to ¼ acre and were isolated from other crimson clover.

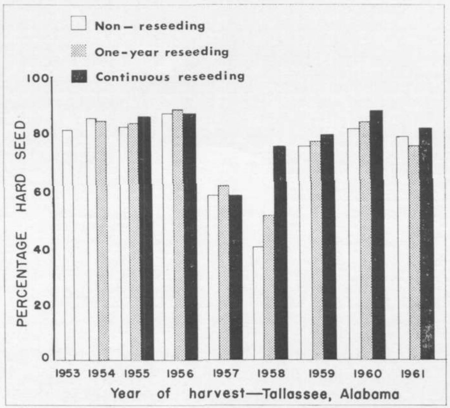


FIG. 2 Hard seededness from continuous reseeding and nonreseeding stands persisted at relatively high levels.

Results

Hard seededness from continuous reseeding and nonreseeding stands persisted at relatively high levels, Figure 2.

An interesting fluctuation in percentage of hard seed occurred during the period 1957-59. The hard seed percentage in 1957 was reduced proportionately in all stands from the previous year's high level, Figure 2. In 1958, reseeding stands essentially regained their original high level of hard seed production. Nonreseeding stands from the previous year's softer seed, however, produced seed of even a lower percentage of hard seed. The reason for this is not known. In 1959, all stands produced high levels of hard seed. There was no consistent trend toward an increased level of hard seededness in the continuous reseeding block during the study. Once a high level of hard seed is established in a variety, natural selection apparently maintains it under climatic conditions of the Southeast.

Conclusions

Hard seededness in crimson clover from continuous reseeding stands, nonreseeding stands, and 1-year reseeding stands persisted at relatively high levels during the test period. The high level maintained in seed from nonreseeding stands suggests that, after a high level of hard seededness is attained, this characteristic is maintained under the climatic environment of the Southeast.

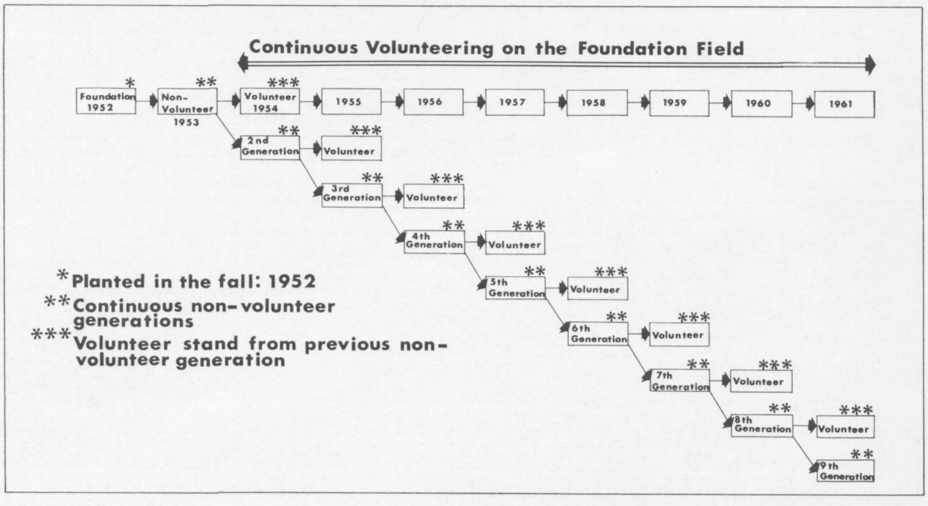


FIG. 3. This diagram shows the experimental plan used to determine the persistence of the reseeding characteristic in a reseeding variety of crimson clover.

STANDS of Coastal Bermuda Influenced by MANAGEMENT

E. M. EVANS, R. M. PATTERSON, L. E. ENSMINGER, and

C. S. HOVELAND, *Dept. of Agronomy and Soils*

IT IS GENERALLY KNOWN that management has major effects on forage yield and quality of Coastal bermudagrass. Now it is learned that the same management factors also have a bearing on stand maintenance.

Since Coastal is often established on land contaminated with common bermuda, this species competes with the planted grass. But results of Auburn University Agricultural Experiment Station studies show that adequate fertilization and good clipping practices provide at least partial control of common bermuda in Coastal meadows.

Irrigation, harvest frequency, and nitrogen fertilization were factors studied to determine effects on persistence of Coastal. The experiments were begun in 1961 at the Lower Coastal Plain Substation, Camden, and at the Tuskegee Experiment Field. Established stands of Coastal infested with some common bermudagrass were selected for experimental sites.

Three annual nitrogen rates – 200, 400, and 600 lb. per acre – were used, with split applications at 3, 6, and 12-week intervals during the growing season. Harvest intervals of 3 and 6 weeks were compared. All treatments were tested with and without irrigation. Application of lime and mineral fertilizers in 1961 was done according to soil test results. In 1962, 56 lb. of P and 115 lb. of K per acre were applied in addition to N.

TABLE 1. EFFECT OF IRRIGATION ON COMMON BERMUDA CONTENT OF FORAGE, 1961-62

Harvest date	Common bermuda content of forage: Lower Coastal Plain Sub.		Tuskegee Field	
	Irr.	Not irr.	Irr.	Not irr.
	Pct.	*Pct.*	*Pct.*	*Pct.*
June '61	1.1	0.3	1.2	0.9
Aug. '61	2.8	1.0	6.4	3.5
June '62	1.6	1.1	6.0	0.4
Aug. '62	1.1	<0.1	45.6[1]	<0.1

[1] High content of watergrass (*Paspalum sp.*).

Botanical composition of the swards was estimated at each harvest. A final stand estimate was made during 1963, the third year.

Coastal bermuda was the dominant grass initially. With one exception it accounted for almost all of the harvested forage, Table 1. There was a tendency for weeds to increase from June to August, and irrigated plots had a higher weed content. Some irrigated plots at the Tuskegee Field had especially high contents of watergrass at the August harvest.

TABLE 2. EFFECT OF N RATE AND HARVEST FREQUENCY ON COASTAL CONTENT OF FORAGE, 1963[1]

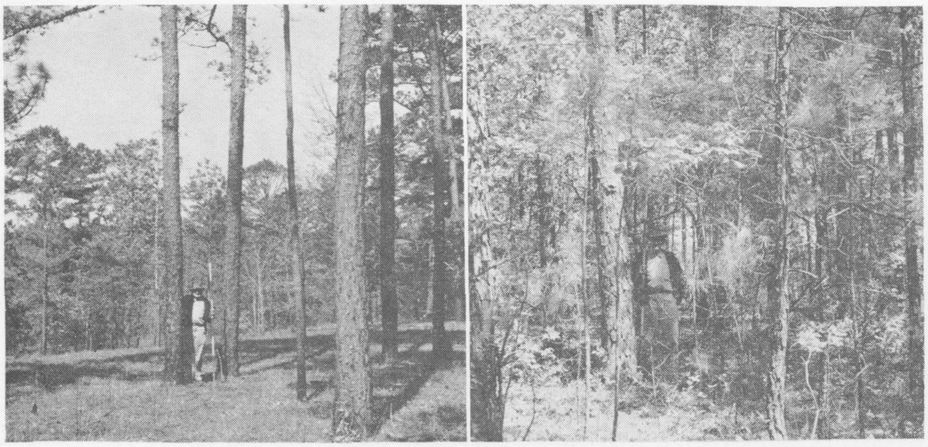
Annual nitrogen rate, lb. per acre	Coastal content of forage at different harvest frequencies: Lower Coastal Plain Sub.		Tuskegee Field	
	3-week	6-week	3-week	6-week
	Pct.	*Pct.*	*Pct.*	*Pct.*
200	32	48	26	34
400	41	63	27	17
600	38	84	19	12

[1] Data from irrigated plot only. All non-irrigated plots had 90-95% Coastal.

At the Lower Coastal Plain Substation, persistence of irrigated Coastal was better at the 6-week harvest interval and at the higher nitrogen rate, Table 2. This effect was different at the Tuskegee Field. There, irrigation and high rates of nitrogen apparently favored common bermuda, watergrass, and other weeds.

Where no irrigation was used, Coastal bermuda persisted well (90% or more) under all management treatments. This was true at both locations. Persistency is probably related to the ability of Coastal to extract soil moisture from deeper in the soil. Thus, sprinkler irrigation would favor the more shallow rooted common bermuda. The photographs, made in 1963, show visual evidence of differences in persistency as a result of treatments.

Effects of irrigation on Coastal bermudagrass stands are illustrated by these photographs made at the Lower Coastal Plain Substation, Camden, in the summer of 1963. All plots shown received nitrogen at the rate of 200 lb. per acre. With cuttings at 3-week interval (above) stand maintenance was better without irrigation. Although the same was true for sods cut at 6-week intervals (left), persistence of irrigated Coastal was better when cut at 6-week intervals (comparison of two irrigated plots shown). Results also showed that stands were maintained better with the higher nitrogen rates tested.



Plot at left burned every year has no seedlings or small trees in the undergrowth. Plot at right not burned has a substantial ingrowth of small trees.

Frequent WINTER FIRES do not damage LARGE PINES

G. I. GARIN, *Department of Forestry*

FREQUENT BURNING of woods was a common practice before markets for pulpwood were developed.

This practice killed young pine seedlings. Annual fires prevented establishment of small trees, but partial fire protection allowed some seedlings to grow larger. These results came from experimental plots at the Barbour County Experiment Forest of the Auburn University Agricultural Experiment Station. They also showed that large trees were not damaged by fires.

The burning experiment was started in 1941 and trees were measured and classified either as small pines, the 4-8 in. diameter class, or sawlog size pines, the 9-in. and larger diameter class. There was an average of 52 small pines and 9 sawlog size pines per acre, see chart. This indicated very light stocking. Shortleaf pine accounted for 83% of the growing stock. Small numbers of loblolly and longleaf pines completed the stocking. There was a negligible amount of hardwoods present when the study began and never became a problem.

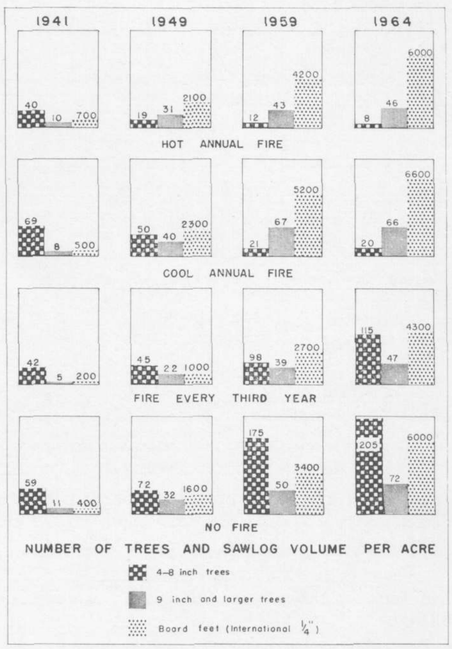
Eight half-acre plots were subjected to four fire treatments. All burning was in late winter. Two plots were subjected to an annual hot fire, a second set of two plots to an annual cool fire, a third set burned once every 3 years, and the fourth set never burned.

Two sets of plots subjected to the annual fires, whether hot or cool, retained about the same number of trees per acre throughout the experiment. Fires did not kill pine trees of pulpwood size and larger, see photo. Many small pines in the 4-8 in. class grew into the larger sawlog class, increasing the number of these trees while depleting the smaller size class. Killing of new seedlings by annual fires prevented ingrowth of small trees. The number of small trees became progressively fewer each year. Fires apparently did not have a detrimental effect on tree growth. Trees continued to grow at a substantial rate, as indicated by the increase in board-foot volume.

Trees on the set of plots burned every third year increased in size and progressed into larger diameter size at about the average rate for the entire experimental area. Allowance must be made for the smaller number of trees present on these two plots and their smaller initial volume compared with other plots. Periodic winter fires did not appear to reduce tree growth. The fact that new seedlings were not burned every year allowed some of them to escape lethal effects of fires. This resulted in ingrowth of pulpwood size trees. There was an increase in number of small trees even though some of them grew into the larger size class.

The two plots not burned displayed the same progression of small trees into the larger size class. Their growth was not appreciably different from trees on the burned plots. Winter fires were not a factor in the growth of pines of pulpwood or larger size. The rate of increase in board foot volume was similar on all four sets of plots. The outstanding characteristic of unburned plots was the large increase in numbers of small trees, see chart. The number of trees increased from 70 to 277. The ingrowth came from new seedlings that were never burned. After 23 years of fire exclusion, the protected area has become adequately stocked with small trees. A few of these have already grown to sawlog size.

Winter fires did not damage established pine trees or affect their growth when compared with protected trees. Fires prevented attainment of adequate stocking by killing most new seedlings established each year. Only full protection from fires resulted in a sufficient number of pine trees to serve as a base for future accelerated increase in volume growth.



Numbers of trees and sawlog volume per acre resulting from various burning treatments are presented here.

Index to Articles Published in

HIGHLIGHTS of Agricultural Research 1964

HIGHLIGHTS OF AGRICULTURAL RESEARCH reports new developments resulting from research of the Agricultural Experiment Station. In 1964, the Quarterly featured 55 articles covering 14 major fields of research relating to the general areas of food and fiber, the home, consumption, and marketing. During last year numbers of requests were received for back copies of the Quarterly. If you are one of those who saves HIGHLIGHTS for reference purposes, "fill-ins" for the last several years are available. Address your request to Editor, HIGHLIGHTS OF AGRICULTURAL RESEARCH, Auburn University, Agricultural Experiment Station, Auburn, Alabama.

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Miscellaneous

SUDAX-11 SILAGE IMPROVED BY USE OF PRESERVATIVE

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L. A. SMITH and H. W. GRIMES, JR., *Black Belt Substation*
G. E. HAWKINS, *Dept. of Dairy Science*

USING A PRESERVATIVE improves quality of silage made from Sudax-11. Adding ground ear corn to reduce moisture content (1) increases silage dry matter content, (2) results in greater consumption by cattle, and (3) supports higher milk production.

These advantages were noted in a study at the Black Belt Substation in 1962 and 1963. In this test, Sudax-11 was seeded following small grain, cut in the pre-head stage (50-54 days after planting), and ensiled in 15-ton tower silos. Two silos had ground ear corn added at time of ensiling, at rates of 100 and 200 lb. per ton of green forage. These silages were compared with Sudax ensiled without corn preservative as a source of nutrients for milking dairy cows.

Test cows were fed silage free choice as their only source of roughage. In addition, all cows received a 17% crude protein concentrate mixture at the rate of 1 lb. for each 3 lb. of FCM (4% fat corrected milk) produced daily during the 10-day standardization period preceding each test.

Yields of forage dry matter averaged 2,755 lb. per acre for the 2-year period. This yield is much lower than from many silage crops, but it represents only one cutting of forage. Two and possibly three cuttings of Sudax are possible in most Alabama areas.

Addition of ground corn as a preservative to Sudax-11 markedly reduced seepage and spoilage losses in the silos. However, dry matter lost as fermentation gases was increased about three fold by adding corn. Hence, total dry matter lost in storage was similar for each treatment, 15-18%.

Composition, digestibility, intake, FCM production, and persistency of production are given in the table.

Crude protein content of all silages was relatively high each year, with digestible protein averaging 4.7%. There was no significant effect on protein content because of level of preservative added. Nevertheless, direct relationships were found between level of preservative and dry matter, crude fiber, lignin, and nitrogen-free extract contents of the silage.

Range of TDN contents of the silages was 62.6 to 63.5% in 1962 and 55.0 to 62.3% in 1963. Lower TDN contents in 1963 were associated with the higher crude fiber and lignin contents of these silages. Adding 100 and 200 lb. of corn increased TDN of the high-moisture silages fed in 1963.

Consumption of silage dry matter was relatively good in 1962 but low in 1963. In both tests, forage intake increased with addition of preservative and was directly related to dry matter content of the forage. This emphasizes the need of producing silage with relatively low moisture content.

FCM production and persistency of production were greater for cows fed Sudax with preservative. As shown by data in the table, cows fed silage with corn added consumed more forage dry matter and produced more milk than cows getting silage without preservative. However, only the cows fed Sudax with 200 lb. corn per ton were able to maintain a normal level of production. Thus, the 200-lb. rate gives greatest benefits.

Amount of silage TDN eaten was the primary factor limiting milk production. Cows fed Sudax ensiled with 200 lb. of corn per ton consumed an average of 2.54 lb. more TDN daily than those fed the same forage without added corn. The cows on silage without preservative would have needed an extra 3.5 lb. of concentrate daily to maintain level of production equal to those getting silage with corn added.

COMPOSITION, DIGESTIBILITY, AND INTAKE OF TEST SILAGES AS RELATED TO LEVEL AND PERSISTENCY OF MILK PRODUCTION

Ground ear corn per ton	Silage content							DM intake per cwt.	FCM production	
	DM as fed	CP	CF	NFE	Lignin	DP	TDN		Daily per cow	Persistency[1]
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Lb.*	*Pct.*
1962										
None	25.1	9.5	28.4	52.8	3.5	4.6	63.5	1.81	35.1	82
100 lb.	27.5	9.3	27.6	55.1	3.6	4.1	63.1	1.97	36.8	86
200 lb.	29.6	8.1	25.0	58.0	3.2	2.9	62.6	2.05	38.5	90
1963										
None	16.2	11.9	34.3	41.0	5.6	5.4	55.0	1.20	26.3	80
100 lb.	18.7	12.4	30.5	43.0	4.3	6.4	62.3	1.32	27.4	83
200 lb.	22.2	11.9	24.6	50.3	3.7	5.0	59.9	1.64	30.4	93

[1] Average for 6-week experimental periods.

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