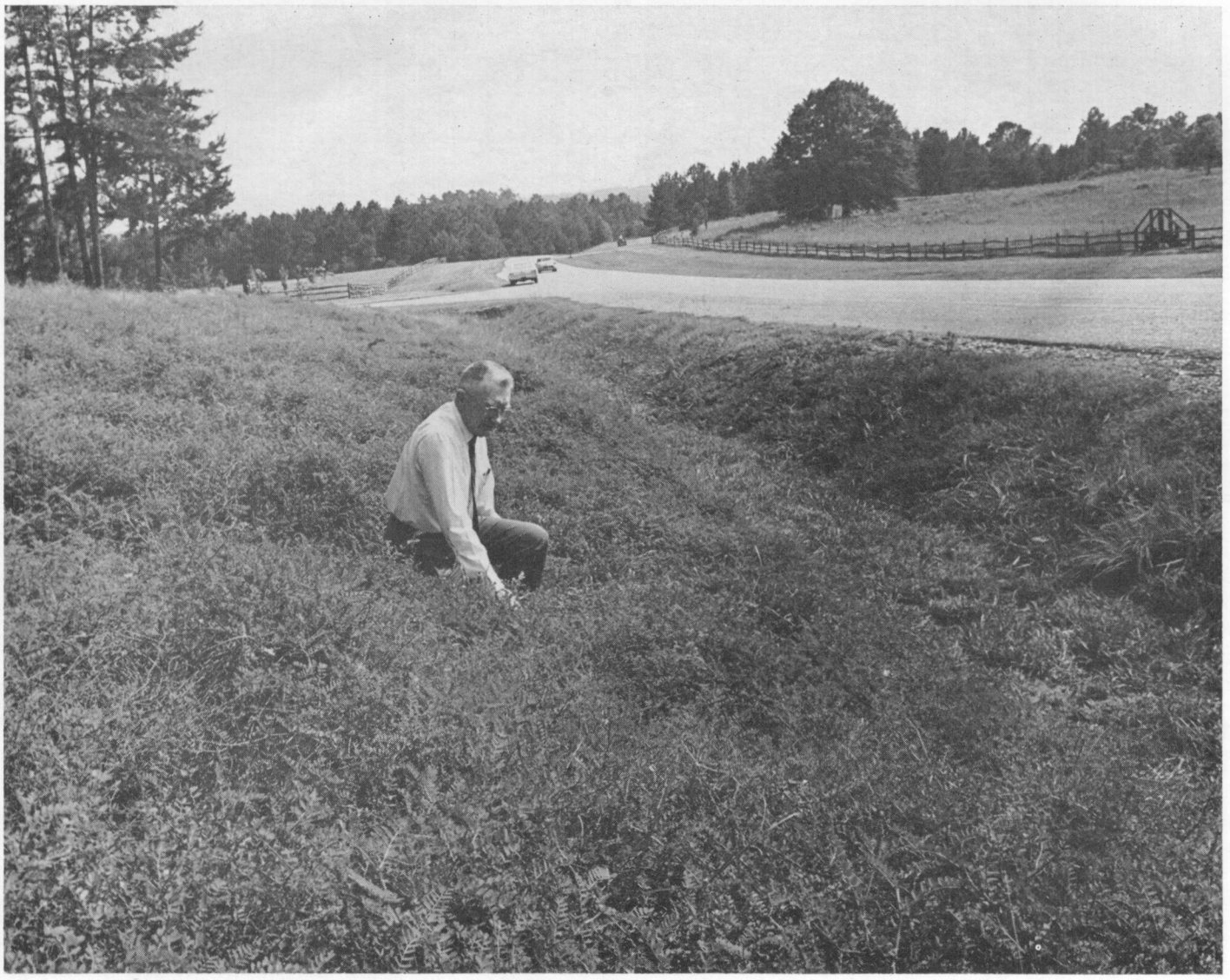
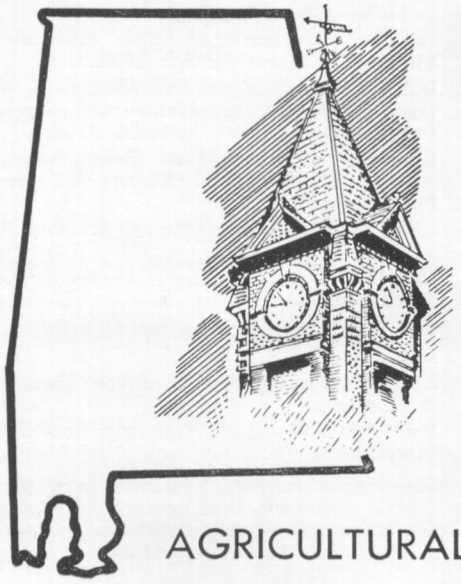
VOLUME 12, NUMBER 4 WINTER 1965





HIGHLIGHTS of AGRICULTURAL RESEARCH

AGRICULTURAL EXPERIMENT STATION, AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 12, NO. 4 WINTER, 1965

In this issue . . .

On the cover. The beauty of Alabama's highways has its beginning with research. Thirteen years ago the Department of Agronomy and Soils, Auburn University Agricultural Experiment Station began cooperative work with the State Highway Department on use of suitable vegetative cover for stabilizing back slopes and fills of Alabama highways. Shown here is a back slope planted in crown vetch — an effective cover. Some of the results are highlighted in the story on page 3.

Published by

AGRICULTURAL EXPERIMENT STATION of AUBURN UNIVERSITY

Auburn, Alabama

New and Timely PUBLICATIONS

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

Bul. 355. Grain Movements in Alabama.

Bul. 359. Response by Urban Homemakers to Mailed Advertising.

Bul. 360. Movement of Cattle and Calves Through Alabama Auction Markets.

Bul. 361. Implications of Allotments on Optimum Farm Organization and Supply Relationships in Two Alabama Areas.

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

Cir. 147. Diseases of Small Grains in Alabama.

Cir. 148. Farm Handling and Marketing of Pecans in Alabama.

Cir. 149. Crop Varieties for Alabama.

Leaf. 64. Ball Clover.

Leaf. 69. Performance of Peach Varieties in Alabama.

Prog. Rept. 85. Early Thinnings from Pine Plantations.

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

RESEARCH *helps stabilize slopes and beautify State's highways*

D. G. STURKIE, *Dept. of Agronomy and Soils*

WHEN YOU SEE expanses of Alabama highways with well sodded slopes, you can be sure that Auburn research is back of it! Prevention of erosion and highway beautification make for greater safety and motorist pleasure.

Stabilization of back slopes and fills has been an important objective since 1952 of joint work of the State Highway Department and Auburn University Agricultural Experiment Station. Some 12 grasses and 8 legumes were tested for roadside coverage, extending from the Gulf Coast to the Tennessee line. Included were experiments to determine various rates and kinds of fertilizers and lime. Tests showed that sawdust is not suitable as a mulch on highway slopes since it floats and washes away. Tying down soil with adapted plants has been very much a concern of the Experiment Station and pre-dates current interest in landscaping Alabama highways.

In August 1963, the Experiment Station's Department of Agronomy and Soils received a 3-year grant from the Bureau of Public Roads, U.S. Department of Commerce, and the State Highway Department for close study of problems.

The expanded research, made possible by the grant, includes study to determine: (1) value of different mulches for establishing various cover plants, (2) how slope of land effects establishment and maintenance, (3) how exposure affects establishment of vegetation, (4) new plant species suitable for use on highways, (5) necessary soil preparation for ground cover, (6) value of topsoil depth for establishing vegetation, and (7) fertilizer, lime, and other treatments necessary for maintenance and value of mowing.

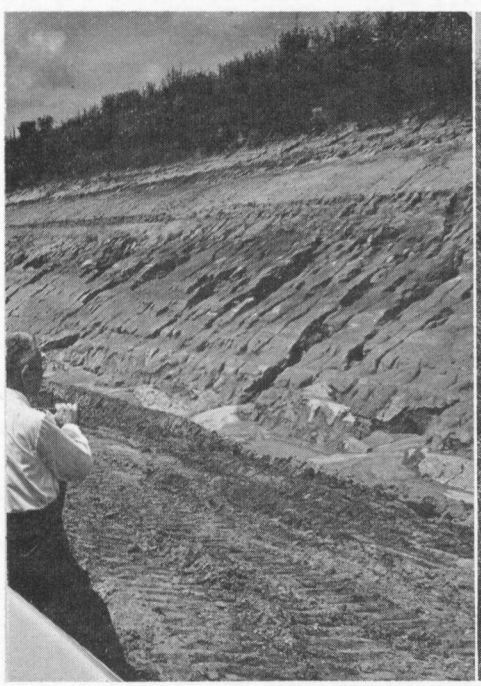
Although most of the work has been done on the interstate system, all areas of the State are included. Another phase is study of fine grassing between lanes in urban areas, using fine leaved bermudagrass and zoysia.

The most promising plants in the study have been perennials or reseeding annuals. A combination of grasses and legumes would probably yield the best results. Nonreseeding annuals have been of little value as roadside cover.

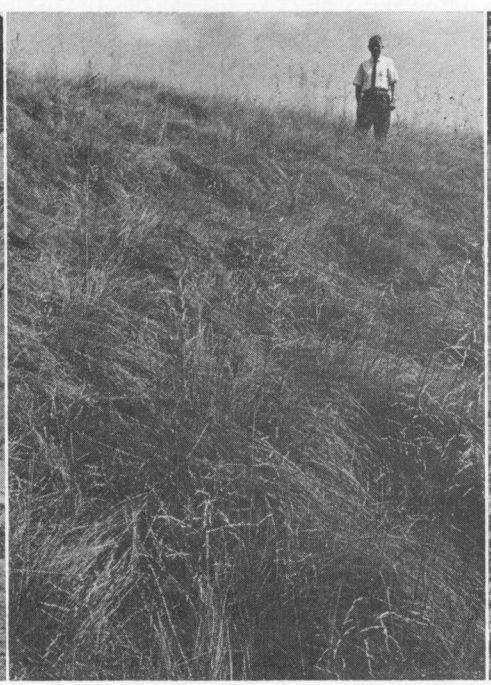
Plants found to be of greatest value are weeping lovegrass, tall fescue, sericea lespedeza, crimson clover, Kobe lespedeza, and bahiagrass. Admired especially by highway users is the reseeding crimson clover because of its handsome dark red blooms. A mixture that has proved effective in northern Alabama is crown vetch and weeping lovegrass.

On unmowed back slopes, bicolor lespedeza has been used to add beauty to the landscape, to provide food for wildlife, and to conserve soil and water. New low-growing strains of sericea lespedeza as possible cover plants, and use of bamboo for screening unsightly areas are included in the tests.

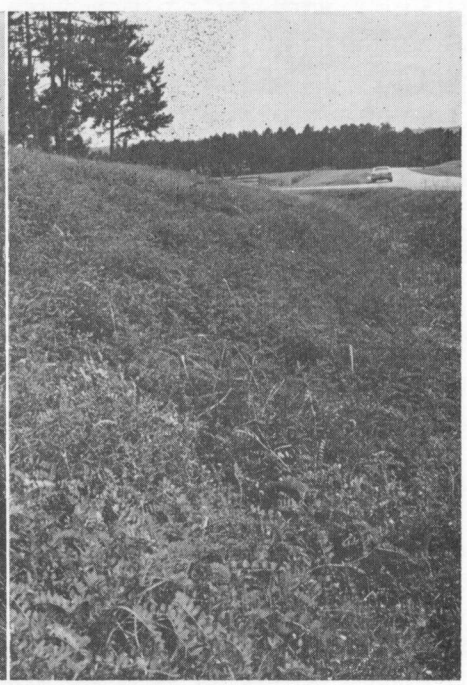
Through research the State stands to conserve funds by use of tested, proven plants that provide effective, rapid coverage and ease of maintenance.



This is typical erosion damage from washing rains on unprotected back slopes.



Here is a promising cover—weeping lovegrass—that provides good protection.



Shown above is crown vetch, a perennial legume proved valuable on unmowed banks.

WHAT IS YOUR FARM WORTH?

J. H. YEAGER
Department of Agricultural Economics and Rural Sociology

"Dirt cheap" does not apply to modern farming that requires large amounts of capital.

The average value of production assets per U.S. farm today is about $60,000, see table. Almost 80% of this amount is in farm real estate (land, buildings, and certain other permanent improvements). Machinery is the second major item of farm investment followed by livestock.

Farm real estate led in value increases since 1950. The average farm real estate today is four times its 1950 value per farm. This is a result of higher land values and larger acreages per farm. Farm machinery investment has increased three-fold since 1950 while the value of livestock per farm has almost doubled. It is probable that these trends in increased dollar value of production assets will continue.

Capital investment per farm varies with size; amount of land in crops, pasture, and woods; quality of land; level of land values; amount and kind of improvements; type of farming operation; and other variables.

Based on 1964 records kept by four groups of Alabama farmers according to type of farm and analyzed by agricultural economists of the Auburn University Agricultural Experiment Station, beef calf producers had the highest average investment. Averages were $70,900 for beef farms, $63,000 for dairy, $34,700 for cotton, and $25,900 for hog farms. Land was, in most cases, valued conservatively in the farm records.

Livestock investment averaged $18,900 on dairy farms and $16,100 on beef farms. Machinery investment was highest on dairy followed by cotton farms. Total acreage of land owned was as follows for the four types of farms: cotton 198, beef 581, dairy 261, and hog 149.

Beef farmers had an average of 103 cows; dairy farmers 56 cows; and hog farmers 16 sows. Thus for each cow, dairymen had more than $1,100 invested. For each cow, beef producers had $688 invested; and for each sow, hog farmers had $162 invested.

As for increases in farm real estate values, Alabama has followed the U.S. pattern. In March 1965, the average value of farm real estate in Alabama was $128 per acre as compared with $146 for the U.S. (48 states), see figure. In recent years however, the increase for Alabama has been greater than the U.S. average. From March 1964 to March 1965, the percentage change in dollar value of farmland was greater in Alabama and Georgia than other states.

Value of Production Assets Per Farm, U.S.

	Year			
	1950	1955	1960	1965 (prelim.)
	Dol.	*Dol.*	*Dol.*	*Dol.*
Farm real estate[1]	12,003	18,814	32,480	47,187
Machinery[2]	1,983	3,402	4,870	6,120
Livestock[3]	2,199	2,357	3,850	4,260
Other[4]	1,193	1,592	1,799	1,952
Total	17,378	26,165	42,999	59,519

[1] Farmland and service buildings excluding operator's dwellings.
[2] Includes 40% of value of automobiles.
[3] Excludes horses and mules.
[4] Includes one-half the Jan. 1 inventory of feed and crops stored on farms (excluding CCC loans) and working capital needed for production expenses.

These values give an indication of the worth of farms. What are the factors that support present levels of worth of farm value?

Three broad factors enter into the worth of a farm. They are earnings, location, and home-use features.

A farm has value because it will produce net income. The flow of net income that is possible in a period of time gives rise to value. Land that will yield a high net return per acre, from an income standpoint, is more valuable than land that will yield low net returns.

Certainty of a given level of net income is also an influencing factor not to be overlooked. To the extent that government price support programs have made more certain the returns to farmland, they have also contributed to increased land values. Studies have shown that the beneficial effects of acreage allotment-price support programs and related land diversion payments become capitalized into land values.

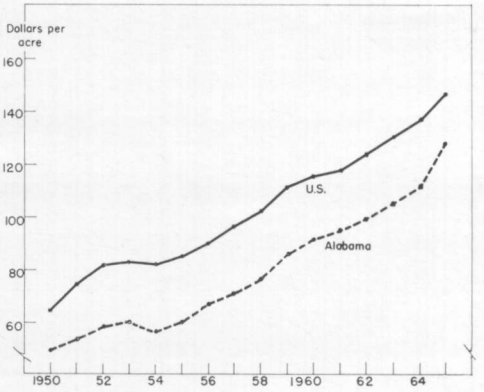
In recent years location has become an increasingly important factor in land values. Growing cities and suburban areas, highways, recreational developments, and many other nonagricultural uses take more than a million acres of land per year. Farmers who sell land for urban or industrial expansion generally receive considerably more than agricultural value. If they continue to farm, these sellers have substantial purchasing power to bid for farmland available.

Location of land not only relative to growing population centers but simply from an access or a communications standpoint is a factor of worth. In some areas and circumstances, the premium paid for land to be on or near a paved road has been quite high. Location relative to markets, trading centers, services, and recreational features influences value.

The third basic value of a farm is the fact that it affords a home and has home-use features. Home-use value is more intangible and more difficult to measure than value from earnings and location. Individual personal preferences play a significant part.

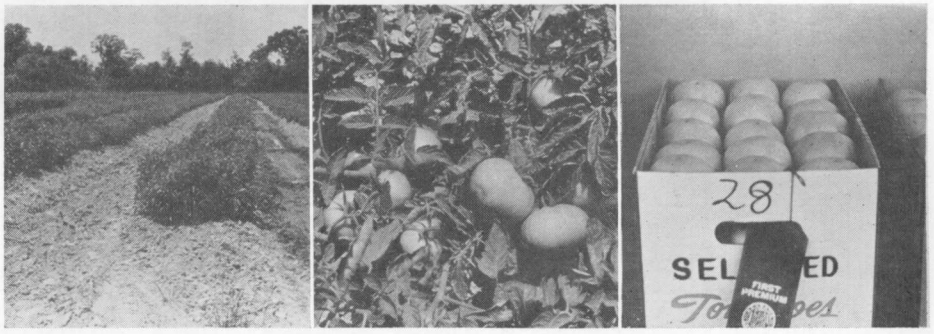
With increased demand for suburban living and country estates, home features should be given consideration in estimating farm values.

How much a farm is worth depends primarily on present and future net earnings, location, and home features. However, farm worth may depend more on any one of these factors than the other two. Regardless, by present levels of capitalization, the farm isn't "dirt cheap."



Average value of farm real estate per acre, Alabama and U.S. (48 states).

Variety selection is the first step in successful tomato production. Commercial fields may produce 12,000 lb. per acre of fancy grade tomatoes within 80 days from planting when adapted variety is used.



TOMATO VARIETIES for SOUTHWESTERN ALABAMA

SAM T. JONES, *Department of Horticulture*
HAROLD YATES and WILLIAM BARRETT, *Gulf Coast Substation*

TOMATO VARIETY selection presents more complications than meet the eye.

For instance, different production areas may have different requirements for a successful variety. In southwestern Alabama, earliness is an important factor. Size of fruit, resistance to cracking, appearance, and quality are all important. Yield of fruit, particularly early yield, and factors affecting this yield should also be considered.

Promising new varieties were compared with standard varieties in replicated tests each year since 1961 at the Gulf Coast Substation of Auburn University Agricultural Experiment Station. Seed were planted at Auburn in greenhouse flats in early February each year and transplanted to 2-in. square peat pots approximately 10 days later. After growing 5 to 6 weeks in the greenhouse at 55 to 60°F night temperatures they were carried to the Gulf Coast Substation and transplanted to the field in late March or early April. Plants were spaced 3 ft. apart in 38 in. rows and fertilized with 800 lb. per acre of 8-8-8 fertilizer. Plants were sidedressed with 400 lb. per acre of 8-8-8, 3 weeks after transplanting. Lime or gypsum was applied when needed. Plants were not staked.

Homestead 24 and Marion were included in the test each year of the 5-year period. Homestead 24 had a slightly higher average yield but Marion averaged slightly larger fruit size. Both required 61 days from transplanting to first harvest and produced acceptable fruit both in quality and appearance. Rutgers was near the bottom in average yield, required 62 days to maturity, and had an average fruit size of one-third of a pound for the season. These three varieties may be compared with others in the table to determine relative desirability of varieties.

Delsher and Campbell No. 146 appear to be promising for this production area. Both are early and produce large fruit that are very good in quality and appearance. Urbana yields exceptionally well and is among the earliest of the varieties tested. However, fruit size is too small for most markets. Small differences in average fruit size for the season as given in the table may not give sufficient emphasis to this point. All varieties produce smaller fruit toward the end of the season, while size differences in the early season are much more pronounced.

Manalucie and Indian River produced large fruit on large vigorous growing vines but were often unproductive early in the season. Although number of days to first harvest for these two varieties were 62 and 61 days, respectively, main production was much later than some of the other varieties. Since diseases were more difficult to control late in the season, total yields were lower for these varieties.

Floralou yielded well and produced fruit of a deep-globular shape and an acceptable fruit size through the early part of the season. However, late season fruit size was reduced considerably. Chesapeake and Heinz 1370 produced uniform ripening fruit with light green shoulders when immature.

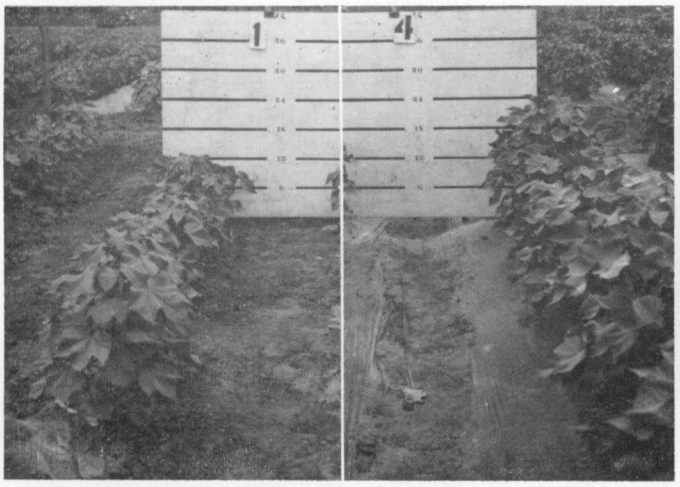
Of the three hybrids tested, Moreton was the earliest and produced the highest average yield. Fruit was slightly smaller than Big Boy Hybrid but still larger than the standard varieties.

Earliana, Valiant, and Early Pak No. 7 were severely damaged by early blight. Earliana cracked severely. Fireball produced small fruit that were sunburned severely in some seasons.

YIELD AND CHARACTERISTICS OF TOMATO VARIETIES GROWN AT THE GULF COAST SUBSTATION, FAIRHOPE, ALA., 1961-65

Variety	Yr. in trial	Yield per acre[1]	Days[2] to harvest	Av. fruit size	Fruit shape	Type of plant	Spec. problems
	No.	*Lb.*	*No.*	*Lb.*			
Homestead 24	5	12,041	61	.32	Med. globe	D[3] Med.,[4] compact[5]	
Marion	5	9,260	61	.34	Deep globe	I Large, open	
Rutgers	4	7,388	62	.33	Med. globe	I Med., open	
Campbell 146	4	9,766	60	.35	Med. globe	I Med., open	
Urbana	3	12,301	55	.30	Globe	D Small, compact	Sm. fruit
Delsher	3	10,801	59	.35	Med. globe	I Large, open	
Indark	3	8,582	62	.35	Deep globe	I Large, open	
Indian River	3	8,056	61	.34	Med. globe	I Large, open	
Manalucie	3	7,442	62	.36	Deep globe	I Large, open	
Red Global	2	10,236	62	.30	Globe	I Med., open	Sm. fruit
Floralou	2	10,184	64	.26	Deep globe	I Med., open	Sm. fruit
Chesapeake	2	6,358	66	.32	Med. globe	I Large, open	Lt. gr. shoulders
Moreton Hybrid	2	11,974	56	.37	Med. globe	I Large, open	
Big Boy Hybrid	2	11,728	62	.43	Med. globe	I Large, open	Sus. to fus. wilt
Big E. Hybrid	2	8,262	58	.42	Med. globe	I Large, open	
Heinz 1370	1	10,651	57	.28	Deep globe	D Med., compact	Lt. gr. shoulders
Earliana	1	8,922	55	.43	Globe	I Small, compact	Cracking
Epoch	1	5,329	63	.29	Globe	D Dwarf, compact	Extreme dwarf
Fireball	1	7,724	59	.27	Globe	D Small, compact	Sunburn
Valiant	1	9,938	59	.37	Globe	D Small, open	Early blight
Early Pak #7	1	10,009	63	.38	Deep globe	D Med., open	Early blight
Tecumseh	1	9,009	67	.27	Med. globe	D Med., compact	Sm. fruit

[1] Yield in pounds of marketable fruit per acre.
[2] Number of days from transplanting to first harvest.
[3] D—determinate; I—indeterminate.
[4] Size of plant.
[5] Foliage cover.



Cotton mulched with black plastic (right) was several inches taller than unmulched plot (left) when these photographs were made June 6. Planting date was the same for both treatments, April 10.

Black Plastic Mulch STRETCHES Water Supply and May Become Profitable

O. L. BENNETT and B. D. DOSS, *USDA, ARS, SWCRD*
J. T. COPE, JR., *Dept. of Agronomy and Soils*

ALABAMA'S TOTAL RAINFALL is usually adequate for high cotton production, but poor distribution during the growing season often creates drought problems. In addition, evaporation from the soil surface results in high water loss. This can account for more than 50% of total water loss in row crops, especially early in the growing season.

Management practices designed to reduce evaporation losses to a minimum offer potential means of stretching the soil water supply and thereby increasing production efficiency. Plastic mulches are being effectively used for this purpose with high value cash crops in some areas.

Effects of black plastic mulch on yields of cotton, both irrigated and nonirrigated, were determined in 1962-63 studies at the Foundation Seed Stocks Farm, Thorsby. In 1964, plastic was used without irrigation at Alexandria, Auburn, Brewton, Monroeville, and Prattville.

A complete ground cover of 1½-mil black plastic costing approximately $100 per acre was used on mulched plots. This provided good weed control with no cultivation after planting. Water entered the soil where the 48-in. wide plastic overlapped in middles.

Mulching with black plastic immediately after planting increased soil temperature and maintained higher moisture content at seed depth. This resulted in more rapid germination, better stands, increased early growth, and earlier maturity (see photos).

EFFECT OF PLASTIC ON COTTON YIELD

Test location and year	Seed cotton yield per acre		
	Without plastic	With plastic	Difference
	Lb.	*Lb.*	*Lb.*
Thorsby, 1962	2,490	3,100	+610
Thorsby, 1963	2,400	3,380	+980
Alexandria, 1964	2,670	2,970	+300
Auburn, 1964	3,360	3,230	−130
Brewton, 1964	1,530	1,530	-----
Monroeville, 1964	820	930	+110
Prattville, 1964	2,660	2,800	+140

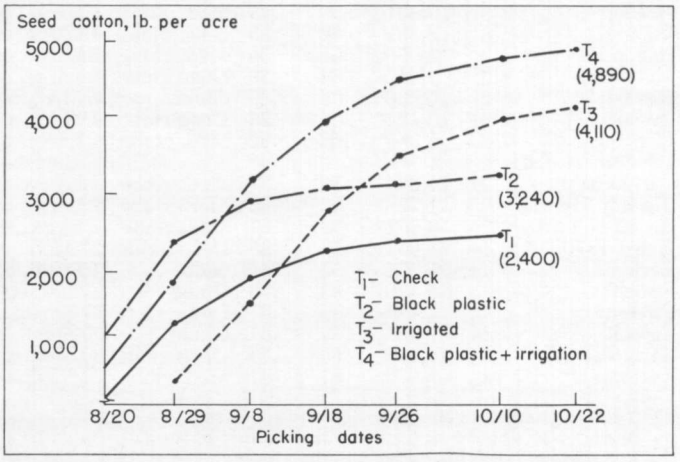
Earlier maturity was the major advantage of using plastic. Mulched cotton started opening about 2 weeks earlier than the unmulched cotton. When yield increases were obtained, most of the increase was in the first two pickings, as shown by the graph. Early fruiting and maturity of cotton are valuable in reducing the risk of loss from insects and boll rot often experienced with late maturing cotton. Early harvested cotton normally produces better quality lint and seed than late harvested cotton.

Plastic increased seed cotton yields in five of seven tests, as shown by data in the table. However, only at Thorsby were increases large enough to pay for the plastic at present prices. This practice offers some promise for the future if plastic prices are lowered and satisfactory mechanical means of applying and removing the plastic are developed.

Yields at Thorsby were increased more than 1 bale per acre by irrigation both test years. Plastic reduced water losses from the soil during the early part of the growing season, but not after plants grew large enough to shade the soil. Mulching with plastic reduced irrigation needs by 4.5 in. in 1962 and 6 in. in 1963. Irrigation increased yield about the same on mulched and unmulched plots. Yields were about 3 bales per acre on nonmulched, irrigated cotton.

Some advantages that may result from using plastic mulch are: (1) earlier germination, maturity, and harvest; (2) elimination of need for cultivation or chemical weed control; (3) better water utilization and less damage from drought; and (4) potentially better quality lint and seed.

On the other side of the coin are these disadvantages: (1) high cost of plastic; (2) special equipment needed to apply; and (3) removal of plastic can be a problem.



Effects of plastic mulch and irrigation on cotton yields are illustrated here. Shown are 2-year average cumulative yields.

Alabama's Egg Industry MAKES IMPORTANT GAINS

MORRIS WHITE, *Dept. of Agricultural Economics and Rural Sociology*

FEW ALABAMIANS are aware of important changes that have taken place in the State's egg industry. Between 1955 and 1964, egg production trebled and Alabama moved from 24th to 11th position nationally.

Although rate of increase in production was greatest after 1961, there was some gain in each of the past 10 years, see table. The annual average production increase was 12%.

Production per layer per year increased from 173 to 217 eggs or a gain of 44 eggs. In 1964, average rate of lay per hen in Alabama equaled the national average, whereas 10 years earlier the rate was 19 eggs below average.

Special attention had been directed at reducing egg production costs of which about 65% is for feed. By improving conversion of feed to eggs, feed fed per dozen dropped from an average of 6.7 lb. in 1955 to about 5.0 lb. in 1964.

Average annual prices received for eggs produced in Alabama fluctuated similarly to annual prices received by producers in other states. Wide fluctuations occurred prior to 1960. Since then changes in annual average prices have been small, but prices have been decreasing continuously. Reduction in price fluctuations indicates that the industry has been making production adjustments and practicing orderly marketing. A continued decline in price could reflect improved efficiency in either or both production and marketing.

Efforts have been directed toward adjusting seasonal egg production – reduce surplus in first half of the year and increase fresh egg supplies the last half. For instance, 54% of the State's production in 1955 was in the first 6 months. These eggs sold at an average of 39¢ per dozen. The 46% produced in the last 6 months averaged 47¢ per dozen. By 1964 the seasonal production pattern had changed. Out of a total of 2,177 million eggs produced, the difference between the two periods amounted to only 11 million, with production being greatest during the last half of the year. Average price differed only three-tenths of a cent per dozen and was higher during the last 6 months.

A change in importance of the egg enterprise in Alabama is reflected in cash receipts from sales of farm products. The proportion of total cash farm receipts accounted for from sales of eggs amounted to 4.6% in 1955 and 11.6% in 1964. During that period total cash farm receipts increased 28% in Alabama.

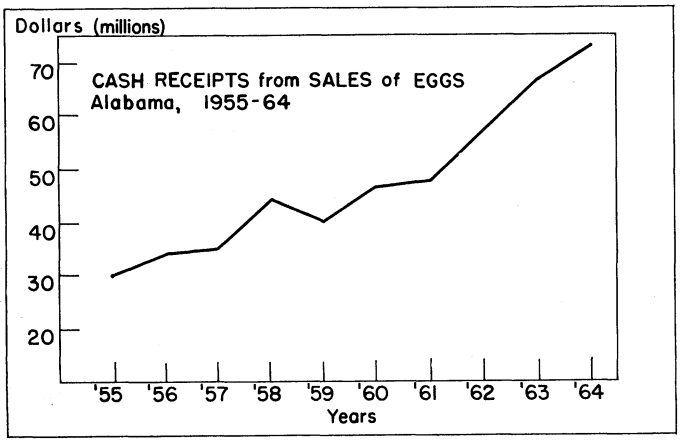
In 1964 cash receipts from sales of eggs was equal to 93% of those from sales of cattle and calves, and to 215% of cash receipts from hog sales. Growth in value of the industry is shown by an average increase of 11% annually in cash receipts from sales of eggs.

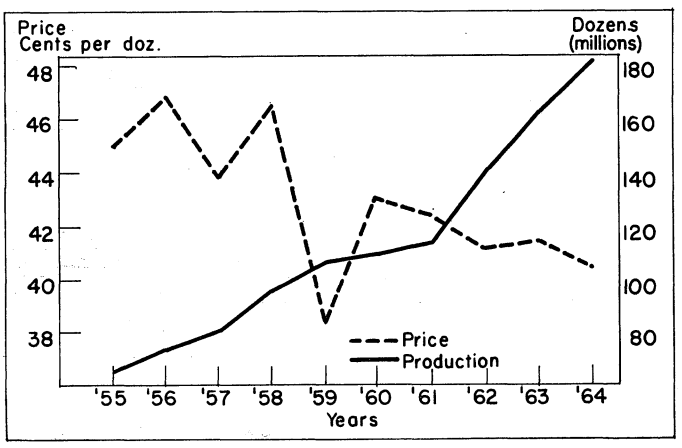
Development of the egg industry in Alabama has escaped notice for a number of reasons; attention has been focused on a tremendous growth of the State's broiler industry and on extensive farm enterprises like beef cattle and forestry. Also, relatively few people have been involved directly in the expanding commercial egg industry.

The rate of development and adoption of cost-reducing techniques in production and marketing, and extent of need for an additional farm enterprise will be important factors in further expansion of Alabama's egg industry.

DOZENS OF EGGS PRODUCED, PRICE, CASH RECEIPTS, AND ANNUAL PERCENTAGE CHANGE IN PRODUCTION AND CASH RECEIPTS, ALABAMA, 1955-64

Year	Dozens produced	Farm price per dozen	Cash receipts	Change in production	Change in cash receipts
	Millions	*Cents*	*Dollars (million)*	*Pct.*	*Pct.*
1955	65.7	45.0	29.6	...	...
1956	73.0	46.9	34.2	11	16
1957	80.6	43.8	35.3	10	3
1958	95.7	46.6	44.6	19	26
1959	106.1	38.4	40.7	11	— 9
1960	108.7	43.1	46.8	2	15
1961	115.2	42.4	48.3	6	3
1962	140.6	41.2	57.9	22	20
1963	162.5	41.4	67.3	16	16
1964	181.4	40.5	73.5	12	9





Mr. Beef Cattle Man you may need to check on the mineral needs of cows such as these. They may need a mineral supplement.

ALABAMA FORAGES and MINERAL NEEDS of cattle

W. B. ANTHONY and R. R. HARRIS, *Department of Animal Science*

THIRTEEN is the number of mineral elements needed for normal healthy, productive livestock.

These minerals include calcium, phosphorus, magnesium, potassium, sodium, chlorine, sulfur, copper, iron, zinc, cobalt, manganese, and fluorine. Other elements have been investigated, but research results fail to prove they are required. Selenium may be an exception and finally may be proved to be required in the diet.

Mineral Sources

Cattle and sheep obtain most of their mineral needs from forage crops. These crops are usually good sources of calcium, whereas concentrate feeds such as corn contain very little calcium. On the other hand, concentrate feeds, especially high protein supplements, are much richer in phosphorus than forages.

Salt, a supplier of sodium and chlorine, is not present in common feedstuffs and must be added to the diet of all animals. In general, all other mineral elements are present in forages in sufficient amounts to meet the need of animals on grazing. There are, however, well-known mineral-deficient areas located in various sections of the country. Examples are certain areas of Florida and southern Texas. In contrast, no clearly defined mineral deficiency disease has been observed in livestock on grazing in Alabama. Failure to observe deficiencies does not necessarily indicate adequate mineral content for all productive situations. It also does not preclude the presence of borderline deficiencies that may reduce productive efficiency.

Research on Minerals

Research is being conducted at Auburn University Agricultural Experiment Station to establish mineral contents of Alabama feedstuffs and determine if additional minerals are needed. The species of plant and the soil in which it is grown have major influences upon accumulation of minerals. Legumes, as a rule, are richer in minerals than grasses. Forages grown in lime soils of the Tennessee Valley accumulate far more calcium and phosphorus than similar forages grown in sandy and upland soils. Calcium, phosphorus, and magnesium contents of grasses harvested from several areas of Alabama are given in the table.

These forages were grown on well fertilized fields located on outlying units of the Experiment Station. Because it was observed that grasses grown on sandy soils of southern Alabama tended to be low in calcium and phosphorus content, a survey was made in 1957 of forage grown on farm lands in southern Alabama. The forage surveyed was Coastal bermudagrass. Calcium and phosphorus contents in most samples were low and in many samples the phosphorus content was sufficiently low to term the forage deficient in that element.

Based on results of this survey, it is a good practice to supply a calcium and phosphorus supplement to beef breeding herds carried permanently on swards established on sandy soils of Alabama.

Trace Elements Studied

The trace element content of Alabama forages is being studied. Many data have been collected on copper, zinc, and cobalt. Coastal bermudagrass samples were obtained from 34 farms located in various areas of Alabama and analyzed for copper. The copper content in these samples ranged from 2.76 to 11.99 parts per million (p.p.m.) on a dry matter basis. It has been established that about 5 p.p.m. of copper are required in forage to prevent copper deficiency in cattle. Twelve of the 34 samples examined contained less than the 5 p.p.m. minimum.

Zinc is an important element in feedstuffs. There are, however, major differences among species of animals in requirement for zinc. Hogs require a relatively high amount of zinc, whereas cattle need only a small amount. A feed containing 25 p.p.m. of zinc probably would be adequate for cattle, but inadequate for swine. Data have been obtained on zinc content of some Alabama feeds. The content of zinc in Coastal bermudagrass forage ranged from 23 to 31 p.p.m. for samples harvested at 3- and 6-week intervals, both early- and late-season at Camden, Alabama. Samples of Coastal obtained from the Wiregrass area contained from 18 to 80 p.p.m. of zinc. The 18 p.p.m value was obtained for a sample of forage harvested in September. All early-harvested samples contained more zinc. Steer-fattening feeds used at the Wiregrass Substation (no zinc added) contained 24 to 40 p.p.m. of zinc. Corn cobs and sorghum plant stalks are Alabama products analyzed that had the lowest amount of zinc (about 13 p.p.m.)

Cobalt in Alabama forage is frequently too low to supply cows their daily need when the forage is the entire ration. However, it usually requires several months to deplete an animal of cobalt. During this period animals would normally consume some feed other than the original cobalt-deficient forage. In this way cobalt deficiency in Alabama probably is prevented. The minimum cobalt level in feed to prevent deficiency symptoms is about 0.07 p.p.m. In a study of Coastal bermudagrass forage harvested in all areas of Alabama, cobalt-deficient forage was frequently located. The highest incidence of deficiency was found for forage harvested in southern Alabama.

CALCIUM, PHOSPHORUS AND MAGNESIUM IN FORAGES GROWN IN VARIOUS PARTS OF ALABAMA[1]

Element	Tennessee Valley	Southern Alabama	Prairie soils
	Pct.	*Pct.*	*Pct.*
Calcium	.47-.99	.18-.58	.36-.42
Phosphorus	.25-.77	.12-.24	.23-.26
Magnesium	.17-.39	.09-.29	.19-.23

[1] Data are expressed on a dry matter basis.

ALABAMA'S POPULATION— Growing Rapidly in Some Areas, Barely Breaking Even in Others

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ALABAMA'S POPULATION has climbed almost to the 3½-million mark. Mid-year estimates placed the number at 3,480,250 persons on July 1, 1965. This is an increase of more than 200,000 people since the 1960 Census, for a 6.5% rate of growth. If these estimates are reasonably accurate, then Alabama should equal or surpass the projected 1970 population of 3,670,000 predicted by the Bureau of the Census based on growth trends between 1950 and 1960.

The major source of error in making population estimates comes from a lack of recorded information on the number of people migrating into and out of an area (county or state). The absence of migration figures extending over periods of 5 or more years can affect the accuracy of population estimates. Estimates of smaller populations are more subject to error, making it more hazardous to predict change. Despite this inherent handicap, this report reviews Alabama's county and state population as it was estimated for specific categories of residents at mid-year 1965.

Some Counties Growing

Although Alabama is growing at a healthy pace, this growth is not equal in all areas of the State. Some counties are growing rather rapidly, while others show little or no increase. Of the 12 counties having the largest estimated population gains during 1960-65, Table 1, heavily urbanized areas accounted for most of the growth except in Baldwin and Dale counties. There were 46 counties (69%) that showed a change in population of less than 1%. In most of these counties the estimates actually indicated some slight loss of residents.

It was found that counties increasing in population were generally adding both white and nonwhite residents. Thirteen counties gained both whites and nonwhites during the period. An additional 10 counties gained white population while losing some nonwhite residents. No county declined in white population while showing an increase of more than 100 nonwhite residents. Twenty-six counties were estimated to have lost both white and nonwhite residents, usually fewer than 50 and never exceeding 200 persons.

The data in Table 1 show the changes in white and nonwhite segments of the population for the 12 counties having the largest estimated population increases. Madison County grew the fastest, with most of the growth among whites; Mobile's growth was marked by a large increase in the nonwhite population.

Rural Population Decreases

Estimates of population change for rural areas are not available from any published sources. However, such estimates can be made from existing data if it is assumed that the percentage change recorded during a known period occurred at the same rate as changes taking place in a new period. Again the shorter the time period involved and the more similarity there is in economic and social conditions, the more likely is the assumption to be valid.

In this instance the assumption was made that population change recorded during the 1950-60 decade continued at the same rate during the first half of the 1960's. The resulting estimates indicated that 39% of all Alabamians lived in rural areas in 1965, as compared with 45% the previous 5 years. Only five counties were estimated to have gained rural residents and in these the growth was explained by expanding city populations spilling over into the unincorporated fringe areas. As city limits are expanded, most of this gain in rural population will disappear.

Table 2 lists the 12 counties having the largest estimated decrease in rural people. The per cent decrease varies considerably from county to county, with Henry County having the greatest loss. Generally, the counties showing the largest decrease in number of rural residents were also the ones either having no urban places or only small ones (less than 5,000 population).

TABLE 1. ESTIMATED CHANGE IN WHITE AND NONWHITE POPULATIONS OF 12 ALABAMA COUNTIES HAVING THE LARGEST ESTIMATED INCREASE IN POPULATION BETWEEN 1960 AND 1965

Counties	1960 population		Estimated change 1960-1965*					
	Total	Proportion urban	Total		White		Nonwhite	
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Madison	117,348	64	65,300	56	62,300	65	3,000	14
Mobile	314,301	86	44,100	14	31,500	15	12,600	12
Jefferson	634,864	85	39,800	6	34,300	8	5,500	3
Montgomery	169,210	84	15,900	9	13,600	13	2,300	4
Calhoun	95,878	55	8,500	9	7,000	9	1,500	8
Tuscaloosa	109,047	70	7,900	7	5,100	7	2,800	9
Dale	31,066	31	5,200	17	4,800	19	400	7
Baldwin	49,088	26	4,200	9	3,600	9	600	9
Morgan	60,454	57	4,100	7	4,200	8	—100	—1
Lauderdale	65,500	51	3,900	7	3,800	6	100	1
Colbert	50,200	57	3,700	8	3,300	9	400	5
Russell	49,500	60	3,100	7	2,100	9	1,000	4

* Rounded to the nearest hundred.

TABLE 2. TWELVE COUNTIES HAVING THE LARGEST ESTIMATED DECREASE IN RURAL PEOPLE BETWEEN 1960 AND 1965

Counties	1960 population		Estimated decrease	
	Total	Proportion rural		
	No.	*Pct.*	*No.*	*Pct.*
Tallapoosa	35,007	49	—4,732	14
Henry	15,286	66	—4,281	28
Marion	21,837	87	—4,167	19
Marengo	27,098	64	—3,642	13
Jackson	36,681	75	—3,470	9
Cullman	45,572	76	—3,417	7
Sumter	20,041	85	—3,250	16
Covington	35,631	47	—3,218	9
Pike	25,987	51	—3,109	12
Clarke	25,738	68	—2,940	11
Marshall	48,018	53	—2,091	7
Greene	13,600	80	—2,833	20

Growth differences resulting from different flooding treatments are illustrated here for four different clovers. S-1 white clover (top) and Regal ladino (center) show effects of four treatments. From left: 0—well drained; 3—3 days flooding in 10; 6—6 days flooding in 10; and cont.—continuous flooding. In comparisons at bottom, ball (left) and crimson (right) show differences between good drainage, pot at left, and continuous flooding.

Clovers and Flooding— *some can take it, others cannot*

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Some clovers, like proper young ladies, don't like wet feet. Others are more like little boys, and seem to thrive on wet ground.

A big difference among winter clovers in the way they tolerate poor drainage has been demonstrated in Agricultural Experiment Station studies at Auburn University. Such information is valuable because flooding and poor soil drainage are common problems on many Alabama sites during winter and spring when rainfall is often excessive.

White, ball, arrowleaf, berseem, and crimson clovers were started under well drained conditions in greenhouse experiments. Then after all were well established, each was subjected to the following conditions: (1) well drained and watered as needed; (2) flooded for 3 days, followed by 7 days of drainage; (3) flooded for 6 days, followed by 4 days of drainage; and (4) continuously flooded to the soil surface. Forage growth was harvested three times over a 4-month period.

Ball and intermediate white clovers were most tolerant of poor drainage, as shown by yield data in the table. Crimson, arrowleaf, and berseem yields were sharply reduced by flooding 3 days in 10. Crimson clover was most adversely affected in this treatment, producing only 45% as much as the well drained check. After two 10-day cycles of this treatment, dead leaves appeared on crimson clover plants and increased in number as the experiment progressed. In contrast, plants of ball and white clover remained vigorous and green throughout the test.

Flooding 6 days in 10 further reduced forage yields of clover. Ball and white clovers were affected to a lesser degree than crimson and arrowleaf.

Continuous flooding further reduced clover production, except for crimson. This suggests that crimson clover plants were able to adjust better to continuous flooding than to a fluctuating water table. Under field conditions, fluctuating conditions of excess water are more likely. This may explain why crimson is less productive than ball clover on some soils.

In a similar study, Regal ladino (Auburn developed variety) was more tolerant of poor drainage than S-1 white clover. Under continuous flooding Regal produced 60% and S-1 white only 37% as much as the well drained treatments.

Protein content of the forage was also affected by flooding. Only a slight drop in protein was noted for Regal ladino, but S-1 showed a steady decline in protein as length of flooding increased. Further work is planned to determine how other white clover varieties respond to poor drainage.

Results of the tests reported show that soil drainage is an important factor to consider when planting clover. Crimson and arrowleaf clovers should be planted only on well drained soils. Berseem is somewhat more tolerant of poor drainage but is easily damaged by cold weather, making it of limited value in Alabama. Ball, ladino, and intermediate white clovers will tolerate wet soils and grow successfully on poorly drained soils.

Effect of Flooding on Forage Yields of Five Clovers

Clover	Relative yield at each flooding treatment			
	Well drained	3 days in 10	6 days in 10	Continuous
	Pct.	*Pct.*	*Pct.*	*Pct.*
White	100	95	72	54
Ball	100	87	75	62
Berseem	100	76	60	52
Arrowleaf	100	71	46	36
Crimson	100	45	27	48

At right is a row-thinned pine plantation. If all trees in row are of merchantable size and cut, the cleared row may provide a trail for trucks and facilitate harvest.

ROW THINNING *Saves Time and Expense*

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PLANTED FORESTS comprise an increasingly important portion of Alabama's forest resources, and thinnings furnish a larger proportion of the wood harvested.

On most forest plantations, the trees are in rows, yet they are never uniform in size and form. It is these differences that call for the forest manager's best judgment when thinning.

Not to discredit the value of skilled selection of trees to be cut, it must be recognized that individual tree selection requires time and that time of the skillful is valuable. The rows of trees in a plantation provide a means of selection that takes little time or skill. The plantation manager merely selects and marks a sequence of rows to be harvested. Cutters take all trees in the marked rows, but may not be required to cut trees below merchantable size. If the rows are cleared, they may provide trails for trucks and facilitate harvest.

A few miles north of Auburn in the Piedmont is a 20-acre row-thinning experiment of Auburn University Agricultural Experiment Station. It is in a slash pine plantation on an eroded old field. The trees were spaced 6 ft. apart in 6-ft. rows. Two intensities of row thinning are compared with selection thinning and with unthinned control (check). Trees were thinned 12 years after planting.

Merchantable Volume

At the time of thinning, pulpwood volume averaged 13 cords per acre and ranged from 9 to 19 cords. (See table.) This range indicates a corresponding variation in site quality. Both yields from thinning and total yields are related to volume before thinning, which was used as an indicator of land quality.

Both the moderate row thinning and selection thinning yielded 4 cords per acre, whereas light row thinning yielded 3 cords. Seven years after thinning, there were no real differences in total yield between the three thinnings. Total pulpwood production, including thinning, averaged 24 cords per acre and ranged from 19 to 30 cords. On the unthinned area, average production was 27 cords with a range of 19 to 38 cords.

PULPWOOD VOLUME PER ACRE FROM THREE DIFFERENT QUALITY SITES

Age and category	Treatments, volume per acre			
	Unthinned control	Selection thinning	Row thinning	
			Moderate[1]	Light[2]
	Cords	*Cords*	*Cords*	*Cords*
Poorest land				
12 years				
Before thinning	9	9	9	9
Cut	0	2	2	1
19 years	19	17	17	18
Average land				
12 years				
Before thinning	13	13	13	13
Cut	0	4	4	3
19 years	27	20	20	21
Better land				
12 years				
Before thinning	19	19	19	19
Cut	0	6	6	5
19 years	38	24	24	25

[1] Every third row cut.
[2] Every fourth row cut.

Conclusions

There are three principal findings: (1) Thinning 12 years after planting apparently caused a reduction in average pulpwood growth during the following 7 years; (2) reduction was more severe on the better sites and disappeared on the poorest land; and (3) thus far there was no difference in total pulpwood production that can be attributed to type of thinning.

The first two findings are in accord with experience. Early thinning, even though it stimulates diameter growth of remaining trees, usually reduces subsequent volume production on the area thinned. However, the resulting smaller volume is concentrated on larger trees that usually have a higher value. This becomes increasingly advantageous as the trees grow into sawtimber sizes.

Trees on the poorer sites were in intense competition with each other for the limited supply of soil moisture and nutrients. Therefore, reducing competition by thinning had a relatively greater stimulating effect on growth.

The third finding can be used to support a recommendation of row thinning, but it must be accepted with reservations. Although row thinning was followed by the same pulpwood volume increment as selection thinning, it remains to be seen whether value increment is the same when trees grow into sawtimber sizes. Row thinning gives the plantation manager no opportunity to discriminate between trees to be cut or left. Yet, row thinning is a method that can save time and reduce expenses.

MILK QUOTA TRANSFERS

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AN ACTIVE MARKET for Grade A milk quotas (base) has developed in Alabama in recent years.

More than one-third of the Grade A producers in the State have purchased base since 1961. Although prices paid for quotas varied, most quota purchasers appear to have made profitable investments in base.

Reasons for the active market for quotas are: the Alabama Milk Control Board eased restrictions regarding quota transfers in 1961, and there have been major shifts in the market structure of the milk industry.

A study of 1,656 Alabama dairymen who sold milk in 1959 revealed that by 1964, 667 had quit dairying, while only 212 new producers entered the market. However, average sales per producer rose 52% during this 5-year period.

Almost all dairymen who quit producing milk sold their quotas either to dairymen who wanted to increase sales or get a higher price for milk, or to new producers. In a 4-year period beginning January 1, 1961, 516 milk quotas were sold in Alabama.

Quota Purchasers Make Adjustments

Records of 1,201 dairymen for the 1959 and 1964 base-building periods reveal that producers who bought quotas sold considerably more milk on the average than producers who had not bought quota. Average daily sales during the 1964 base-building period were 1,791 lb. and 1,136 lb. for buyers and nonbuyers, respectively. Purchasers of quotas who produced milk in both periods had larger sales than nonpurchasers in 1959 as well as in 1964. Average percentage increase in milk sales between 1959 and 1964 was also much higher for purchasers. About one-half of the 212 new producers in the market since 1959 had purchased quotas during the study period. A high percentage of the producers who bought quotas followed good management practices, such as production testing, silage feeding, and artificial breeding.

Prices Vary Widely

Thirty-nine dairymen who shipped to eight different plants were interviewed to determine prices paid for base. These producers paid from $160 to $7,200 for quotas, see table. The amount paid for quota was converted to price per 100 lb. of Class I eligibility. For plant usage quota, this figure is the total cost of the quota divided by the number of pounds of Class I that the purchased quota enabled the buyer to sell. For the alternative quota plan, it is based on number of pounds of Class I that the quota would enable a producer to sell within one year from date of purchase. These prices can be compared with the difference in Class I and Class III price, approximately $3.44, as an estimate of potential producer outcome on quota purchases.

Prices varied widely from plant to plant. Price per 100 lb. of Class I eligibility ranged from 39¢ to $1.96 for plant usage quota. Rapid year-to-year adjustments are possible under this quota plan, which is based on producer deliveries. Price per 100 lb. of Class I eligibility acquired within one year from date of purchase ranged from 54¢ to $7.29 for quotas bought under the alternative quota plan. This plan is based mainly on sales and does not allow rapid base increases.

Purchasers Made Good Investments

Average minimum number of months required to regain investment in quota was 2.6 months for the plant usage transactions and 6.9 months for the alternative quota transactions. While only 15 of the 39 purchasers gave an estimate of the number of months they thought necessary to regain the purchase price, 10 of the 15 estimated within 2 months of the calculated minimum number of months required.

Most dairymen interviewed had received assistance in calculating price to pay for quota. Personnel at the producers' plants were the most common source of assistance.

The majority of the sample group said that they purchased quota either to raise blend price, to increase volume of sales or both. Although about three-fourths of the dairymen stated that they made a good buy on quota, only about one-third said that they would definitely attempt to purchase more quota in the future.

It appeared that Alabama dairymen placed a high discount on the value of quotas. This high discount has led to the purchase of quotas at low prices in relation to potential value. Most producers who have purchased quota have been able to increase milk sales at relatively low cost, although some producers made uneconomical purchases. In most instances, Alabama dairymen have been able to increase quotas more cheaply by purchasing rather than by building.

An analysis of responses to questions concerning quotas indicated that many milk producers were not familiar with quota regulations in the State. Because of the effect these regulations have on producers' incomes, it is important from an economic standpoint that all dairymen become familiar with pertinent regulations. Increased understanding of quota regulations will help dairymen make better decisions regarding year-to-year production and marketing adjustments, as well as decisions about quota purchase.

AMOUNTS PAID FOR QUOTA, PRICES PER HUNDREDWEIGHT OF CLASS I ELIGIBILITY AND MINIMUM MONTHS REQUIRED TO REGAIN INVESTMENT IN QUOTA, 50 QUOTA TRANSACTIONS AT 8 PLANTS, BY QUOTA PLAN, ALABAMA, 1961-1964

Quota plan and plant	Transactions studied	Amount paid per transaction			Price per 100 lb. of Class I[1]			Minimum months to regain investment		
		Low	Average	High	Low	Average	High	Low	Average	High
	No.	*Dol.*	*Dol.*	*Dol.*	*Dol./ Cwt.*	*Dol./ Cwt.*	*Dol./ Cwt.*	*Mo.*	*Mo.*	*Mo.*
Plant usage	24	160	1,131	3,900	.39	.95	1.96	1.0	2.6	6.3
Plant A	4	900	1,742	3,500	.73	.78	1.00	1.5	2.3	2.7
Plant B	11	160	624	1,000	.39	.95	1.71	1.0	2.4	4.0
Plant C	3	290	1,287	2,220	.97	1.23	1.52	2.7	3.5	4.7
Plant D	6	525	1,704	3,900	.51	1.00	1.96	1.5	2.9	6.3
Alternative	26	375	1,811	7,200	.54	1.82	7.29	2.0	6.9	25.0
Plant E	10	375	771	1,450	.54	.69	1.11	2.0	2.8	4.0
Plant F	6	1,000	2,250	4,000	1.18	2.29	3.37	4.5	8.7	11.5
Plant G	3	750	750	750	1.26	1.26	1.26	5.0	5.0	5.0
Plant H	7	1,400	3,374	7,200	2.21	3.41	7.29	7.5	11.8	25.0

[1] Price per 100 lb. of quota purchased under the alternative quota plan is price per hundredweight acquired within one year and is not directly comparable with price per hundredweight for plant usage quota.

Turkey Coccidia Widely Distributed in United States

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THERE HAVE BEEN few reports concerning the incidence and importance of coccidiosis in turkeys. Most printed material has covered only the sources of the seven known species of turkey coccidia upon which original descriptions were made.[1] No one has reported on the incidence of any of the species. Davies *et al.*,[2] write that it seems likely that distribution of the various species of *Eimeria* is limited only by availability of hosts and their survival can be expected wherever the environment is moist and reasonably warm for part of the year.

Only two of the seven known species have been reported as highly pathogenic. They are *Eimeria meleagrimitis* and *E. adenoeides.* In studies at Auburn University Agricultural Experiment Station, a third species, *E. gallopavonis,* has been shown to be highly pathogenic. This report summarizes briefly some of the data on turkey coccidia obtained at Auburn.

[1] Becker, E. R. **Protozoa in Diseases of Poultry,** by H. E. Biester and L. H. Schwarte. Chapter 36. Iowa State U. Press, Ames, Iowa. 1959.
[2] Davies, S. F. M. **Coccidiosis.** Oliver and Boyd, Edinburg. 264 pages. 1963.

Coccidia Widely Distributed

Samples of turkey tissue or litter samples from turkey pens were received during a 2-year period from turkey farms in 21 of 41 states contacted. These were from flocks totaling more than 660,000 birds of different ages. Identifications to date of the different species are summarized in Table 1.

Although identity of all species of coccidia in all samples have not yet been determined, it is evident that the three pathogenic species are widely distributed throughout the United States. All others have been identified one or more times. Two species were found in a specimen from England.

Pathogenicity Determined

Results of some pathogenicity trials of *E. gallopavonis* are summarized in Table 2. Severe infection by this species caused mortality among 1- to 9-week-old turkeys, but there were no deaths among those infected at 11 or 13 weeks of age. However, growth suppression at 7 and 14 days after inoculation in the older age groups (about 2 lb. per bird) was as great or greater than that of survivors of other age groups.

The three disease causing species already mentioned were about equally pathogenic to 1- to 26-week-old turkeys. Severe infections by all three caused mortality, retarded growth, and poor feed conversion of birds infected at 1 day to 9 weeks old. There was no evidence of morbidity in 2- to 9-week-old turkeys infected with as many as 10 million oocysts of *E. meleagridis.* Turkeys kept coccidia free until 6 months of age were still highly susceptible to the three pathogenic species.

Other Information Gained

Additional details on the life cycles of some species have been learned. Under optimum conditions for the parasites, it was found that the life cycles of species studied were shorter than previously reported. Some species completed life cycles in as few as 5 days when fresh cultures of oocysts and young turkeys were used.

There are more than 20 marketable coccidiostatic drugs that control infections by one or more of the nine species that cause coccidiosis in chickens. However, only three or four have proved effective against the disease in turkeys. There is evidence that turkey coccidiosis is often not recognized and goes uncontrolled. There is a need for new and better methods for controlling coccidiosis in turkeys and for greater awareness of the economic importance of the disease.

TABLE 1. DISTRIBUTION OF TURKEY COCCIDIA BY STATES

State	Species identification							
	E. adenoeides	E. gallopavonis	E. meleagrimitis	E. meleagridis	E. dispersa	E. innocua	E. subrotunda	Other
Ala.	4	4	3	1	3	1		4
Ark.	5	4	3	1	3		1	7
Calif.	1	1	1					1
Del.	1	1	1					
Ga.	1	1						
Ind.	2	2	2					1
Iowa	2	2	2					1
Miss.	1	1	1					
Nebr.	2	2	2		1			2
N.C.	2	2	2					1
N. Dak.	3	3			1	1		5
Ohio	2	3	3					1
Oreg.		1	1					1
Pa.	4	3	4	1			1	5
S.C.	3	5			3			5
Tex.	3	2	2		1			3
Utah	1	1	1					1
Wis.	5	4	2					4
England	1		1					
TOTAL	43	42	31	3	12	2	2	42

TABLE 2. EFFECT OF E. GALLOPAVONIS INFECTION ON GROWING TURKEYS[1]

Age inoculated orally	Birds in treatment	Oocysts per bird, thousands	Suppression of growth among survivors[2]		Mortality[3]
			7 days	14 days	
Weeks	*No.*	*No.*	*Pct.*	*Pct.*	*Pct.*
1	5	100	50	20	40
1	10	500	80	75	90
3	25	500	100	0	28
5	7	500	100	25	43
8	9	1,000	99	45	11
9	8	1,250	100	80	12
11	6	1,500	100	80	0
13	12	2,000	100	80	0

[1] Beltsville Small Whites or Broad Breasted Bronze, straight run, mixed sexes.
[2] Weighted by sex of birds.
[3] Most deaths occurred during 6th to 8th day after inoculation.

FARMER CO-OPS *in Alabama*

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By extending the line fences of the farm, farmer cooperatives help broaden the concept of agriculture. Such cooperative associations are voluntary business organizations established by members to provide market outlets, supplies, or services at cost after allowing for expenses and authorized reserves.

Directory Prepared

Completed recently at Auburn University is a directory of Alabama farmer cooperatives. It provides information about cooperative associations of various kinds throughout the State*. There are presently 140 cooperatives of all types in operation located in 53 counties, with farmer members in all counties of the State.

Distribution of the 140 associations of various kinds in Alabama are:

Organization	*Per cent of total*
Alabama Farmers Cooperative, members and affiliates (Alabama)	33
Cotton Producers Associations, members (Alabama)	14
Credit Cooperatives	19
Other cooperatives, largely marketing and supply	16
Rural electric and telephone associations	18
TOTAL	100

Many products and services are being supplied members throughout the State by the listed organizations. Regional associations provide complete services to farmers through separate integrated arrangements with member associations or their affiliates. Manufacture or processing of feed, seed, and fertilizer is done extensively by regional organizations and by some large independent associations within the State.

Marketings of grain, broilers, livestock, milk, peanuts, fruit, and nuts are carried on extensively by both regional and certain independent associations. Farm supplies of various kinds are handled by member associations and affiliates of regional organizations, as well as by independent outlets. Items include agricultural chemicals, hardware, petroleum products, feed, seed, fertilizer, tires, and batteries. Primary services offered are credit, electricity, insurance, and technical assistance.

Farmers in St. Clair County, Alabama, market tomatoes cooperatively through the Chandler Mountain Tomato Growers Association.

Organization Dates

The 1930's and 1960's are noted as periods of fairly rapid cooperative development in Alabama. Dates of organization for all associations are:

When organized	*Per cent of total*
Before 1930	10
1930-39	35
1940-49	19
1950-59	13
1960 to date	23
TOTAL	100

Development during the 1930's resulted from the need to improve conditions in rural areas caused by the general economic depression. Both of the large regional associations operating in Alabama today had their beginning in the 1930's, as did many of the independent organizations. New laws were passed at that time making it possible to develop and expand credit and rural electric facilities. These were considered necessary to help overcome the economic and physical hardships being experienced in rural areas.

Unlike the 1930's, the period of 30 years later is one of unprecedented prosperity for the general economy but not the farm economy. Although consumers have been enjoying relatively low food and fiber prices, farmers have been faced with lower farm prices and higher costs of items bought. Thus cooperative development has been stimulated as a means of alleviating economic hardships created by these conditions.

The present period is both one of expansion and reorganization of cooperatives throughout the State. Alabama farmers, like other businessmen, are finding it necessary to form new business arrangements through merger or otherwise to achieve the efficiencies desired.

Volume and Membership

Despite trends underway, Alabama cooperatives are still relatively small. During the most recent fiscal period, about 46% of all associations in the State had gross sales of less than $500 thousand and more than 70% had less than $1 million. Relatively low sales volumes were generally characteristic of all types of associations reporting.

About 55% of the associations in Alabama reported having less than 1,000 members each. Approximately 80% of the marketing, purchasing, and credit associations reported memberships of 2,500 or less. Except for rural electric cooperatives, few associations reported memberships above that number.

Cooperative Council

The Alabama Council of Farmer Cooperatives represents all types of associations throughout the State, and is concerned with the development and growth of cooperatives. It sponsors educational programs, such as speaking contests and scholarships. It also supports the Tri-State Committee for Cooperative Research and Education in the region. This committee will soon publish a handbook for directors, and is planning management training programs to be held in the area. In addition, it is investigating research priorities relating to cooperative problems.

Although development of cooperatives in Alabama has been substantial in the past, present interest indicates even a more promising future.

* **Directory of Farmer Cooperatives in Alabama,** published jointly by the Agricultural Experiment Station and the Cooperative Extension Service, Auburn University, August, 1965. Copies are available on request to the Department of Agricultural Economics and Rural Sociology, Auburn University, Auburn, Alabama.

IMPROVING MIXED HARDWOOD STANDS

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PROPERLY MANAGED mixed hardwood timber stands in small stream bottoms can produce both quantity and quality.

Frequently such stands contain complex mixtures of vines, shrubs, and trees of many sizes. Cutting merchantable timber from such stands generally results in a mass of vines and many undesirable hardwood species left to grow.

Management Study

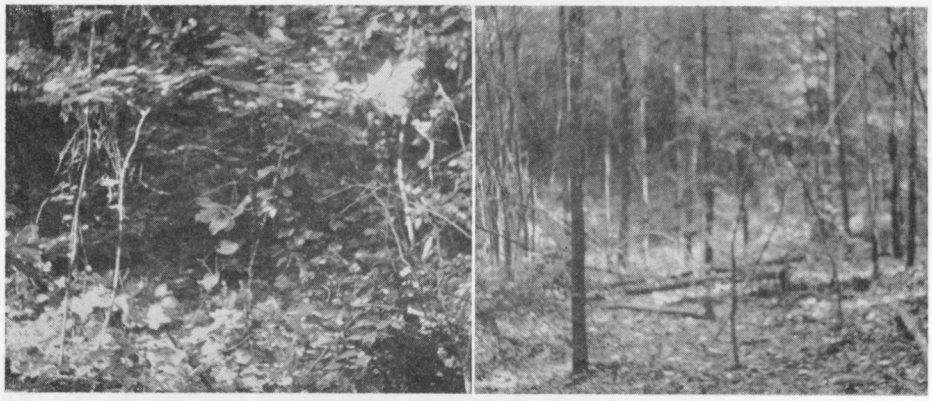
A study was begun in 1962 at the Fayette Experiment Forest, a unit of Auburn University Agricultural Experiment Station, to determine cost and effectiveness of using a herbicide to control overstory and understory weed species prior to commercial cutting. The objective was to test three methods of herbicide application and to correlate these methods with increases in desirable reproduction[1] and general stand improvement.

Stands treated averaged 1,100 stems per acre of shrubs and trees 1 to 4 in. d.b.h. (diameter 4.5 ft. above ground) and 200 stems per acre of trees over 4 in. d.b.h., Table 1. Diameters ranged up to 30 in. but averaged only 7.7 in. d.b.h.

Treatments included (1) control (no treatment); (2) injecting all undesirable trees and shrubs (stems larger than 1 in. in diameter 2 in. above ground line) with a mixture of 1 gal, 2,4,5-T[2] in 20 gal. of fuel oil; (3) basal spraying as above, except in a dilution of 1 part 2,4,5-T concentrate to 25 parts fuel oil to lower 4 in. of the stem until runoff occurred; and (4) mist blowing plus injection. The mist, a concentration of 1 part 2,4,5-T concentrate, in 9 parts of fuel oil, was applied in June 1962 to all leaf surfaces of vegetation up to 20 ft. in height. After one month all living undesirable stems that showed no signs of dying from the mist application were injected as in treatment 2. All treatments were replicated five times.

[1] Desirable reproduction includes seedlings of yellow-poplar, pine, sweetgum, and white oak. All others are considered undesirable in this study.

[2] An ester of 2,4,5-T containing 4 lb. of acid equivalent per gal. of 2,4,5-T concentrate.



The area at left is a typical check area and at right is typical mist blowing effects one year after treatment.

Results

An average of 80% of all treated stems over 4 in. d.b.h. were killed by injection, whereas only 47% were killed by basal spray, and none was killed by the mist only. Effectiveness of the basal spray was considerably lower on larger trees (no trees over 12 in. d.b.h, except red maple, were killed). The difference between tallies before treatment and 2 years later indicate that stands treated by basal spray were reduced about half as much as by the other two treatments, Table 1. The diameter increase shown for the treated stands indicates that most of the cull and undesirable trees were in the lower diameter classes. These are trees that would have been left after harvest for lack of markets.

TABLE 1. CONDITION OF STANDS BEFORE AND AFTER TREATMENTS ON A PER ACRE BASIS

Treatment	Time	Need seedlings		Stems 1-4"	Stems over 4"	
		Total	Desirable		Total	Av. d.b.h.
		No.	*Pct.*	*No.*	*No.*	*In.*
Check	Before			1,600	200	8.0
	After[1]	19,550	29	1,650	200	8.0
	Dif.			+50	0	0
Injection	Before			1,000	200	7.4
	After[1]	18,000	43	300	150	8.6
	Dif.			−700	−50	+1.2
Basal Spray	Before			900	200	7.8
	After[1]	32,700	49	150	150	8.4
	Dif.			−750	−50	+0.6
Mist plus	Before			1,000	200	7.6
	After[1]	26,050	58	200	150	8.3
	Dif.			−800	−50	+0.7
	Av. before			1,100	200	7.7

[1] Two years after treatment.

TABLE 2. LABOR AND MATERIAL COSTS OF TREATMENTS ON A PER ACRE BASIS

Treatment	Costs		
	Labor[1]	Material	Total
	Dol.	*Dol.*	*Dol.*
Check	$0.00	$0.00	$0.00
Injection[2]	4.09	2.35	6.45
Basal Spray[3]	5.19	8.81	14.00
Mist[4]	0.53	4.27	4.80
Injection[2]	3.21	2.60	5.81
Subtotal	3.74	6.87	10.61

[1] Labor at $1.15 per hour.

[2] One part herbicide in 20 parts of No. 2 fuel oil @ $0.489 per gal. of mix.

[3] One part herbicide in 25 parts of No. 2 fuel oil @ $0.442 per gal of mix.

[4] One part herbicide in 9 parts of No. 2 fuel oil @ $0.985 per gal. of mix.

All treatments were equally effective in controlling stems 1 in. to 4 in. d.b.h. Treatments by basal spray and by mist were more effective in control of vines and understory vegetation than treatment by injection as shown by the more abundant reproduction.

Injection was the cheapest of three treatments, Table 2, but mist plus injection was the most effective treatment. An average of 58% of all new seedlings on the mist plots were considered desirable, whereas the basal, injection, and check plots had 49, 43, and 29% desirable, respectively. At this point in the study treatment 4 (mist blowing plus injection) is considered to be the best for combined economy, kill of undesirable stems, and increase of desirable reproduction.

Match Nitrogen and Spacing for Most Profitable Corn Yields

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PLANT SPACING and rate of nitrogen fertilization are two of the most important management factors in corn production. Since each of these factors affects the other, good management calls for matching rate of nitrogen to drill spacing used.

The relationships between corn spacing and nitrogen requirements are investigated regularly by Auburn University Agricultural Experiment Station. Continuous testing is needed since the most profitable combination may shift with changes in varieties, management practices, and economic factors.

Prolific type corn varieties recommended by the Station were planted at five locations during 1961-64, the period reported here. Drill spacings were 9, 12, 18, and 24 in. in 42-in. rows, which correspond to populations of 16,000, 12,000, 8,000, and 6,000 plants per acre. (Corn was hand thinned to the desired spacing for the test.)

Rates of nitrogen were 60, 90, 120, and 150 lb. per acre at all spacings. Split applications were made. Corn receiving no nitrogen was spaced 24 in. in the drill. Adequate phosphorus and potassium were applied.

At the widest drill spacing, 24 in., there was little response to rates of nitrogen above 60 lb. per acre (see table). Response to nitrogen increased as the spacing was reduced. At the 9-in. drill spacing, raising N from 60 to 120 lb. increased yield an average of 13 bu. In similar fashion, at each rate of nitrogen, yield was upped with every increase in number of plants per acre. With 120 lb. of nitrogen, yield was increased from 66 to 83 bu. by reducing spacing from 24 to 9 in. This clearly shows that nitrogen rate should be selected in relation to drill spacing.

At most test locations, corn yields were higher at 9-in. than at wider spacings. Yields were similar for 9- and 12-in. spacings at the Sand Mountain and Gulf Coast substations. There were no instances when 9-in. spacings produced less than wider spacings. With the higher rates of nitrogen, spacings wider than 12 in. sharply decreased yields.

Effect of drill spacing was similar in both favorable and unfavorable years. Response to both spacing and nitrogen is reduced when yields are limited by drought, but the relationship remains the same.

While response to nitrogen varied considerably among locations, yield was increased an average of 7 bu. per acre by raising nitrogen from 60 to 90 lb. at either 9- or 12-in. spacing. The 120-lb. rate produced about 5 bu. more than the 90-lb. rate. Yield increases from above 120-lb. nitrogen rates were small, except at the Sand Mountain Substation. However, the highest nitrogen rate did not cut yields, even in most unfavorable years.

Although high yields can be made most years with 90-120 lb. of nitrogen and 9- to 12-in. spacing, there are disadvantages. Close spacing reduces ear size, which may affect picker efficiency. Lodging may increase with closer spacing and higher rates of nitrogen. The higher rates of nitrogen increase financial risk since responses may be small in dry seasons.

Results of the tests reported emphasize that high nitrogen rates must be combined with close spacing for profitable returns from the nitrogen.

Best yields are made with 9- to 12-in. drill spacing. For most locations, 90 to 120 lb. of nitrogen are recommended, although there may be response to larger amounts in the Sand Mountain area.

CORN YIELDS FROM RATES OF NITROGEN AND SPACING EXPERIMENTS

Spacing in 42-in. rows	Per acre yield					
	Brewton 4 years	Monroeville 4 years	Prattville 4 years	Gulf Coast 3 years	Sand Mt. 3 years	Average
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*
No nitrogen						
24 inches	49	44	28	54	36	42
60 lb. nitrogen						
24 inches	65	64	49	69	63	62
18 inches	74	66	52	73	74	67
12 inches	73	73	54	76	70	69
9 inches	75	74	54	78	69	70
90 lb. nitrogen						
24 inches	63	66	49	71	76	64
18 inches	77	72	56	74	80	71
12 inches	77	77	58	79	88	75
9 inches	82	85	62	79	86	78
120 lb. nitrogen						
24 inches	67	68	51	69	76	66
18 inches	74	75	56	78	82	72
12 inches	83	81	59	83	100	80
9 inches	86	86	66	84	97	83
150 lb. nitrogen						
24 inches	65	65	49	72	77	65
18 inches	73	76	59	77	88	74
12 inches	84	78	64	83	102	81
9 inches	92	86	62	86	106	85

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