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HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 10, No. 1 SPRING, 1963

In this issue . . .

On the cover. Getting the most return from limited cotton acreage calls for doing a good job of all operations. Shown here at the Tennessee Valley Substation, Belle Mina, is post-emergence weed control treatment with herbicidal oil. On pages 3, 4, 8, and 10 of this issue are reports of research on insect control, cotton varieties, chemical weed control, and hopper-box fungicidal seed treating.

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New and Timely PUBLICATIONS

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

Bul. 326. Corn Earworm Control.

Bul. 332. Management of Irrigated Cotton.

Bul. 337. Nitrogen and Moisture Requirements of Coastal Bermuda and Pensacola Bahia.

Cir. 136. Nitrogen for Dallisgrass Pastures in the Black Belt.

Cir. 138. Soybeans for Oil in Alabama.

Cir. 140. Bahiagrass for Forage in Alabama.

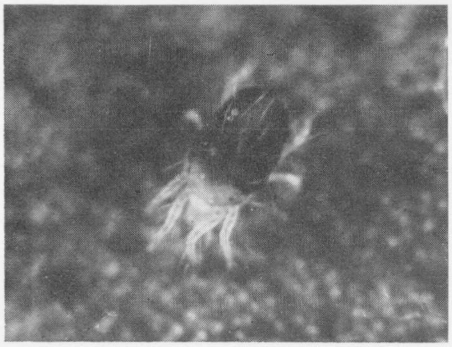
Cir. 142. Procedures for Calculating Producer Quotas and Prices for Grade A Milk in Alabama.

Leaf. 68. Biology and Control of Spider Mites on Cotton in Alabama.

Prog. Rept. 82. Performance of Silage Varieties.

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

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



Effects of SPIDER MITES on Cotton Production

T. D. CANERDAY and F. S. ARANT*
Department of Zoology-Entomology

SPIDER MITES are becoming increasingly important cotton pests in Alabama.

These tiny mites, barely visible to the naked eye, live on the underside of leaves and suck juices from plants. The damage caused by these mites is reflected in loss of vigor, discoloration, and shedding of foliage. Spider mites enter cotton fields from wild or cultivated plants growing nearby. The presence of mites is usually noticed first along field margins when visible damage to leaves occurs, but occasionally isolated spot-infestations may be found in any part of a field.

For several years, spider mites have caused damage in the Tennessee Valley and Sand Mountain areas of northern Alabama, and are now becoming economic pests in central and southern Alabama. Research and observations in Alabama indicate that increased damage from spider mites has been brought about mainly by extensive use of organic insecticides on cotton. Most of these insecticides destroy predators and other beneficial insects without controlling mites. Therefore, mites are able to reproduce and develop in the absence of biological control.

Several species of spider mites have been found to attack cotton in Alabama. Mites most commonly present are carmine, strawberry, and two-spotted spider mites.

Field Experiments

Field experiments were conducted on the Tennessee Valley Substation at Belle Mina in 1961 and 1962 and at the Auburn University Agricultural Experiment Station's Agronomy Farm in 1962 to determine the effect of infestations on yield and quality of cotton by the carmine spider mite. The mites were artificially introduced at different times of the growing season. An experiment was conducted at Belle Mina in 1962 to study the effect of three levels of infestation artificially introduced on July 20. The strawberry spider mite was used in the experiment, since it appeared to be the dominant species in cotton fields late in the growing season in northern Alabama. In all experiments, a set of control plots was kept virtually mite free with periodic applications of an acaricide, demeton.

Infestation determinations were made at regular intervals, and concise climatic data were recorded from each experiment. Cotton was harvested two to three times in all experiments for yield determinations and quality studies.

Yield of seed cotton was reduced 14 to 44% by infestation of the carmine spider mite in three field experiments conducted in 1961 and 1962. In addition to this reduction in yield, several characters of seed and lint as well as boll size appeared to be adversely affected by spider mites. Summarized results of the research are presented in the table.

In 1961 the greatest reduction in yield occurred in plots infested late in the growing season. In 1962 at both Belle Mina and Auburn, this trend was reversed. An analysis of climatic data and infestation counts indicated that spider mite populations and subsequent damage were greatest during extended periods of hot and dry weather and further that reduction in yield and quality are affected accordingly.

Infestations of the strawberry spider mite introduced late in the growing season reduced yield of seed cotton 13 to 21% per acre. Results from seed and fiber studies revealed a reduction in boll size, seed index, lint index, fiber maturity, and seed germination attributable to spider mite injury. In this test, plants in the infested plots were completely defoliated 40 days after mites were first detected in plots.

Spider mites can be effectively controlled with recommended miticides. Cotton fields should be examined weekly and control measures started as soon as leaves begin to show damage or when mites are found in large numbers. Recommended miticides include Trithion, Ethion, or Demeton (Systox).

* The authors gratefully acknowledge the cooperation and assistance of J. K. Boseck, superintendent, Tennessee Valley Substation; L. J. Chapman, assistant in agronomy; and Dr. A. L. Smith, pathologist (Coop. USDA).

TABLE 1. EFFECTS OF INFESTATION BY THE CARMINE SPIDER MITE AT DIFFERENT TIMES OF THE GROWING SEASON ON YIELD AND QUALITY OF COTTON

Date infested	Reduction in[1]						
	Total yield	Boll size	Seed index	Lint index	Staple length	Micronaire	Seed germination
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Belle Mina 1961							
June 6	16	6	3	2	0	0	
July 7	28	2	0	1	0	0	
August 8	31	3	0	0	0	0	
Belle Mina 1962							
June 6	44	11	4	8	0	12	6
July 5	27	11	5	3	0	0	1
July 30	18	14	4	6	0	4	6
Auburn 1962							
June 5	26	17	10	8	0	3	6
July 2	21	16	8	4	0	6	13
August 6	14	3	3	3	0	5	10

[1] Reductions based on an average of three pickings from each test at Belle Mina and two at Auburn.

(Title picture) Adult female spider mite (carmine), about 70X enlargement at left, and a field of cotton extensively damaged by spider mites at right.

COTTON VARIETIES *for* 1963

LOUIE J. CHAPMAN, *Asst. in Agronomy*

WHICH COTTON variety shall I plant on my farm?

Of the many factors involved in getting the most cotton from each acre, variety selection is among the most important. An acre planted to an *unadapted* variety will not produce top yields regardless of the management practices used — land preparation, fertilization, irrigation, and weed and insect control.

The varieties listed in the tables are only those approved for planting in the regions specified. Selection of a particular variety from those listed should be based on the conditions under which it is to be grown and the management practices that will be used. For more detailed information concerning cotton varieties, see "Cotton Varieties for Alabama — Report of 1962 Tests," published by the Auburn University Agricultural Experiment Station.

Testing Program

New varieties, promising experimental ones, and older established varieties are carefully compared each year in tests at 10 units of the Auburn Agricultural Experiment Station System. Locations of these tests are Belle Mina, Crossville, Alexandria, and Winfield in northern Alabama; Auburn, Prattville, Monroeville, Brewton, and Headland in southern Alabama; and a special test at Tallassee to study wilt resistance on severely infested soil.

Why are so many tests necessary? The evaluation of varieties is a complex process because of the many factors that must be considered, all of which are affected by environmental conditions. Therefore, many tests are required to adequately compare performances of varieties.

How Recommendations Are Made

Recommendations are made for two general regions, northern and southern Alabama. The chief reason for dividing the State is the distribution of Fusarium wilt. Heavy-textured soils of the northern half, particularly the Tennessee and Coosa valleys, usually are not seriously infested with wilt. Susceptible varieties have performed well in these areas.

Most of the cotton-producing soils in southern Alabama are infested with wilt to the extent that susceptible varieties usually do not perform satisfactorily. For this reason, only resistant varieties should be grown in this region.

TABLE 1. PERFORMANCE OF RECOMMENDED COTTON VARIETIES IN SOUTHERN ALABAMA DURING 3-YEAR PERIOD, 1960-62

Variety	Lint yield	Gin turnout	Staple length
	Lb.	*Pct.*	*Pct.*
Wilt resistant			
Auburn 56	801	36.8	34
DeKalb 108	795	37.5	34
Dixie King	787	37.8	34
Rex	780	38.0	34
All-in-One	766	36.5	34
Coker 100A	765	38.0	34
Plains	730	37.6	34

Recommendations are based on average results of all tests in each region during the preceding 3-year period. Measurements taken and used in arriving at recommendations are yield, gin turnout, staple length, micronaire, wilt resistance, storm resistance, boll size, and earliness.

Varieties for Irrigation

For maximum returns from irrigated cotton, higher rates of fertilization, especially nitrogen, are needed than are normally used for nonirrigated cotton. These conditions may cause certain varieties to lodge severely, resulting in extensive boll rot loss and harvesting difficulty. Therefore, stem strength is an important factor in selecting a variety. Irrigation studies at Thorsby and Tallassee showed Stoneville 7A to have the strongest stem of the susceptible varieties listed. Auburn 56 has lodged less than other wilt-resistant varieties. See Auburn University Agricultural Experiment Station Bulletin 332 for detailed information concerning varieties for use under irrigation.

Mechanical Harvester Performance*

In 1961 and 1962, the test at Belle Mina was harvested with a spindle picker to evaluate varieties for adaptability to mechanical harvesting.

In 1961, there was very little weather loss and total field losses were relatively small, ranging from 4.7% to 8.5%, Table 2. In 1962, weather losses were larger and varied significantly among varieties. Weather losses coupled with slightly higher machine losses resulted in definite and important differences in total field losses among varieties. The total field loss ranged from a low of 6.4% for Stoneville 7A to a high of 14.6% for Pope.

While these results indicate that the field losses should be considered in selecting a variety for mechanical harvesting, the harvested yield really determines the return from any variety. A high yielding variety with low weather and machine losses should be planted for mechanical harvesting.

* Mechanical harvesting evaluations were under supervision of T. E. Corley, Agricultural Engineering Department.

TABLE 2. PERFORMANCE OF RECOMMENDED COTTON VARIETIES IN NORTHERN ALABAMA DURING 3-YEAR PERIOD, 1960-62

Variety	Lint yield	Gin turnout	Staple length	Total field loss* 1961	Total field loss* 1962
	Lb.	*Pct.*	*1/32"*	*Pct.*	*Pct.*
Wilt susceptible					
Stoneville 7A	817	40.3	34	6.2	6.4
DeKalb 220	816	39.1	34	4.7	10.0
Stardel	805	40.3	34	5.6	9.1
Pope	795	41.4	34	8.2	14.6
Hale 33	793	39.5	34	6.7	10.1
Fox 4	773	38.5	34	5.4	12.4
Wilt resistant					
DeKalb 108	813	38.8	34	5.8	9.2
Rex	813	39.7	34	5.5	9.8
Auburn 56	807	38.1	34	5.9	8.8
Dixie King	793	39.0	34	5.9	10.1
Plains	773	38.6	34	8.5	11.6
Coker 100A	773	39.2	34	6.4	8.9
Empire WR-61	754	39.2	34	5.1	10.0

* These data are from the Belle Mina test only.

This clean test plot of pepper shows results of weed control with diphenamid. Using PEBC gave equally good control.

Chemicals Control Weeds in Tomatoes and Pimento Pepper

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M. H. HOLLINGSWORTH, *North Alabama Horticulture Substation*

WEED COMPETITION before and after layby considerably reduces yields of pimento peppers and tomatoes. Controlling weeds in these crops by cultivation becomes increasingly difficult as layby time approaches.

Hand labor is expensive and often unavailable when needed. Since pepper acreage in northern Alabama has grown in recent years and tomatoes are important in many areas of the State, a good chemical weed control program is needed.

The weed complex confronting pepper and tomato growers is primarily annual grasses, with crabgrass and goosegrass predominating. In growing seasons having adequate or heavy rainfall, the grass problem is especially serious.

In 1960, varying rates of several promising herbicides were applied to tomatoes after transplanting (pre-emergence treatment for weeds) and to pimento peppers as a layby treatment. Both crops were growing in sandy loam soil at Auburn.

CDEC (Vegedex) at 6 and 8 lb.; Zytron at 5, 10, and 15 lb.; and Neburon at 4 lb. active ingredient per acre provided satisfactory weed control in both peppers and tomatoes. Applications of CDAA (Randox) at 4, 6, and 8 lb., Amiben at 4, 6, and 8 lb., and EPTC (Eptam) at 4 lb. active resulted in injury and yield reduction of tomatoes. Casoron at 1, 2, and 5 lb. active per acre gave excellent weed control but caused brittleness and subsequently reduced stand of peppers. DCPA (Dacthal) at 8 and 10 lb. and CDEC at 6 and 8 lb. active per acre on peppers and the CDEC treatment for tomatoes appeared to offer the most promise of all materials tested in 1960.

Beginning in 1961 research was directed toward (1) evaluating promising herbicides for pepper transplants in Sand Mountain area tests and for pepper and tomato transplants and direct seeded tomatoes at Auburn; and (2) testing a pepper layby treatment at North Alabama Horticulture Substation, Cullman, for effect on yields and degree of weed control from most promising chemicals tested earlier in 1961.

At three locations in the Albertville area, DCPA at 8 lb. and CDEC at 6 and 8 lb. active per acre were applied April 30 to recently set pepper transplants. Only DCPA gave sufficient weed control to be of value when treatments were evaluated 6 weeks later.

During the same period at Auburn, four Stauffer herbicides (R-1856, R-3441, R-3400, and R-3408), CDEC, Trietazine, and Simazin were eliminated from the group of potential herbicides for pepper or tomato. In this test, PEBC (Tillam) and diphenamid at 4 lb. and DCPA at 8 lb. per acre showed greatest promise. Direct-seeded tomato seedlings emerged satisfactorily only in PEBC and diphenamid treated plots. In these plots, weed control was excellent and seedlings grew normally. In unhoed check plots, weeds severely restricted growth of seedling tomatoes and reduced stands considerably.

Excellent results with PEBC and diphenamid as layby treatments for pimento peppers were achieved at Cullman, see table. DCPA failed to control goosegrass but was effective against crabgrass. Crabgrass appeared more competitive with pepper because of its spreading growth habit in comparison with the non-spreading goosegrass. Effect of crabgrass control showed up in increased yields from DCPA-treated plots (8 lb. rate) as compared with the check plots, even though goosegrass was not controlled.

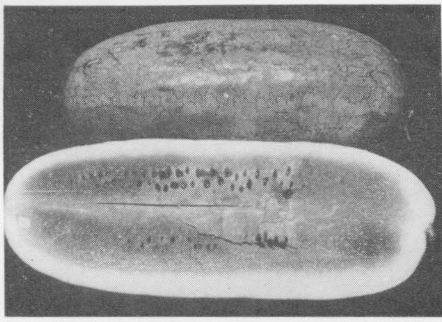
Most promising of the herbicides tested were PEBC incorporated in soil (4 lb. active per acre), DCPA (8 and 10 lb.), and diphenamid (2 and 4 lb. per acre). PEBC and diphenamid are approved for use on both tomatoes and peppers.

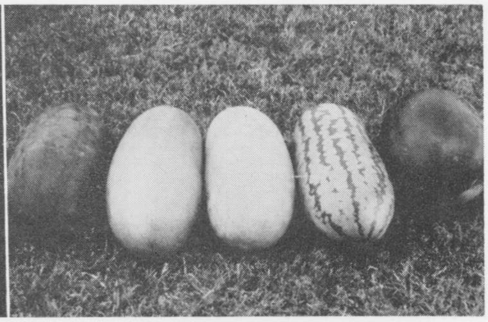
WEED CONTROL AND PIMENTO PEPPER YIELDS FOLLOWING HERBICIDE TREATMENTS

Treatment	Yield per plant	Weed control rating[1]
	Lb.	
Unhoed check	1.48	3.2
DCPA, 6 lb.	1.51	4.5
DCPA, 8 lb.	1.76	4.3
Diphenamid, 4 lb.	1.81	9.6
Diphenamid, 6 lb.	1.53	9.7
PEBC, 4 lb.[2]	1.74	9.7

[1] Rating: 1.0, no control; 10.0, complete control. Made 6 weeks after treating.

[2] PEBC, which normally requires soil incorporation to prevent volitalization, was applied to freshly prepared soil. It was incorporated by 1½-in. rain shortly after treating.





WATERMELON VARIETIES for Alabama

SAM T. JONES, *Associate Horticulturist*

WATERMELON VARIETY selection is based on many factors.

Yield of marketable melons, disease resistance, interior quality, size, and factors affecting market acceptability are important. Special market preferences sometime demand that certain types for rind color, fruit shape, and size be grown. Anthracnose and fusarium wilt-resistant varieties are required to reduce risk from disease losses. However, because of competition from other growers and regions, only high-yielding varieties are profitable.

Variety Tests

To provide information for selection of proper varieties, tests of leading watermelon varieties and promising breeding lines are conducted at the Auburn University Agricultural Experiment Station and at substations located throughout the State.

The comparative yielding ability, quality, and characteristics of some of the leading large-fruited watermelon varieties are given in Table 1. Charleston Gray is probably the best all-round melon because of high productivity, high interior quality, and resistance to disease and sunburn. It has ability to produce good quality melons consistently, even under adverse conditions. It generally averages smaller melons than other varieties. However this small size, like its gray color and long shape may be either disadvantages or advantages depending upon particular market outlets.

Garrisonian is an excellent melon where large size is in demand. It generally produces considerably larger melons than other similar varieties and also has good interior quality. It is a long, distinctly green striped melon attractive in appearance. Resistance to anthracnose makes it preferable to older similar varieties.

Congo is a good shipping melon with green rind and darker green stripes faintly visible. A tough rind, good interior quality, and anthracnose resistance has kept Congo in popularity despite fusarium wilt susceptibility.

Blackstone should replace Black Diamond where a round green melon is desired because of its disease resistance and superior quality. Although Black Diamond, also known as Cannon Ball and Florida Giant, had a higher yield than other varieties in tests, it is not recommended because of unreliability. It is susceptible to disease and has low quality.

TABLE 1. YIELD AND QUALITY OF WATERMELON VARIETIES GROWN AT AUBURN AND CLANTON

Variety	Yield per acre		Av. wt. per melon	Av. soluble solids[1]	Taste preference[2]	Width-length ratio[3]	Days to maturity	Rind
	No.	*Lb.*	*Lb.*	*Pct.*			*No.*	*Color*
Garrisonian	816	20,604	26	9.2	4	.43	90	Striped
Charleston Gray	873	20,569	24	8.8	1	.44	80	Gray
Blackstone	735	17,339	23	7.7	3	.98	85	Green
White Hope	521	11,650	22	9.0	2	.46	80	Gray
Hope Diamond	470	10,945	23		6	.76	90	Green
Black Diamond	918	23,669	26	8.5	9	.82	90	Green
Summit	801	20,643	26	9.4	8	.82	90	Green
Congo	707	16,572	24	9.0	5	.74	85	Striped
Calhoun Sweet	608	14,358	24	8.7	7	.76	90	Green

[1] Soluble solids in watermelons are mostly sugars.
[2] Rated by panel from 1 for most desirable to 10 for least desirable.
[3] A ratio of 1.00 would be round while .50 would be twice as long as wide.

Small Melon Varieties

The small fruited, or icebox, melon is gaining in popularity. Varieties tried at Auburn and their characteristics are given in Table 2. Of the older varieties only Sugar Baby has had sufficient size and quality under average conditions to be acceptable. Others were extremely small, full of seed, and had a tendency to overripen quickly.

Graybelle, a new introduction from USDA, has performed even better than Sugar Baby; in addition, it has some resistance to anthracnose. Other varieties tested were extremely susceptible to this disease.

The Tri-X series are seedless hybrids. They have been outstanding in quality, and fruit size has been satisfactory. They are susceptible to several foliage diseases. Because of high cost of seed and poor germination, the seedless hybrids should be planted in peat pots and transplanted to the field for adequate stands. Tri-X 313 is best for commercial use because of larger fruit size, better shipping ability, and resistance to anthracnose.

TABLE 2. YIELD AND QUALITY OF ICEBOX WATERMELON VARIETIES GROWN AT AUBURN

Variety	Yield per acre		Av. wt. per melon	Av. soluble solids[1]	Width-length ratio[2]	Rind thickness	Days to maturity	Rind
	No.	*Lb.*	*Lb.*	*Pct.*		*cm.*	*No.*	*Color*
Takii Gem	3,851	12,941	3.4	7.8	.84	.9	75	Striped
New Hampshire Midget	3,298	8,758	2.7	7.8	.83	.5	75	Striped
Sugar Baby	1,717	14,168	8.2	8.1	.94	1.3	80	Green
Market Midget	4,200	23,668	5.6	8.5	.78	.8	90	Green
Golden Midget	----	----	3.4	7.4	.82	.5	75	Yellow
Mardela	2,493	25,815	10.4	8.0	.84	1.7	80	Green
Calif. Honey	2,163	22,352	10.3	8.6	.82	1.6	90	Green
Graybelle	1,581	16,797	10.6	7.8	.82	1.8	80	Gray
Tri-X 313	1,649	23,668	14.4	9.4	.58	2.0	80	Striped
Tri-X 317	2,134	26,894	12.6	9.7	.92	1.7	80	Striped
Tri-X 392	1,843	23,926	13.0	9.7	.60	1.8	80	Striped

[1] Soluble solids in watermelons are mostly sugars.
[2] A ratio of 1.00 would be round while .50 would be twice as long as wide.

Improving

CREAMED COTTAGE CHEESE QUALITY

R. Y. CANNON, *Dairy Technologist*

PRODUCTION of creamed cottage cheese in Alabama increased about 150% from 1955 to 1960. Yet, consumption of this product in the State is much lower than in other areas of the United States. An increase in consumption of cottage cheese, an important health food, would provide an outlet for more milk in Alabama.

Flavor studies by Auburn University Agricultural Experiment Station of cottage cheese from grocery stores during the past 3 years showed that about one-third of the cheese was of excellent quality, another third was fair to good, and the remainder was poor in flavor.

What Affects Flavor

Since consumption of cottage cheese is influenced directly by flavor, studies were made to determine factors that would improve the flavor and keeping qualities of cottage cheese.

Samples of dry cottage cheese curd, cream dressing, and packaged creamed cottage cheese were picked up from Alabama plants on the day of manufacture. These were refrigerated and sent immediately to Auburn. Flavor and bacterial analyses of the samples were made on arrival and again after 7 days' storage at 50°F.

Of the bacterial analyses made, changes in the number of organisms that grow at temperatures below 50°F. (psychrophilic organisms) were closely related to flavor breakdown. Although the numbers of organisms increased to a considerable extent in the curd of samples of poor keeping quality, there was an even greater increase of them in the cream dressing. In the samples of fair keeping quality, large increases in psychrophilic numbers occurred only in the cream dressing. Bacterial counts of the creamed cheese were about 10 to 15 times greater than the count of the curd and the cream used to make the cheese. These indicate contamination during the creaming and packaging process. Thus, good sanitation practices in handling the curd and cream before and during packaging are necessary if the product is to be of good quality.

Determination of Keeping Quality

Cottage cheese was made under ideal or near ideal conditions to determine the maximum "shelf-life" (keeping qualities during storage) that might be obtained.

Skimmilk was pasteurized and delivered to the cheese vat in an air-conditioned room with filtered air. The manufacturing process used was the conventional "short-set" method in which the curd was cut at pH 4.7 and cooked at 125°F. for 20 minutes. After draining the whey, the curd was washed with acidified water (pH 5.0) with 15 p.p.m. chlorine added. Cream dressing was heated to 140°F., homogenized, then pasteurized in a 10-gallon can at 180°F. for 30 minutes, and cooled in the can. The cream was added to the drained curd in the vat, and the creamed cottage cheese was immediately packaged by hand. Using this procedure, a storage life of 3 to 4 weeks at 50°F. was obtained consistently.

To determine the number of spoilage organisms required to shorten shelf-life, cultures of psychrophilic bacteria from spoiled cottage cheese were added through the cream dressing at different inoculation rates. Bacterial counts were run on the cheese immediately and after 5 days storage at 50°F.; flavor was judged at intervals up to 30 days. The table shows that even the addition of one bacterium per gram of cheese will cause a reduction in keeping quality and a decided increase in bacterial content after 5 days' storage at 50°F. If the cheese has as many as 100 psychrophilic bacteria per gram at packaging time, the bacterial count after 5 days storage may be 100,000. This is more than 100 times the count of the cheese that was packaged free of such bacteria. Good quality may be maintained up to about 30 days in storage if proper sanitary methods are used. If the cheese is contaminated to begin with, storage life may be less than 10 days.

These results point to the need for good sanitation practices in producing, handling, and packaging creamed cottage cheese.

EFFECT OF LEVEL OF CONTAMINATION ON KEEPING QUALITY AND PYSCHROPHILIC BACTERIA COUNT OF CREAMED COTTAGE CHEESE

Calculated inoculation rate[1]	Keeping quality[2]	Psychrophilic bacteria count	
		When packaged	After 5 days at 50°F
Per gram	*Days*	*Per gram*	
0	30	less than 600	less than 600
1	16	less than 600	11,000
10	12	600	70,000
100	9	820	100,000
1000	9	1240	140,000

[1] Cream was inoculated with bacteria from spoiled cottage cheese to provide inoculation rates as shown in the creamed cottage cheese.
[2] Days of storage at 50°F. required for flavor deterioration to barely acceptable limits.

GRANULES or SPRAY for COTTON WEED CONTROL?

T. E. CORLEY, *Associate Agricultural Engineer (Coop. USDA, ARS, AERD)*

ALMOST ALL PRE-EMERGENCE chemicals used for weed control in cotton are now applied as sprays. However, use of granules offers these advantages: (1) a reduction in bulk handled, (2) elimination of chances for error in mixing, and (3) lowered cost of application equipment.

Granular herbicides have disadvantages too, the major one being lack of versatility of application equipment. Whereas a sprayer can be used for applying all chemicals used in cotton production, granule application equipment is presently limited to putting on pre-emergence herbicides and insecticides and fungicides that are applied at planting. Despite the shortcomings, advantages of granules are such that laboratory and field studies have been made by the Agricultural Experiment Station.

Laboratory Study

Three makes of applicators with two designs of rotor bar metering devices and two types of nozzles (band distributors) were evaluated for uniformity of metering and distribution. Concentrations of 5% and 20% CIPC with a granular base of 15/30-mesh attapulgite clay were used for laboratory tests. A test stand consisting of an electric drive and a catch pan with 1-in. divisions was used to make metering measurements and across-the-row distribution analyses.

Results of the tests showed no distinct advantages of either metering mechanism or nozzle type. Each machine gave uniform metering and fairly good across-the-row distribution. Depth of material in the hopper or rotor speed did not materially affect discharge rate. Cross winds greater than 10 m.p.h. caused severe distortion and shifting of nozzle patterns. A slight deviation in height adjustment and mounting angle made little difference in distribution patterns of either nozzle type.

Field Test

Granule distribution was also studied in field plots, using a photographic technique. Across-the-row distribution was found to be uneven because the smooth, convex shaped row profile left by the zero-pressure tire of the planter caused the granules to roll away from the center of the row. Down-the-row distribution was fairly uniform with no difference between machines.

The two chemicals recommended for cotton weed control in Alabama, CIPC and diuron, were applied in granular and liquid formulations on Decatur clay and Hartsells fine sandy loam. Both formulations were applied at recommended rates of active ingredients to a 14-in. band in 42-in. rows. Liquid was applied in 10 gal. of water per acre.

There was no rain on the clay soil until 8 days after planting in 1960, until 15 days later in 1961, and 30 days in 1962. On the sandy soil, rain fell immediately after treatment in 1962, but not for 2 weeks in 1961.

Half of each plot received a post-emergence oiling when cotton plants reached 2½ in. high. In 1962 on the clay soil, a second oiling was done 1 week after the first.

Hoe Labor Required

Effectiveness of each treatment was measured by amount of hoe labor required to keep plots free of weeds. As shown by data in the table, all herbicidal treatments reduced hoe labor. The herbicides were a little more effective on the clay than on the sandy soil. Tests on both soils were grouped to give the comparisons recorded in the table.

There was no difference in hoe labor among the different concentrations (5%, 20%, 35%) of CIPC granules tested.

For both herbicides, liquid-treated plots required slightly less hoe labor than the granule-treated plots. The difference was small, but it prevailed in all five tests with CIPC and in two of the three diuron tests.

In the three tests using CIPC and diuron, CIPC was slightly better in two and diuron looked better in the other. The three-test average showed no important difference between the two herbicides. Dry weather following application reduced effectiveness of both chemicals.

When post-emergence herbicidal oil was applied, there was no difference among any of the pre-emergence treatments. In addition, chemically-treated plots were only slightly better than the check plots.

HOE LABOR REQUIRED FOR COTTON FOLLOWING DIFFERENT PRE- AND POST-EMERGENCE TREATMENTS

Treatment		Hoe labor per acre		
Pre-emergence	Post-emergence[1]	Effect of granular conc., 3-test av.	CIPC vs. diuron, 3-test av.	Liquid vs. granules, 5-test av.
		Man-hr.	*Man-hr.*	*Man-hr.*
Untreated check	No oil	18.4	16.2	18.5
	Oil	5.0	9.7	7.8
Liquid CIPC	No oil	5.8	7.7	7.3
	Oil	3.0	4.6	4.1
5% granular CIPC	No oil	8.3	----	----
	Oil	2.8	----	----
20% granular CIPC	No oil	7.5	9.2	8.8
	Oil	3.5	5.0	4.5
35% granular CIPC	No oil	7.5	----	----
	Oil	3.2	----	----
Liquid diuron	No oil	----	9.8	----
	Oil	----	4.7	----
Granular diuron	No oil	----	10.4	----
	Oil	----	4.5	----

[1] Herbicidal oil used for post-emergence treatment.

Thick Silage Spacing— Good Practice or Highly Overrated?

R. M. PATTERSON, C. S. HOVELAND,
O. N. ANDREWS, JR., and H. L. WEBSTER
Department of Agronomy and Soils

SPINNERS OF FARM YARNS have weaved interesting tales about fantastic silage yields from extra thick plantings of corn and sorghum!

Like most tall tales, those about thick corn and sorghum planting seem to "stretch" the truth. This practice was checked and found lacking in Agricultural Experiment Station studies of factors affecting silage production.

Among the silage production studies was one in 1961-62 at the Black Belt Substation, Marion Junction, and Plant Breeding Unit, Tallassee. This experiment was done to determine effects of row spacing and seeding rate on yield, ear or head content, and leafiness of Dixie 18 corn and Beefbuilder sorghum. Both varieties had already proved satisfactory for silage production. They were planted in late April or early May in row widths and seeding rates given in the table.

Test crops were fertilized at planting with 20-30 lb. per acre of nitrogen and adequate phosphorus and potassium. Both crops were sidedressed with 60-80 lb. of nitrogen. Conventional cultivation was used in 40 and 20-in. row spacings, but weeds were not a problem with 10-in. rows.

Corn was harvested when well dented and sorghum when it reached the dough stage. Regrowth of sorghum was harvested, except in 1961 at the Black Belt Substation.

Yields and Forage Quality

Neither row width nor seeding rate greatly affected sorghum yields at either location. This was true for both years at both locations. Yields of corn were also unaffected by close spacing or by using higher seeding rates. Yields in the table are for dry matter. Silage yields are about 3½ times the figure given.

Amount of grain in the sorghum forage was not related to either row width or seeding rate. Grain or head content differed more from year to year and from location to location than between seeding rates or row spacings.

Corn at conventional row width and seeding rate (40-in. rows and 8 lb. seed per acre) at Tallassee and Marion Junction had 52% and 37% ear in the dry forage. Increasing seeding rate from 8 to 16 lb. in 40-in. rows decreased ear content. When the recommended seeding rate (8 lb. per acre) was followed, ear content was about the same in 20-in. as in 40-in. rows. However, thicker spacing in the 20-in. rows resulted in about a 50% decrease in ear content. Such a reduction is accompanied by a decrease in silage quality.

DRY FORAGE YIELDS AND FORAGE COMPOSITION OF CORN AND SORGHUM FROM DIFFERENT ROW SPACINGS AND SEEDING RATES, 1961-62

Row width	Seed-ing rate	Dry forage/acre		Pct. ear or head		Pct. leaves	
		PBU[1]	BB Sub.[2]	PBU	BB Sub.	PBU	BB Sub.
In.	*Lb.*	*Tons*	*Tons*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Sorghum							
40	6	11.56	10.33	21	4	17	16
40	12	11.52	8.65	29	6	16	18
20	6	10.74	10.37	24	3	20	18
20	12	12.26	10.78	21	5	20	16
10	24	11.05	10.92	18	6	28	24
Corn							
40	8	4.06	2.80	52	37	14	18
40	16	4.58	3.15	43	24	21	21
20	8	4.06	3.81	46	40	18	15
20	16	4.89	3.88	23	26	26	22
10	32	4.28	3.32	33	26	23	19

[1] Plant Breeding Unit.
[2] Black Belt Substation.

Close row spacing and high seeding rates (left) did not increase forage yields of sorghum over conventional planting (right).

The leafiest sorghum forage resulted from the closest spacing and highest seeding rate (10-in. rows and 24 lb. seed). Leafiness was about the same from all other treatments. Corn was also leafier when planted thick, and leafiness increased as ear content decreased.

Lessons Learned

Three facts stand out in results of the silage tests:

(1) Close row spacing or high seeding rates failed to increase forage yields of Dixie 18 corn or Beefbuilder sorghum when compared to conventional row widths and seeding rates.

(2) Ear content of corn was reduced by increasing seeding rate at either row spacing. This probably reduces quality of silage.

(3) Leafiness of sorghum was not greatly affected by row width or seeding rate, but corn became leafier as seeding rate increased or row width decreased. Ear content always dropped as leafiness increased.

In addition to spacing and seeding rate, such factors as soil fertility, soil moisture, temperature, and rainfall distribution affect silage production. However, results of the tests reported indicate that broadcast or thick planting of corn or sorghum will not give greater silage yields on many Alabama soils.

Hopper-box treating of seed saved the stand of cotton in rows at left. At right is an untreated row that had to be replanted.

COTTON STANDS IMPROVED BY HOPPER-BOX FUNGICIDES

ALBERT L. SMITH, *Plant Pathologist (Coop. ARS, CRD, USDA)*

SEEDLING BLIGHTS damage cotton stands in Alabama every year and take a heavy toll in severe years. These diseases cause poor stands that cut yields and reduce profits.

But this loss is unnecessary. Applying fungicides in the hopper box with cotton seed at planting time can prevent the poor stands caused by blight. In 1960-62 studies at the Plant Breeding Unit, Tallassee, and at other locations, emergence was improved and seedling blight reduced 80 to 85%.

What Causes Blights?

Seedling blights result from invasion by soil fungi. Sore-shin, *Rhizoctonia solani,* causes most stand losses by attacking young stems near the soil line. Some fungi, particularly *Phythium* spp. and *Fusarium* spp., attack roots or lower stems or both. Other soil fungi are responsible for seed rotting. Seedling diseases become more serious when conditions are unfavorable for rapid growth. Cool, moist weather, low soil pH, poor quality seed, thrip and aphid attack, and lack of mineral nutrients are factors that interfere with seedling growth and increase seedling disease loss.

Seedling disease control resulting from use of different soil fungicides is reported in the table. Most of these materials were in dust form and had 10% technical fungicide when used alone and 10% of each when used in combination. Exceptions were XP440 dust and XP441 granules, which contained 25% Nemagon, 15% PCNB, and 7.5% dieldrin, and Nabac, which contained 1.25% hexachlorophene and 5% captan.

Good Blight Control

Results of 1961 tests showed 2% or less post-emergence seedling blight following the best fungicidal treatments as compared with 10% for check (untreated) plots. With seedling diseases more severe in 1962, there was 5-7% blight with the best fungicides used and 36.5% for the check plots. Thus, 80-85% blight control was obtained in both years with hopper-box application of fungicides.

Effective fungicides were combinations of PCNB and either captan, thiram, maneb, Dithane M45, Niagara 9102, or B720. The XP440 dust gave comparable control, but the granular formulation, XP441, was less effective. Last year, however, PCNB at the 3-lb. per bu. rate was as effective as combinations with other fungicides. Since PCNB is so specific for *Rhizoctonia* control, it should be a constituent of hopper-box fungicide formulations. Because of the other soil fungi involved, fungicide combinations are necessary for seedling disease control in a wide range of soil types.

Correct Use Important

The suggested rate for machine-delinted seed is 3 lb. of fungicide per bu. of seed. Band application of fungicide is preferred for acid-delinted seed because of poor adherence to the seed surface. This system required a dust applicator that placed a band of fungicide on top of the seed directly behind the planter at the rate of 5-8 lb. per acre.

Addition of fungicides decreased seed flow, so planters must be calibrated after seed and fungicide are well mixed. Shallow planting, 1 to 1½ in., gives best results. Deep plantings have not benefitted from hopper-box treating.

Hopper-box treating is of most value when weather is unfavorable for emergence and survival of cotton seedlings. When such conditions exist and seed vigor and germination are low, the hopper-box fungicides can save stands. Their use can be considered as stand insurance that costs about 75¢ to $1 per acre. The savings of a stand 1 year out of 10 will justify the annual per acre cost.

COTTON SEEDLINGS KILLED BY FUNGI AFTER EMERGENCE FOLLOWING DIFFERENT HOPPER-BOX TREATMENTS, PLANT BREEDING UNIT, TALLASSEE

Fungicide and rate per bushel of seed	Dead seedlings	
	1961	1962
	Pct.	*Pct.*
With reginned seed		
Check, no treatment	*10.0*	*36.5*
Captan + PCNB, 1½ lb.	----	7.5
Captan + PCNB, 2 lb.	1.8	----
Captan + PCNB, 3 lb.	1.8	5.3
Captan + Phaltan, 3 lb.	----	13.5
PCNB, 1½ lb.	----	10.1
PCNB, 3 lb.	----	6.3
Thiram-PCNB, 3 lb.	1.7	6.4
Maneb-PCNB, 3 lb.	1.1	5.2
XP440 dust, 3 lb.	1.4	----
XP441 granules, 3 lb.	3.2	----
Nabac, 2 lb.	6.8	----
Nabac, 3 lb.	6.3	----
B720-PCNB, 3 lb.	----	7.4
Dithane M45-PCNB, 1½ lb.	----	6.1
Dithane M45-PCNB, 3 lb.	----	6.3
Niagara 9102, 3 lb.	----	19.0
Niagara 9102-PCNB, 3 lb.	----	4.7
With acid-delinted seed		
Check, no treatment	----	*20.0*
Captan-PCNB, 2 lb.	----	7.9

Regulation of TRADE PRACTICES *in the* DAIRY INDUSTRY

LOWELL E. WILSON, *Asst. Agricultural Economist*

HISTORICALLY, the fluid milk industry has been troubled with harmful business practices affecting producers, distributors, and consumers.

The industry has been especially susceptible to unstable marketing conditions. Few distributing firms, nature of supply, peculiar characteristics of milk distribution, and demand for milk have contributed to an unstable market. Since milk has been considered an essential food for health and well-being of the population, federal, state, and local governments have taken steps to ensure both orderly marketing and distribution of wholesome milk products.

What Are Fair Trade Practices?

Fair trade practices is the somewhat confusing term generally used to specify business practices prohibited or controlled by state laws relating to the dairy industry. A better description would be unfair trade practices. Most trade regulations are concerned with practices of handlers, processors, distributors, and retailers of milk products. Determination of what is fair or unfair is largely a problem of ethics. Rules of fair competition, which are a part of the ethics of an industry, may become legal codes.

Unfair competition by milk dealers or distributors can eliminate milk dealers from a market. On the belief that producers, consumers, and dealers are adversely affected by unfair competition, the Alabama Legislature passed an emergency law in 1935 dealing with business practices in the dairy industry. It was reenacted in 1939, and now stands as Title 22 of the Code of Alabama.

Regulated Practices in Alabama

Dairy trade practices in Alabama's fluid milk industry are regulated by the State Milk Control Board. Although the major function of the Board is fixing the price of fluid milk in its various forms and uses, the Board also has the power to make rules and regulations of fair trade practices pertaining to business transactions among licensees.

Persons subject to provisions of the milk control law are licensed by the Board. Licensees are required to keep records of certain information as specified by the Board. The Board has authority to inspect books and records of licensees. Licensees found violating provisions of orders, rules, or regulations issued by the Board are guilty of a misdemeanor. Licenses may be suspended or revoked for continued violations.

Direct control of prices can be effective only if other transactions among licensees are regulated. State milk price control thus requires economic control of the fluid milk industry in the State by a regulatory agency. For example, a dealer could charge a customer the legal price for a quantity of milk and then give this special customer a discount, a rebate, merchandise, or some other consideration. The result of such action would make price fixing ineffective. Hence, it is necessary for the regulatory agency to spell out in a set of rules what constitutes unfair practices.

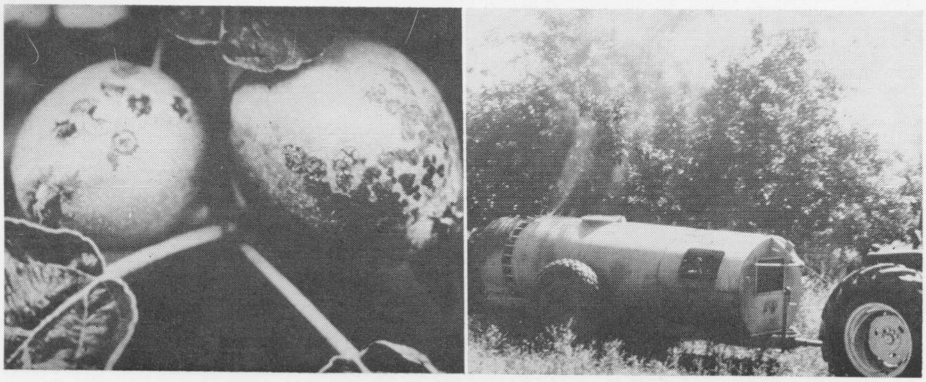
Unfair practices specifically stated in the Alabama Act are: false or misleading advertising; misrepresentation of quality of products, services, or facts with intent to defraud; any act tending to make provisions of the Act inoperative; and schemes that make a lottery of the sale of milk. Trade practices currently regulated by the Board are defined in 17 rules covering various phases of production, marketing, and merchandising of fluid milk in Alabama. In addition to practices enumerated in the Act, the current list includes rules governing delivery, purchase, and payment for producer milk; disposition of producer surplus milk; producer quotas; and display signs. Also, a number of other rules and orders of the Board relate to trade practices.

After prices for milk are fixed by the Board, it is illegal for licensees or their agents to buy or sell milk at any price other than the fixed price. Any method that has the effect of changing prices of regulated products is illegal.

A number of other Southern States with a milk control board or commission provide for trade practice regulation similar to Alabama. Some states, usually without resale price control by a state milk control agency, have enacted special dairy fair trade laws. According to these laws, regulated practices have the intent or effect of unfairly affecting the competitive structure of the dairy industry in the state. Further, these laws state that regulated practices are those that reduce competition and create monopoly conditions. Disruptive or unfair practices most commonly found in this legislation include advertising, loans, credit, and sales and repair of equipment. Illegal practices usually include price discrimination, sales below cost, rebates and discounts, gifts, joint sales (combined prices), and false claims and advertising.

Regulation of trade practices varies among states. An illegal practice in Alabama may be considered a fair practice in the dairy industry of another state. Likewise, some other trade practices considered fair in Alabama may be illegal in some states. This variation in the concept of fairness among states is brought about by the variation in development and structure of the dairy industry from one state or region to another.

Practices listed in state laws specify some of the more prevalent unfair practices found in this industry. In essence, these acts provide that persons engaged in the sale of milk are forbidden to sell milk at prices other than the established market price.



Apples severely damaged by scab, left, and air-blast spray machine in operation at Cullman, right.

APPLE DISEASE CONTROL in Alabama

U. L. DIENER, *Associate Plant Pathologist*

THE ADVENT of dwarf and semi-dwarf apples has awakened interest in apple production in Alabama.

The promise of high return per acre in 3 to 5 years has resulted in acres of new apple plantings in central and northern Alabama. However, success will require hard work, dedication to learning new practices involved in growing apples and dwarfing understock, investment in an adequate sprayer and trees, and a knowledge of pest control, especially apple diseases.

Control of apple diseases and insects in home and commercial orchards has always been a difficult problem. More effective pesticides and improved sprayers, combined with the recommended spray program and good orchard sanitation should ensure success to the orchardist. Proper timing and thorough coverage of the trees with pesticide sprays are essential to quality fruit production. Research at the Auburn University Agricultural Experiment Station has produced control of major apple diseases in Alabama.

Apple Scab

Scab is the most costly disease of apples. It is most severe during cool, rainy springs. Scab can defoliate a tree; even when partially controlled may damage all the fruit. The critical time for scab control is from the delayed dormant stage of bud development to 2-3 weeks after bloom. Cyprex has given outstanding scab control in Alabama at ¾ or 1 lb. rate and good control at ½ lb. per 100 gal. of spray. Where scab is a problem, one of the applications before bloom should be at the 1 lb. level. Cyprex is ineffective against other diseases. Captan at a 2 lb. rate also provides good scab control.

Fireblight

Fireblight has long limited apple and pear production in the Southeast. A warm (75-85°F.) rainy period during bloom favors the spread of this bacterial disease and will result in a severe blighting of blossoms, twigs, and branches. Sprays containing the antibiotic, streptomycin, gave excellent control with only 2 or 3 blossom sprays applied every 4 to 5 days starting at 20 to 30% bloom at rates of 50-100 p.p.m.

Fruit Rots and Spots

Fruit rot diseases cause extensive losses. Sanitation practices including pruning and destroying dead spurs, twigs, branches, and old neglected trees are most important to control black rot. Picking off and burying old mummied apples in the winter helps control bitter rot.

Fruit spotting diseases, such as sooty blotch and flyspeck, develop superficially on the surface of the apple and spoil the appearance and sale value of the fruit.

Captan and Phaltan at 2 lb. per 100 gal. at 10 to 14-day intervals give good control of these summer diseases. These chemicals are safe and can be applied up to the day of harvest. Phaltan, approved for apples in 1962, has given results superior to captan in Alabama and other states.

Cedar-Apple Rust

This disease is severe if there are red cedar trees adjacent to apple trees. Rust causes leaf spotting on some varieties as well as lesions on the fruit. Removal of the cedar trees within a mile of the orchard or including ferbam (¾-1 lb.) in sprays from pink through first cover will give control of cedar-apple rust.

Fruit russeting may be caused by varietal susceptibility to damage by spray materials. Golden Delicious, Grimes Golden, Gano, and Jonathan may be russeted by ferbam, glyodin, dodine (Cyprex), Bordeaux mixture, and by parathion in the early sprays. Sulfurs cause russeting when applied in the postbloom sprays. Avoid using these fungicides on these varieties. Phaltan has been reported to roughen the skin of some varieties.

Safety precautions for handling pesticides are indicated on the package. The number of days before harvest to avoid toxic residues is indicated in spray recommendations and on labels. *Read the manufacturer's labels carefully.*

Success in apple production will not be easy and will require intelligence, knowledge gained from available information and the experience of others, and constant attention to detail. These investments in time and money can yield from 1-2 thousand dollars per acre gross returns to the producer of quality fruit. Alabama apples, especially early varieties, reach the market before those from other areas are in production and bring top prices.

FUNGICIDAL CONTROL OF DISEASES OF RED DELICIOUS APPLES IN ALABAMA AS MEASURED IN PER CENT OF DISEASED FRUIT

Disease	Fungicidal treatment: Check	Captan	Cyprex Phaltan
	Per cent diseased fruit		
	Pct.	*Pct.*	*Pct.*
Apple scab			
1960	9.7	0.4	0.4
1961	97.6	17.8	7.7
1962	70.9	29.8	17.3
Av.	59.4	16.0	8.5
Sooty blotch and flyspeck			
1960	80.7	51.3	13.3
1961	96.5	0.8	3.1
1962	70.9	14.2	18.2
Av.	82.7	22.1	11.5

FARM REAL ESTATE TAXES
Trends and Comparisons

J. H. YEAGER, *Agricultural Economist*

THIRTY-FIVE cents per acre – that was the average farm real estate tax levied in Alabama in 1961.

According to USDA, Alabama in 1961 was 6th from the bottom of all states in taxes levied on farm real estate per acre. States below Alabama were West Virginia, Montana, Wyoming, New Mexico, and Nevada. Farm real estate value in each of these states was considerably below the Alabama average value of $94 per acre.

Other States

New Jersey, with an average tax of $10.16 per acre, was highest of all states. Massachusetts, Connecticut, and Rhode Island had per acre farm real estate tax levies above $5. In the Corn Belt and Lake States, farm real estate taxes averaged about $2.50 per acre. Illinois was highest in these groups with $4.18 per acre in 1961. In all other states except Florida and California, taxes levied on farm real estate were less than $1.50 per acre. Average for Florida was $1.73 and California $4.35 per acre. Differences among states reflect variation in value of farm land and improvements and differences in emphasis on the property tax in local and state financing.

The average tax per acre on farm real estate in 1961 for the 13 Southern States was 75¢. Thus, a farmer with 120 acres paid $90 in farm real estate taxes based on the average rate for Southern States. This ignores any exemptions or exclusions in property taxes. An Alabama farmer with 120 acres paid in 1961, an average of $42 in property taxes on farm real estate.

Trends

Since 1940, farm real estate taxes per acre in every state have increased to a level three to four times that of 1940.

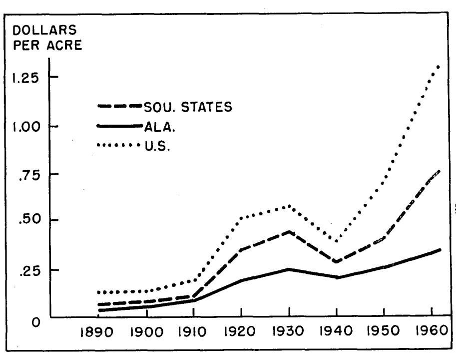


FIG. 1. Comparisons of taxes levied on farm real estate in dollars per acre are given in the above chart.

In 1940, the Alabama average was 20¢ per acre as compared with 28¢ for the 13 Southern States and 39¢ for the U.S. average. The 1961 taxes per acre were 35¢, 75¢, and $1.29 for Alabama, Southern States, and U.S. respectively.

From 1890 to 1910 property taxes per acre were stable, Figure 1. They increased from 1910 to 1930 and declined from 1930 to 1940. Since 1940, the rate of increase was greater for the Southern States and U.S. than for Alabama. From 1940 to 1961 taxes levied on farm real estate increased 75% in Alabama, 167% in the 13 Southern States, and 230% in the U.S.

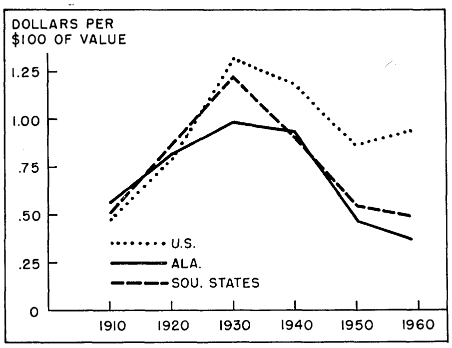


FIG. 2. Comparisons of taxes levied on farm real estate in dollars per $100 value are given in the above chart.

Changes in farm real estate taxes may be considered relative to the value of property. Accordingly, taxes have declined since 1930, Figure 2. Farm real estate values have increased more than taxes on farm real estate. Again, Alabama was low relative to other states in farm real estate taxes per $100 property value. In 1959, farm real estate taxes averaged 37¢ per $100 value in Alabama compared with 49¢ for the Southern States and 93¢ for the U.S.

Relative to Net Income

Net income is generally accepted as an indicator of ability to pay taxes. Based on USDA figures, Alabama farmers paid 2% of their net income in farm real estate taxes in 1961. The same was true for North Carolina. However, in all other states the percentage was higher. As an average for the U.S., farm real estate tax levies took 8.6% of net farm income in 1961.

Problems

There are problems in assessments and administration of the general property tax. One problem is the tendency for higher valued properties to be assessed at a smaller fraction of sales value than lower valued properties. This is known as "regressiveness." Based on a 1956 USDA study, regressiveness in Alabama was higher than average for the Southeast or the U.S.

Another problem is in assessment of rural property that is on the urban fringe. There are many other problems. Problems exist with all forms of taxes – especially from the taxpayer's standpoint. No doubt you will be reminded of some problems when completing your income tax forms.

NEMATODES vs. Resistant Varieties, Rotations, Fumigation

N. A. MINTON, *Nematologist*
C. A. BROGDEN, *Superintendent, Wiregrass Substation*

THE USE of nematode-resistant varieties, crop rotations, and soil fumigation is the most successful means of controlling nematodes.

Crop rotations are beneficial in controlling nematodes only when one or more plants in the cropping sequence are such that they prevent the reproduction of nematodes. A resistant plant may also function in this way or it may be tolerant to the nematodes present. In contrast, the aim of fumigation is to reduce the nematode population low enough for susceptible plants to get established. A combination of two or more of these practices is often more effective than either alone.

Since there are many species of plant parasitic nematodes having different host ranges, the effectiveness of rotations and nematode-resistant varieties is limited by the particular nematodes present and the plants involved. Even within the common root-knot nematodes, there are at least a dozen known species each differing in its pathogenicity on plants.

Field Experiments

Studies were begun in 1962 at the Wiregrass Substation at Headland to determine the effect of nematode-resistant varieties, crop rotations, and soil fumigation on certain nematodes and yields of certain crops. All plots on which the experiment is being conducted were planted to corn in 1961. The soil in these plots contained the following nematode species: root-knot; meadow; ring; stubby root; and dagger. Some plots were fumigated with 2½ gal. per acre of 85% ethylene dibromide prior to planting. Crops included in the study are: Early Runner peanuts; the root-knot-resistant Auburn 56 cotton, and Dixie 18 corn.

First-Year Results

First year's results of non-fumigated plots indicated differences in nematode reproduction under different crops, Figure 1. In November at the end of the growing season, a high population of root-knot larvae was present in peanut plots. Populations were lower in cotton and corn plots with corn plots having the lowest. Root-knot larvae were slightly more numerous in cotton plots than in corn plots and in November than in March. The meadow nematodes had increased in numbers since March under cotton and corn but decreased under peanuts. The ring nematode population increased in numbers slightly under peanuts and cotton. Stubby root nematodes decreased under peanuts, but increased under cotton and corn, with the larger increase occurring under cotton. The dagger nematode population remained low under all crops.

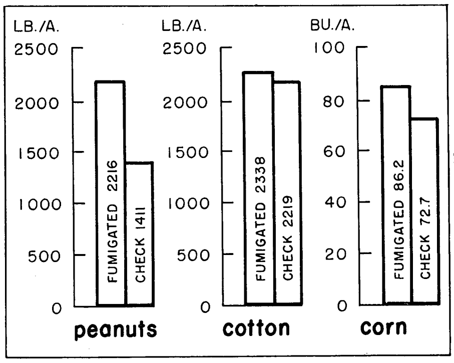


FIG. 2. Given above are yields of peanuts, cotton, and corn grown in fumigated and non-fumigated plots.

These population data represent the effects of cotton, corn, and peanuts on the reproduction of the different nematodes during one growing season. Equally important is the relative number of nematodes that survive in the soil during winter and are present to attack the succeeding crops.

Soil Fumigation

Soil fumigation increased peanut yields about 50% over yields in non-fumigated plots, Figure 2. Increases in cotton and corn yields attributed to fumigation were slight. These data are for three crops following corn. The effects of fumigation may have been different if cotton or peanuts had been the preceding crop because numbers of parasitic nematodes present would have been higher.

Much of the difference in response of crop yields to fumigation apparently came from differences in susceptibility to root-knot nematodes. The high root-knot larval count in November for peanuts, low counts for cotton and corn, severe galling of peanut roots, and negligible amount of galling of cotton and corn were indicative of the severity of attack on the crops. Even though root-knot nematodes in this experiment appeared to have caused major damage, certain of the other nematode species also caused damage as evidenced by the presence of root lesions, stubby roots, and dead root tips.

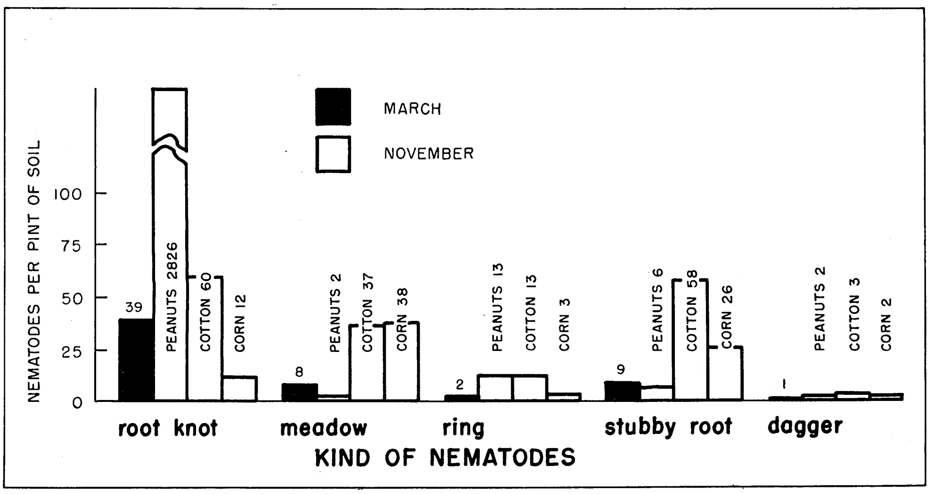


FIG. 1. Numbers of nematodes per pint of soil recovered from non-fumigated plots in 1962 are given above.

Index to Articles Published in

HIGHLIGHTS *of* Agricultural Research

1962

THE FOUR 1962 issues of HIGHLIGHTS OF AGRICULTURAL RESEARCH (Volume 9) carried 55 articles reporting research results in 15 major areas of investigation. For the benefit of HIGHLIGHTS readers, articles published in 1962 are listed below according to subject. Indexes for the previous years are listed in the spring issues of 1959, 1960, and 1961. Readers may wish to up-date their files. Extra copies of all 1962 issues are available to those who are missing copies and wish to complete their files. Write Editor, Auburn University Agricultural Experiment Station, Auburn, Ala., for replacement copies, specifying the issues needed.

Land Use Changing in Alabama

HOWARD A. CLONTS and J. H. YEAGER
Department of Agricultural Economics

MOST LIKELY some fields on your farm that were once planted to cotton or other row crops are no longer used for this purpose. Such shifts are typical of tremendous changes in use of Alabama land during the past 10 years.

Land is a major part of the business on almost all farms. Normally, 50-60% of total farm investment is in land. Use of this land changes with farming adjustments and as a result of other factors, such as government programs, off-farm employment, and nearness to cities.

Land in Farms

In 1950, Alabama farms contained 20.8 million acres, or 63.9% of the State's total land area. This dropped to 16.5 million acres in 1960, or 50.6% of total area. Thus, land in farms was reduced 21% from 1950 to 1960.

Part of the change resulted from a new Bureau of the Census definition of a farm that was in effect in 1960. Places of 10 acres or more were counted as farms if sales of agricultural products for the year were $50 or more. If less than 10 acres, sales had to be at least $250. In 1950, a place of 3 acres or larger was a farm if annual value of farm products produced was $150. Places of less than 3 acres needed sales of $150 or more to be farms.

Cropland Acreage

One of the most significant changes from 1950 to 1960 was in cropland. There was a decrease of almost 2 million acres in cropland harvested. About 200,000 acres per year changed from cropland harvested to other uses.

About 1.5 million acres of cropland in Alabama are used as "cropland pastured." This changed little from 1950 to 1960.

Cropland not harvested and not pastured decreased from 1,393,726 acres in 1950 to 899,573 in 1960. Total cropland declined 31% during the 10 years.

The biggest decrease in cropland, almost 50%, occurred in the Piedmont Area. Except for the Tennessee Valley, Lower Coastal Plains, and Gulf Coast, other areas registered 30-40% decreases in cropland.

Largest decreases in cropland harvested were in Coosa, Clay, and Cleburne counties, see map. Only Baldwin and Mobile counties showed increases.

Acreage in Pasture and Woodland

There was a 31% increase in land in pasture, other than cropland and woodland, from 1950 to 1960. This increase of 530,000 acres, chiefly in open permanent pasture, is associated with increasing livestock numbers in the State. Greatest increases in pasture were in the Gulf Coast, Lower Coastal Plains, and Tennessee Valley areas.

Total land pastured decreased about 90,000 acres from 1950 to 1960. This was primarily a decline in woods pastured. Cropland pastured also dropped. The decline in woods and cropland pastured was more than enough to offset the increase in open permanent pasture. About 42% of total land in farms was pastured in 1960.

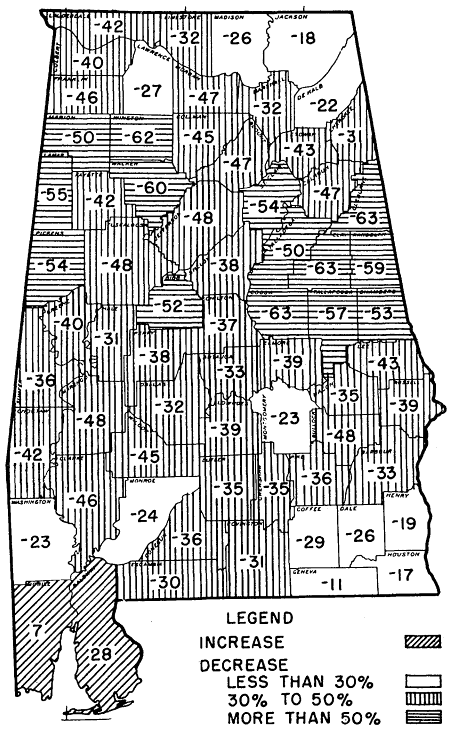
According to the Census of Agriculture, total woodland on farms decreased almost 2 million acres, or 20%, from 1950 to 1960. Woodland pastured declined 432,000 acres, and woodland not pastured, 1,532,000. Of total woodland, 38% was pastured in 1950 and 42% in 1960.

Only the Upper Coastal Plains and Black Belt areas had increases in woodland during the 10 years. All others had decreases.

Other land in farms that declined from 1950 to 1960 included that used for houses, lots, gardens, roads, and wasteland. This was directly associated with reduction in farm population and tenants.

Overall changes in land use from 1950 to 1960 are summarized below:

	Million acres 1950	1960	Change
Total cropland	8.7	6.0	—2.7
Open permanent pasture	1.7	2.2	+ .5
Woodland on farms	9.7	7.8	—1.9
Other	.7	.5	— .2
TOTAL	20.8	16.5	—4.3



Percentage change in cropland harvested is shown on the map for each Alabama county.

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