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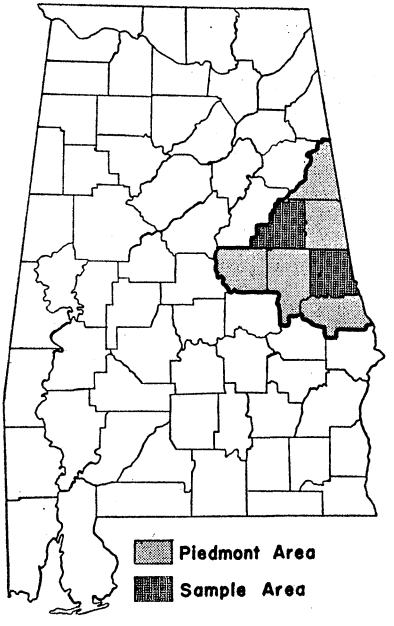
COTTON PRODUCTION PRACTICES *in the* PIEDMONT AREA *of Alabama*



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CONTENTS

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COTTON PRODUCTION PRACTICES *in the* PIEDMONT AREA *of Alabama* *

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FARMERS OF THE Piedmont Area of Alabama long have attempted to provide a livelihood for their families mainly by producing cotton. Climate and rainfall in this area are favorable for production of cotton, and the soils of the area are inherently strong. The topography, however, is variable. Usually it is sufficiently rolling to present serious erosion problems when row cropping is practiced.

During the last two decades, the acreage of cotton harvested in the Piedmont Area of Alabama has been reduced almost 73 per cent, although many farmers in the area continue to produce cotton. About 65 per cent reported that they planted some cotton in 1944.[1] Yield per acre increased approximately 100 pounds between 1928 and 1947, but because of the tremendous reduction in acreage, total production of cotton decreased more than 50 per cent during this 20-year period, Appendix Table 1.

Major problems that face cotton producers in the Piedmont Area of Alabama are high production costs, high labor requirements for cotton, maintenance of adequate farm incomes, and maintenance and improvement of soil resources. Cotton producers in this area, therefore, should consider all possible means of increasing their cotton yields and production efficiency, and of lowering their costs of production. The addition or expansion of enterprises to supplement cotton and/or shifts to alternative

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[1] "United States Census of Agriculture, 1945, Alabama—Statistics for Counties," Vol. I, Part 21, Bureau of the Census: County Tables I and II, pp. 18-78.

enterprises that may completely exclude cotton from individual farm programs may be necessary on some farms.

In view of these considerations and the technological changes taking place in the Piedmont Area, a study of cotton production practices in the area was started in the summer of 1948.[2] Two counties, Clay and Cleburne, were selected as representative of the Piedmont Area, and a field survey was made in these counties (cover). Major objectives of the study were:

(1) To obtain current information on cotton production practices,

(2) To determine variations in current production practices with respect to type of power and equipment used, by size of cotton enterprises,

(3) To interpret and evaluate the economic significance of current cotton production practices and techniques, and

(4) To compare current cotton production practices with Experiment Station recommendations and to emphasize points where improvement is needed.

This report describes current practices used in producing cotton in the Piedmont Area, indicates variations in these practices, and compares present practices with Experiment Station recommendations. Unless otherwise stated, all recommendations shown in this report were the same in 1951 as in 1947.

An analysis of farm records obtained by personal interview with 102 farmers who produced cotton in the Piedmont Area in 1947 is the basis for the description of current practices presented in this report. Approximately the same number of farms with small, medium, and large cotton enterprises were selected as representative of cotton enterprises of the area. The range in acreage of cotton for each of the three groups was: small, less than 10 acres; medium, 10 to 29 acres; and large, 30 or more acres per farm, Appendix Table 2. Approximately three out of five cotton producers in the Piedmont Area grew less than 10 acres of cotton per farm in 1944, Table 1. Farms with these small cotton enterprises accounted for 28 per cent of the area's total cotton acreage and 28 per cent of its total production. Farmers who grew 30 or more acres of cotton per farm made up only 4 per cent of the total cotton producers in the area. However,

[2] This study is a part of a larger over-all study that includes all of the major cotton-producing areas of Alabama. These areas include — Limestone Valleys, Sand Mountain, Upper Coastal Plain, Piedmont, Black Belt, and Lower Coastal Plain.

TABLE 1. DISTRIBUTION OF FARMS GROWING COTTON, ACREAGE HARVESTED, BALES PRODUCED, AND PRODUCTION PER ACRE, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1944[1]

Size of cotton enterprise (Acres in cotton)	Farms reporting cotton		Acreage harvested		Bales produced		Lint cotton produced per acre
	Total number	Per cent of total	Total number	Per cent of total	Total number	Per cent of total	
	No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*Pounds*
Small (Less than 10 acres)	5,440	59	27,475	28	17,221	28	300
Medium (10-29 acres)	3,342	37	46,629	48	28,138	46	288
Large (30 acres or more)	406	4	23,164	24	15,448	26	319
TOTAL (All farms)	9,188	100	97,268	100	60,807	100	299

[1] "Cotton Farms Classified by Acreage Harvested." (A special report prepared by the Bureau of the Census) National Cotton Council of America. Table 2, pp. 28-29. 1945.

these farms accounted for 24 per cent of the area's total acreage of cotton, and 26 per cent of the total production.

The average yield of lint cotton per acre for the three size groups studied indicated that in 1947 farms with large cotton enterprises had highest yields and those with medium-sized cotton enterprises had lowest yields, Table 1. There was a difference of 31 pounds of lint cotton per acre between the average yields for these two groups.

DESCRIPTION *of* SAMPLE FARMS

Some of the more important characteristics of sample farms that should be examined before evaluating cotton production practices include cropland organization and use, tenure of operators, labor organization, livestock organization, and degree of farm mechanization in existence, Table 2.

Farms with small cotton enterprises were small in terms of both cotton acreage and total farm acreage in 1947. These farms averaged 100 acres in size, but had only 28 acres in cropland. Approximately 6 of the 28 acres of cropland were planted in cotton.

The medium-sized cotton enterprise group had an average of 248 acres per farm, with 51 acres of cropland and 15 acres of cotton.

Farms with large cotton enterprises were relatively large units and relied heavily on share cropper and/or tenant labor. These farms averaged 477 acres in size, and had approximately one-

TABLE 2. LAND USE, AND CROPLAND, LIVESTOCK, AND FARM LABOR ORGANIZATION PER FARM, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Item	Size of cotton enterprise		
	Small	Medium	Large
	Number	*Number*	*Number*
Number of farms	32	35	35
	Acres	*Acres*	*Acres*
Land use:			
All land in farms	100.6	248.5	476.8
Owned	76.4	192.5	409.5
Rented in	24.2	56.0	67.3
Total cropland	28.4	51.1	164.9
Permanent pasture	7.8	49.0	75.8
Cropland organization:			
Cotton	5.7	14.9	57.5
Corn	12.9	24.0	70.6
Small grain	.9	1.7	8.6
Lespedeza hay	.7	.0	3.5
Truck crops	.3	1.9	2.1
Other crops	8.0	9.5	22.8
	Number	*Number*	*Number*
Livestock organization:[1]			
Workstock	1.6	2.5	5.7
Milk cows	1.8	1.9	3.7
Other cattle	1.8	5.9	8.5
Brood sows	.3	1.1	1.9
Other hogs	2.1	4.3	6.3
Hens and pullets	34.2	38.1	56.1
Tractors per farm, *av. no.*	.1	.1	.5
Labor organization:			
Families:			
Operator	.9	.9	.8
Cropper	.1	.4	2.8
Other tenant	.0	.0	.0
Wage hand	.0	.0	.1
Workers:			
Operator	1.7	2.5	.5
Cropper	.4	1.2	9.8
Other tenant	.0	.0	.0
Wage hand	.0	.0	.2

[1] Operator's livestock only.

third of this acreage in cropland. Cotton occupied 58 acres, or 35 per cent of the cropland.

The size and shape of fields, topography of land, types of soil, and prevalence of stones and other obstacles in many cultivated fields make the use of modern farm machinery difficult in this area. In 1947 tractors were reported on 6 per cent of the farms with small cotton enterprises, on 11 per cent of those with medium-sized cotton enterprises, and on 51 per cent of those with large cotton enterprises. Tractors were used only for break-

ing and preparing land for planting. No farmers reported using tractor power alone in producing cotton in 1947.

Most farms with small- and medium-sized cotton enterprises were family farms and in 1947 were operated almost entirely with animal power and with family labor. Farms with large cotton enterprises depended heavily on share cropper labor, and in many cases, made extensive use of tractor power in land preparation. On farms with small- and medium-sized cotton enterprises, corn was a relatively more important crop than on farms with large cotton enterprises.

Major livestock enterprises handled by operators increased in size as size of cotton enterprises increased. In no group, however, was livestock of major importance. Cotton was the principal enterprise for all groups studied.

More than three-fourths of all land in farms was owned by operators in all three groups studied in 1947. Generally, farmers on farms with large cotton enterprises owned a larger percentage of the land they operated than did farmers on farms with small and medium-sized cotton enterprises. Farmers with large cotton enterprises owned 86 per cent of the land they operated, farmers with medium-sized cotton enterprises owned 77 per cent, and farms with small cotton enterprises owned 76 per cent. Operators were not necessarily "owner operators." The proportion of farms that was operated without share cropper or tenant labor averaged 84 per cent for farms with small cotton enterprises, and 58 per cent for farms with medium-sized cotton enterprises. Only 3 per cent of the farms with large cotton enterprises were operated without share cropper or tenant labor, while three out of five were operated with share croppers alone. On the remainder of the farms, share croppers and tenants alone or various combinations of operators, share croppers, and tenants supplied the labor for cotton production.

COTTON PRODUCTION PRACTICES

Based on the results of many years of research work and of field testing and observation, the Alabama Agricultural Experiment Station has developed a series of recommendations for producing cotton both economically and efficiently. Although some recommendations are specific and others are general, most of them must be adapted to individual farms, to individual farm resources, and to the capabilities of individual farm operators.

To facilitate an understanding and appraisal of the economic

significance of current cotton practices and techniques, both present and recommended practices are given in this report for comparison and for determining needed practice adjustments. Present practices are based on the crop year 1947. Recommended practices as shown in this report, unless otherwise stated, were the same in 1951 as in 1947. Present and recommended practices are discussed by major operations, including land preparation, seed and seeding rate, planting and spacing, fertilization, cultivation and weed control, insect control, and harvesting.

Land Preparation

Recommendations. The operations recommended for land preparation are those that will result in a good seedbed, good weed and grass control, conservation of moisture, and a good stand of cotton.

On farms operated with workstock, land should be prepared by cutting stalks with a rolling stalk cutter or a disk harrow, and broken with a moldboard or a disk plow to a depth of 6 to 8 inches. Planting beds should then be laid off with a middlebuster early enough to allow them to be settled by rain. Just prior to planting, beds should be cultivated with a section harrow or drag.

On tractor farms, crop residues may be leveled by use of a rolling stalk cutter or a disk harrow. After cutting stalks, the land should be broken with a moldboard or disk plow to a depth of 6 to 8 inches, and early enough to allow the ground to be settled by rain before planting begins. Flat-broken land should be harrowed with a disk harrow just prior to planting.

When a cover crop precedes cotton, care should be taken in timing the planting of cotton with respect to the time of turning the cover crop. Since germination of the seed may be seriously impaired or destroyed by coming into contact with fermenting material, cover crops should be turned 2 weeks or longer before planting to allow for completion of the fermentation process. An alternative is to plant immediately after turning the cover crop in order that cottonseed may germinate before fermentation begins.

Present Practices. On farms operated with workstock as the principal source of power in 1947, the usual procedure in preparing land was to cut stalks with a one- or two-row stalk cutter, followed by bedding with a moldboard plow on farms with small and medium-sized cotton enterprises, and by flat-breaking with

a moldboard plow on farms with large cotton enterprises. Flat-broken land was harrowed one time over with a section harrow and rows were laid off with a Georgia stock.

On farms using both workstock and tractor power in 1947, the usual procedure for preparing land was to cut stalks with a two-row stalk cutter or a disk harrow, and to flat-break with a disk harrow or a four-disk plow. Flat-broken land was cultivated one time over with either a disk or a section harrow. Except for the use of the four-disk plow, and on farms with large enterprises, these operations were performed with workstock power. Laying off rows was usually accomplished with workstock power using a Georgia stock, Appendix Tables 5, 6, and 7.

In most cases, the equipment used in preparing land in 1947 was the type recommended for such operations. Because of the prevailing types of power and equipment used in preparing land, much of the cotton land in this area probably was not plowed the recommended depth during preparation. Also, in many instances, the time that elapsed between land preparation and seeding was not long enough to allow proper settlement of seedbeds. Either or both of these practices may seriously affect the yield of cotton.

Seed, Seeding Rate, Planting, *and* Spacing

Recommendations. A good variety of cotton should be a high yielder, and should have a good lint turnout, a staple length that is in demand, good strength, and character. A relatively large boll facilitates hand picking and an early-maturing variety is desirable in the presence of insect infestation. The varieties that were recommended for this area in 1947 that have most of these characteristics were Stoneville, Coker 100-Wilt, Deltapine 15, White Gold, and Stonewilt. Since 1947, Empire and Plains have been added to the list of recommended varieties for this area. To insure a reliable source of seed, farmers should buy seed of certified quality or better. The use of home-grown seed usually involves a greater possibility of contamination and mixing. Farmers, however, should not hesitate to save home-grown seed of high quality where proper precautions can be taken to preserve quality.

The recommended planting rate for the Piedmont Area is three-fourths to one bushel of non-delinted cottonseed per acre. The planting rate for mechanically delinted seed is one-half to one bushel per acre. When using acid-delinted seed, approximately

one-half bushel per acre is recommended. All cotton planting seed should be treated, but whether planting seed is delinted or non-delinted is optional. Spacing recommendations are 12 to 18 inches between hills regardless of whether spaced by hill dropping or by hand chopping. A row width of from 36 to 48 inches is recommended. Cotton may be planted solid in the drill or hill dropped with one- or two-row planters. No yield difference has been observed between hill-dropped cotton and cotton planted solid in the drill, if uniform stands have been obtained in both plantings. Cotton should be planted between April 1 and 15 in the Piedmont.

Present Practices. Data on seeding practices in 1947 are given in Table 3. Farmers with large cotton enterprises used purchased seed to plant 40 per cent of their acreage, while those with small and medium-sized enterprises used purchased seed for only 24 per cent of their acreage. A much higher percentage of the acreage planted on farms with large cotton enterprises was planted with delinted seed. Three-fourths of the acreage on all farms was planted with seed that was treated. Farmers with medium-sized cotton enterprises planted the smallest proportion of acreage with treated seed, while those with large cotton enterprises planted the largest proportion.

Farmers with small cotton enterprises planted approximately 70 per cent of their acreage solid in the drill in 1947, while those with large cotton enterprises hill dropped more than half the acreage they planted regardless of whether delinted or non-delinted seed was used. Farmers with medium-sized cotton enterprises usually planted delinted seed by hill dropping and non-delinted seed solid in the drill. Farmers in all size groups usually planted more seed per acre when planting solid in the drill than when hill dropped.

The most popular variety of cotton planted in 1947 was Stoneville. Other important varieties were Deltapine 14 and Deltapine 11. Mixed seed was important on farms with large cotton enterprises, where 42 per cent of the purchased seed and 18 per cent of the home-grown seed planted were of this type. Most of the home-grown seed was 2 years or more from the breeder; the major portion of purchased seed was direct from the breeder, though farmers with large cotton enterprises bought much of their seed 1 year from the breeder, Appendix Table 3.

Approximately 50 per cent of the cotton in the Piedmont Area was planted solid in the drill in 1947, and all of it was hand chop-

TABLE 3. SOURCE, TREATMENT, AND METHOD AND RATE OF PLANTING COTTONSEED, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	32	35	35
Cotton planted	*Acres*	183	521	2,012
Purchased seed:				
Proportion of farmers using	*Per cent*	34	31	57
Proportion of acreage planted	*Per cent*	24	24	40
Proportion of purchased seed:				
Delinted	*Per cent*	41	25	83
Treated	*Per cent*	75	50	98
Proportion of home-grown seed:				
Delinted	*Per cent*	13	6	45
Treated	*Per cent*	50	24	81
Delinted seed:				
Proportion of farmers using	*Per cent*	25	29	63
Proportion of acreage planted	*Per cent*	21	25	63
Proportion of acreage planted with delinted seed:				
Solid in the drill	*Per cent*	76	47	40
Hill dropped	*Per cent*	24	53	60
Proportion of acreage planted with non-delinted seed:				
Solid in the drill	*Per cent*	65	72	44
Hill dropped	*Per cent*	35	28	56
Pounds of seed per acre:				
Delinted:				
Solid in the drill	*Pounds*	26	45	25
Hill dropped	*Pounds*	14	24	26
Non-delinted seed:				
Solid in the drill	*Pounds*	36	37	33
Hill dropped	*Pounds*	20	26	27

ped to a stand. Most of the cotton planted solid in the drill was planted in 36- to 38-inch rows and spaced 9 to 11 inches in the row. Hill-dropped cotton was planted in 36- to 44-inch rows with 12- to 18-inch spacing between hills in the rows. Workstock power and workstock equipment were usually used for all seeding operations in this area.

Farmers in the Piedmont Area were usually within the range of recommendations for planting, rate of seeding, and variety in 1947. They were using narrower spacing than is recommended. As a whole, farmers were planting during the last week in April and the first week in May, which was later than the area recommendation of April 1 through 15. Late planting may affect attaining a stand, and may particularly affect yields when insect infestation is a problem.

Fertilization

Recommendations. In the Piedmont Area, it was recommended in 1947 that cotton be fertilized with 36 to 48 pounds of nitrogen, 48 to 64 pounds of phosphoric acid, and 24 to 48 pounds of potash per acre at planting time. In 1947, it was recommended that enough nitrogen be applied as a side-dressing to bring the total nitrogen application up to recommended rates. In 1951, cotton fertilizer recommendations were the same as in 1947 except that heavier applications of nitrogen were recommended in 1951. Where tractors are used, fertilizer may be applied with a fertilizer attachment to the planter. On workstock farms, either a distributor or a planter attachment may be used. When applying fertilizer at planting time, it should be placed 2 inches below and to the side of the seed. Side-dressing may be applied with fertilizer attachments on cultivating equipment or with a distributor at the time of the first or second cultivation after chopping.

Present Practices. All of the farmers interviewed used some type of commercial fertilizer in 1947. The average rate per acre when only complete fertilizer was used varied between 378 pounds on farms with small cotton enterprises and 406 pounds on farms with large cotton enterprises, Table 4. The average rate per acre for complete fertilizer where both complete fertilizer and side-dressing were used varied from about 388 pounds on farms with small- and medium-sized cotton enterprises to 460 pounds on farms with large cotton enterprises; the rate for side-dressing varied from 120 pounds per acre on farms with small cotton enterprises to 125 pounds on farms with large cotton enterprises. Seventy per cent of the cotton acreage was covered with a complete fertilizer and side-dressing; the remainder received only a complete fertilizer. The most popular analysis used on farms with large cotton enterprises was 4-10-7; about 44 per cent of the cotton acreage on the farms studied was fertilized with 4-10-7. On farms with small- and medium-sized cotton enterprises, 6-8-4 was the most popular analysis. This is reflected by the fact that only 51 per cent of the cotton acreage on farms with small cotton enterprises received a side-dressing, while 71 per cent of the acreage on farms with large-sized enterprises was side-dressed.

Workstock power and one-row distributors were used in fertilizing cotton on almost 100 per cent of the farms in this area in 1947.

The amount of plant food in the fertilizer used in 1947 ranged from 29 to 35 pounds per acre of N, from 32 to 42 pounds per acre of P_2O_5, and from 19 to 26 pounds of K_2O. The approximate average per acre was: 32 pounds of N; 40 pounds of P_2O_5; and 24 pounds of K_2O, Table 4.

The over-all average rate of fertilizer application indicates that in 1947 the Piedmont farmers interviewed were using less than the recommended rate at planting time. There was a relation-

TABLE 4. FERTILIZER PRACTICES, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	32	35	35
Cotton planted	*Acres*	183	521	2,012
Proportion using complete fertilizer only:				
Farms[1]	*Per cent*	68	37	30
Acreage	*Per cent*	49	26	29
Proportion using complete fertilizer and side-dressing:				
Farms[1]	*Per cent*	52	71	74
Acreage	*Per cent*	51	74	71
Rate of application where used:				
Complete only	*Pounds*	378	400	406
Complete and side-dressing:				
Complete	*Pounds*	388	387	460
Side-dressing	*Pounds*	120	123	125
Rate of application per planted acre:				
Complete	*Pounds*	379	389	444
Side-dressing	*Pounds*	56	90	88
Analysis of complete fertilizer:				
Proportion of acreage receiving:[2]				
6-8-4	*Per cent*	71	46	35
4-10-7	*Per cent*	31	35	47
4-10-4	*Per cent*	2	12	18
Other	*Per cent*	7	7	1
Analysis of side-dressing:				
Proportion of acreage receiving:				
Sodium nitrate	*Per cent*	51	70	70
Ammonia	*Per cent*	0	0	2
Summary of fertilizer elements:				
N per fertilized acre of cotton	*Pounds*	29	35	34
P_2O_5 per fertilized acre of cotton	*Pounds*	32	35	42
K_2O per fertilized acre of cotton	*Pounds*	19	21	26

[1] Farm totals add to more than 100 per cent because some farmers applied complete fertilizer and side-dressing to part of their acreage and complete fertilizer only to the remaining acreage.

[2] Summed percentages fail to agree with sum of proportions of acreages using complete fertilizer only and complete fertilizer with side-dressing, because some farmers used two complete fertilizers on the same acreage.

ship between the size of the cotton enterprise and the rate of fertilization. Farmers with small cotton enterprises used the lowest rate, while those with large enterprises used the highest rate.

Many farmers in the Piedmont Area of Alabama need to increase their cotton fertilization rates to the amounts recommended. Farmers can increase yields by using more fertilizer, and possibly can reduce labor requirements by using fertilizer attachments on planting and cultivating equipment for applying fertilizers.

Cultivation *and* Weed Control

Recommendations. Cultivation should begin just before cotton comes up or just after cotton is up to a good stand. Cotton should be cultivated to a depth of 1 to 3 inches with one- or two-row cultivators with sweeps. Cultivation should be continued throughout the plant's normal growing season as often as is necessary to control weeds and grass. Cotton should be chopped when it is up to a stand and after the permanent leaves are present. Chopping should allow a spacing of 12 to 18 inches between hills with two to three stalks per hill. Hoeing may be necessary if grass and weeds cannot be controlled by cultivation.

Present Practices. In 1947, cultivation was accomplished on more than 70 per cent of the acreage with half-row equipment. One-row cultivators were used on some farms that had large cotton enterprises. On the average, cotton was cultivated about five times, was chopped once, and was hoed twice.

As a whole, farmers in 1947 were using recommended types of cultivating equipment, Appendix Table 7. Farmers may be able to reduce materially both labor requirements and costs of production by using one-row cultivating equipment instead of using combinations of half-row equipment with other sizes. Earlier cultivations should reduce the number of times that cotton needs to be hoed.

Insect Control

Recommendations. The following materials were recommended for general use in the control of cotton insects in 1951:

Insecticide	Lb. per acre	Application
3 per cent gamma BHC-5 per cent DDT, or	10 — 15	When 25 per cent infestation at 5-day intervals until top bolls are mature; during migration at 4-day intervals.
20 per cent toxaphene, or	10 — 15	Same as above.
Calcium arsenate alternated with 3 per cent gamma BHC-5 per cent DDT, or	7 — 10 10 — 15	Same as above. Same as above.
Calcium arsenate alternated with calcium arsenate containing 2 per cent nicotine	7 — 10 10 — 15	Same as above. Same as above.

With added precautions these materials may be used: (1) A mixture of 2.5 per cent aldrin – 5 per cent DDT, or (2) 1.5 per cent dieldrin – 5 per cent DDT. These materials have not been tested as long as have other cotton poisons, but they have given good results for 2 years in Alabama tests. They are recommended only for tractor or airplane spraying.

For boll worm control, apply 10 per cent DDT or 20 per cent toxaphene at the rate of 15 pounds per acre. If a good boll weevil control program is followed, boll worms are not likely to become numerous.

Except where stated, cotton poisons may be applied as a dust or as a spray. Dust may be put on with hand, mule-drawn, tractor, or airplane equipment. Dust when the air is still and when the cotton plants are dry.

Spray may be applied by tractor or airplane, but row spacing must be taken into consideration where tractor poisoning equipment is used, since this equipment is designed for specific row spacings. The amount of diluted spray used to cover an acre may vary from 2 to 10 gallons. The correct amount of poison to use per acre for each application (regardless of the volume of spray) is as follows:

⅓ to ½ pound of gamma isomer BHC plus ½ or more pounds of DDT.

2 to 2½ pounds of technical toxaphene.

1/4 pound aldrin plus ½ pound of DDT.

1/5 pound dieldrin plus ½ pound of DDT.

Calcium arsenate is effective only as a dust.

Insecticides should be applied while the plants are setting and maturing the crop, and when the number of squares punctured indicates 25 per cent or more infestation. After starting,

poisoning should be repeated at 5-day intervals until the top bolls are mature. During a normal year, six to seven effective applications should be enough. However, during a season of heavy infestation and/or frequent rainfall, more applications may be needed.

The recommendation for boll weevil control in 1947 was calcium arsenate at a rate of 8 to 10 pounds per acre. The time and frequency of application recommended was the same as in 1951. The difference between the 1947 and 1951 cotton poisoning recommendations was due to the fact that in 1947 the newer insecticides that were recommended in 1951 had not undergone the extensive testing necessary to obtain conclusive evidence of their effectiveness.

Present Practices. In the Piedmont Area, about 85 per cent of the cotton acreage received one or more applications of poison in 1947; 23 per cent received five or more applications. The rate per application varied between 5 and 7 pounds of calcium arsenate per acre. Approximately 27 per cent of the farmers interviewed had poisoned their cotton in the last 10 years.

Method *and* Time *of* Harvesting

Recommendations. If cotton is hand picked, it should be picked immediately after the bolls are open and dry. Precautions should be taken to prevent picking wet or green cotton. Picking should be as clean as possible. Usually it will require three pickings during the harvesting season. Harvesting dates in the Piedmont Area are usually from about September 1 to November 15.

Present Practices. All of the cotton harvested on the farms surveyed in 1947 was hand picked. Farmers averaged picking their cotton fields three times in 1947. Approximately 80 per cent of the cotton was harvested with family labor. The highest proportion of hired labor used for harvesting was found on farms with large-sized cotton enterprises, ranging from 17 per cent on farms with small- and medium-sized enterprises to 22 per cent on farms with large-sized cotton enterprises. The seed cotton required to make a 500-pound gross-weight bale of cotton was about 1,285 pounds, Appendix Table 4.

Farmers were following harvesting recommendations in 1947. Cotton fields were picked over two to four times with an average of three. Picking began in September, and in most cases was completed in November.

More than 50 per cent of the total labor required to produce an acre of cotton in 1947 was required for harvesting. Harvesting requirements may be reduced by picking thoroughly a minimum number of times on some farms.

LABOR *and* POWER REQUIREMENTS

High labor and power requirements for cotton production are major factors limiting the most efficient and profitable production of cotton in this area.

The following estimates indicate the relative importance of usual labor and power costs to total costs of producing cotton. On farms with workstock only, power costs amount to approximately 15 per cent of total production costs, and labor costs amount to approximately 54 per cent of the total. Thus, power and labor costs make up more than two-thirds of the cost of producing cotton on workstock farms. Power requirements are greatest for land preparation, planting, and cultivating; labor requirements are greatest during the chopping, hoeing, and harvesting seasons.

With power and labor requirements making up more than two-thirds of the cost of producing cotton, any sizable reduction in power and labor requirements should both increase efficiency and decrease the cost of producing cotton.

Use *of* Power

No wide variations were found in the different kinds and combinations of power used among the farms surveyed in 1947. Seventy of the 102 farms studied used workstock only, while the remainder used workstock and tractors (combination farms), Table 5. The largest proportion of tractors was found on farms with large cotton enterprises. Some tractor power was used on approximately 42 per cent of the acreage of all farms surveyed in 1947.

TABLE 5. DISTRIBUTION OF FARMS, BY SIZE OF COTTON ENTERPRISE, AND BY TYPE OF POWER USED, PIEDMONT AREA OF ALABAMA, 1947

Type of power group	Size of cotton enterprise					
	Small		Medium		Large	
	Number	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*
Workstock farms	24	75	28	80	18	51
Combination farms[1]	8	25	7	20	17	49
TOTAL	32	100	35	100	35	100

[1] Farms that used both workstock and tractors as sources of power.

Usual Labor Requirements

The usual amounts of man labor used on farms in the medium-sized cotton enterprise group varied from 76 hours per acre on combination (operator) farms to 112 hours per acre on workstock farms in 1947. Approximately 37 hours of animal power were required to produce an acre of cotton. Where tractors were used for flat-breaking and cultivating after flat-breaking, they were used for approximately 2 hours per acre of cotton, Appendix Table 5 and 6.

In comparing labor requirements for various operations among different size and tenure groups, chopping and hoeing, and harvesting were considered separately, as these operations required a relatively large amount of labor. Chopping and hoeing required about 15 per cent of the total man labor needed in 1947 to produce an acre of cotton; harvesting required slightly more than half of the total. There was little indication that farms with medium- or large-sized cotton enterprises were more efficient in utilization of labor than were farms with small cotton enterprises.

Time *of* Operation

Proper timing of production operations may mean the difference between success and failure in cotton production. During a year in which normal weather conditions prevail, cotton growers usually have no difficulty in timing production operations to produce a crop. However, when adverse weather conditions occur, those farmers who are equipped to cover large acreages in a short time have a great advantage. Land preparation usually begins in March with preparation of the seedbed. Cotton is planted during the last part of April and the first part of May. In the Piedmont Area, peak labor requirements occur normally during June, largely because of requirements for chopping and hoeing, and during September and October, which are peak harvest months.

Variation *from* Usual Operations

Machinery and equipment of varying sizes were used in producing cotton in 1947. The greatest variation was found in types of equipment used for land preparation and for cultivation, Appendix Table 7. However, these variations are important chiefly from the standpoint of saving labor rather than from quality of work.

Variations in Time Required to Perform Usual Operations

The methods of performing usual operations that saved the most labor were selected for comparison with the most common methods used in performing the same operations in 1947. The greatest labor-saving methods on workstock farms required 102 hours of man labor and 43 hours of workstock labor to produce and harvest an acre of cotton yielding 283 pounds of lint, Table 6. This represented a saving of only about 2 man hours, or 2 per cent of usual requirements.

TABLE 6. SELECTED VARIATIONS FROM USUAL IN PER ACRE LABOR REQUIREMENTS FOR PRODUCING COTTON USING ANIMAL-DRAWN EQUIPMENT, WITH COMPARISONS, PIEDMONT AREA OF ALABAMA, 1947

Item	Size of equipment	Times over	Hours per acre[1]	
			Man	Animal
Cut stalks	2-horse stalk cutter	1	.8	1.6
Flat-break	2-horse moldboard plow	1	4.6	9.2
Bed	1 time per row	1	1.9	3.8
Cultivate beds	Section harrow	1	1.2	2.4
Plant	1-row planter	1	2.5	2.1
Fertilize	1-row distributor	1	3.7	2.1
Cultivate	2-horse cultivator	3	8.1	16.2
Chop and hoe	Hand	2	23.6	.0
TOTAL PRE-HARVEST			46.4	37.4
Harvest	Hand	3	53.0	.0
Haul	Wagon	–	2.7	5.4
TOTAL			102.1	42.8
Comparison (usual total)			104.2	36.5
Labor and power saved			2.1	–6.3
Per cent labor and power saved			2.0	–17.3

[1] Poisoning was not considered; it would add a small amount of time to the total requirements.

Possibilities of Further Changes and Limitations and Effects of Mechanization[3]

The downward trend in the relative importance of cotton as a major farm enterprise in the Piedmont Area of Alabama is likely to continue.

Row crop cultivation with mechanical equipment is relatively more difficult in the Piedmont Area than in many other sections of the State. Small fields can often be combined into larger fields; small farms can often be combined to form larger farms. Under such circumstances, increased mechanization may take place.

[3] Prepared on the basis of information furnished by the Agricultural Engineering Department, Alabama Agricultural Experiment Station.

However, cotton is likely to continue to be the chief source of cash income on farms where topography is not suitable to the use of tractor power and mechanical cultivating equipment, and on small subsistence farms operated with workstock power.

The shift to mechanized farming will require that certain adjustments in production practices be made because of physical limitations of mechanical equipment now available. Well-planned field layouts will aid in reducing both labor and power requirements of many operations performed with machines in the future. Each farmer should select the land on his farm that is best adapted to the production of cotton and on this acreage follow those practices that will result in the most efficient use of machinery and equipment. The following practices must be emphasized:

(1) Level fields and construct broad-type terraces to accommodate all tractor operations.

(2) Eliminate hedge rows to increase size of fields, and construct broad drainage channels that can be crossed with tractor equipment.

(3) Remove rocks and stumps to prevent damage to machinery and equipment.

In preparing land, it is essential that cotton stalks be well shredded or broken up to obtain efficient use of planting and cultivating equipment during subsequent operations. Either horizontal- or vertical-type cutters are satisfactory for this operation. However, when green stalks are present, the power-driven, rotary-type cutter is more efficient. By performing this operation as soon after harvesting as possible, a protective covering for the soil may be obtained, and decay of stalks and insect control may be aided.

A well-prepared seedbed is of utmost importance, since the type of seedbed preparation influences subsequent mechanized operations. The soil should be thoroughly broken to a depth of at least 6 inches, using a moldboard or a disk plow well in advance of planting time. After breaking, a firm seedbed may be formed with harrows and/or cultipackers.

On those farms on which mechanical harvesters are used, the planting operation is of particular importance, because some mechanical harvester manufacturers have designed their equipment to operate best at a standard row spacing of 40 inches.

Insect control has become increasingly important in this area because of conditions favorable to increased insect infestation during the last few years. Sprayers and dusters are equally

effective for insect control, but tractor fenders may be necessary to reduce damage to rank-growing cotton.

If Piedmont Area farmers use mechanical harvesters, defoliation will be an important phase in cotton production. It may also be profitable on hand-picked cotton. It has been found to reduce boll rot and to facilitate hand picking. Defoliation can be accomplished with the conventional insect control duster by dusting when most of the cotton bolls are mature. The defoliant should be applied either late in the evening or early in the morning since contact with moisture is essential for maximum effectiveness.

Although use of mechanical equipment now available requires some adjustment in cotton production practices, the labor-saving aspects of mechanization make a further shift to mechanization appear desirable. On most cotton farms of the Piedmont Area, a high degree of mechanization is likely to come slowly, even in the face of short labor supplies, high prices, and good demand for cotton. Mechanical equipment that is currently used in other cotton-producing areas is not satisfactory for extensive use in the Piedmont Area of Alabama. This is particularly true of those machines required for chopping and hoeing, and for harvesting the crop.

Saving man labor does not necessarily mean that cotton can be produced more profitably. The relative costs of labor and machinery together with the possible effects of mechanical harvesting on cotton quality and price will determine for individual producers how much machinery to substitute for labor and workstock power.

SUMMARY *and* CONCLUSIONS

Cotton has long been one of the chief sources of cash income for farmers in the Piedmont Area, although this area is not one of the principal cotton-producing areas of the State. In view of high production costs, high labor requirements, and other major problems facing cotton producers, a study was begun in the summer of 1948 with a field survey being made in two counties selected as representative of the Piedmont Area to (1) obtain information on current cotton production practices, and (2) to compare current cotton production practices with Experiment Station recommendations so that needed improvements could be pointed out.

In most cases, land in 1947, was being prepared with recommended equipment. There is a possibility, however, that costs can be decreased and efficiency increased through use of more tractor power and equipment in land preparation on some farms. Most of the land was prepared during March and in early April. On many farms, the time that elapsed between land preparation and planting was not sufficient to allow the seedbed to settle properly. Farmers were planting during the last week in April and the first week in May, which was later than the area recommendation of April 1 through 15.

The varieties of cotton most commonly used in 1947 were Stoneville, Deltapine 14, and Deltapine 11, all of which were recommended for the area. Farmers were also within the scope of recommendations for seeding rates. No relationship was observed between size of enterprise and seeding rates, but a slightly smaller amount of seed was used when hill dropped than when planted solid in the drill. Between 24 and 40 per cent of the acreage was planted with purchased seed, and approximately three-fourths of all seed was treated. Improvement in quality of planting seed and further treatment may help to increase cotton yields. Although some hill dropping was done, all cotton was hand chopped and hoed. The number of times that hoeing is necessary may be reduced by improved cultivation practices.

All cotton was fertilized with some type of commercial fertilizer in 1947. The rate of application for mixed fertilizer was considerably below recommendations. The per acre yield of cotton can be increased by increasing fertilizer applications up to recommended rates.

Farmers, in 1947, were using recommended types of equipment for cultivation and weed control in most cases. There is

a possibility that costs of performing these operations can be reduced by using larger equipment where practicable, and cultivating earlier and more frequently to decrease hand-labor requirements for hoeing.

Most cotton farmers in the Piedmont Area poisoned to control insects in 1947 using the insecticide (calcium arsenate) recommended at that time. However, the rate of application was below that recommended. Improvements have been made in cotton insecticides since 1947, and, if cotton yields are to be maintained or increased, current poisoning recommendations should be followed when insect infestation is a problem.

Recommended cotton harvesting practices were being followed in 1947. The majority of farmers picked over their cotton fields an average of three times. Some farmers in this area may be able to reduce the amount of labor required for harvesting by picking thoroughly a minimum number of times, but the possibilities that labor requirements for harvesting may be reduced through use of strippers or mechanical harvesters are not encouraging for the immediate future. Beyond overcoming the problems encountered with the general topography of the area, mechanical harvesters and cleaning and ginning equipment will have to be improved to prevent or offset the loss in grade of mechanically-harvested cotton.

Power and labor requirements for cotton production are relatively high. Cotton producers in the Piedmont Area today are faced with the problem of substituting a diminishing labor supply with machinery that has not proved profitable in the area. The extent to which substitutions should be made on individual farms will depend on topography of cotton land on these farms, future government-control programs, and relative costs of machinery and labor. In the face of increasing competition from cotton-producing areas that can adopt low-cost production practices, many cotton farmers in the area may find it advisable to consider alternative enterprises in which they have better competitive opportunities.

APPENDIX TABLE 1. ESTIMATED ACREAGE, YIELD, AND PRODUCTION OF COTTON, PIEDMONT AREA OF ALABAMA, 1928-1947[1]

Year	Acreage	Yield per acre	Production
	1,000 acres	*Pounds*	*1,000 bales*
1928	304.1	143	90.9
1929	298.0	162	101.1
1930	297.4	175	109.0
1931	266.1	188	104.5
1932	264.2	154	85.3
1933	274.8	132	75.6
1934	185.3	189	73.3
1935	191.6	213	85.4
1936	198.7	199	82.7
1937	217.1	255	115.9
1938	176.5	187	69.0
1939	168.9	162	57.2
1940	161.5	171	57.8
1941	137.8	117	33.7
1942	121.3	194	49.2
1943	119.4	226	56.5
1944	95.5	294	58.7
1945	87.6	257	47.0
1946	94.1	199	39.2
1947	81.1	246	41.7

[1] Source: "Alabama Cotton, Estimated Acreage, Yield, and Production, 1928-1947." Bureau of Agricultural Economics, U.S.D.A., cooperating with Division of Agricultural Statistics, Alabama Department of Agriculture and Industries.

APPENDIX TABLE 2. NUMBER OF FARMS AND ACRES OF COTTON, BY TYPE OF POWER USED, AND BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Size of cotton enterprise	Type of power used			
	Workstock		Combination	
	Number farms	Acres cotton	Number farms	Acres cotton
Small (32)[1]:				
Operator	21	108	7	36
Cropper	3	25	1	8
Tenant	1	6	0	0
Medium (35)[1]:				
Operator	22	275	5	45
Cropper	8	121	4	39
Tenant	3	41	0	0
Large (35)[1]:				
Operator	3	75	7	150
Cropper	15	827	16	809
Tenant	3	110	3	41

[1] Number of schedules included in survey.

APPENDIX TABLE 3. VARIETIES AND QUALITIES OF COTTONSEED PLANTED, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	32	35	35
Cotton planted	*Acres*	202	528	2,351
Proportion of purchased seed by varieties:[1]				
Stoneville	*Per cent*	47	27	28
Deltapine 14	*Per cent*	28	24	1
Deltapine 11	*Per cent*	0	24	1
Coker	*Per cent*	0	10	16
All other	*Per cent*	25	5	12
Mixed	*Per cent*	0	11	42
Proportion of home-grown seed by varieties:[1]				
Stoneville	*Per cent*	52	26	32
Deltapine 14	*Per cent*	7	50	35
Deltapine 11	*Per cent*	7	9	6
Coker	*Per cent*	4	6	3
All other	*Per cent*	30	6	6
Mixed	*Per cent*	0	4	18
Years from breeder:				
Home-grown seed:				
1 year	*Per cent*	0	14	32
2 years	*Per cent*	10	34	26
3 years and over	*Per cent*	66	31	21
Not known	*Per cent*	24	21	21
Purchased seed:				
Direct from breeder	*Per cent*	60	51	39
1 year	*Per cent*	0	0	58
2 years	*Per cent*	13	40	2
3 years and over	*Per cent*	16	7	1
Not known	*Per cent*	11	2	0

[1] Varieties listed are those most commonly used.

APPENDIX TABLE 4. COTTON HARVESTING PRACTICES, YIELD OF LINT COTTON PER ACRE, AND GIN TURNOUT, BY SIZE OF COTTON ENTERPRISE, PIEDMONT AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	32	35	35
Acres harvested	*Acres*	183	521	2,012
Proportion of cotton:				
Hand picked	*Per cent*	100	100	100
Proportion of cotton hand picked by:				
Family labor	*Per cent*	83	83	78
Hired labor	*Per cent*	17	17	22
Bales produced	*Number*	111	294	1,152
Lint yield per acre	*Pounds*	296	275	279
Seed cotton per 500-lb. bale	*Pounds*	1,281	1,289	1,294

APPENDIX TABLE 5. MAN LABOR REQUIREMENTS PER ACRE FOR PRODUCING COTTON, BY USUAL OPERATIONS PERFORMED, BY SIZE OF COTTON ENTERPRISE, AND BY TYPE OF POWER USED, PIEDMONT AREA OF ALABAMA, 1947

Size of cotton enterprise by power groups	Number of records[1]	Man labor used per acre by specified operations												
		Land preparation												
		Cut stalks	Flat break	Cultivate after flat breaking	Bed after flat breaking	Bed only	Lay off rows; open furrows	Plant	Fertilize	Cultivate	Chop and hoe	Harvest	Haul	Total
	(No.)	(Man hours per acre)												
WORKSTOCK FARMS:														
Small:														
Operator	(21)	.8	--	--	--	6.7	--	2.5	3.7	18.6	12.5	52.8	2.6	100.2
Cropper[2]	(4)	.8	--	--	--	6.7	--	2.5	3.7	17.5	23.6	53.9	2.7	111.4
Medium:														
Operator	(22)	.8	--	--	--	6.7	--	2.5	3.7	18.6	23.6	53.3	2.7	111.9
Cropper[2]	(11)	1.5	--	--	--	5.5	--	2.5	3.7	17.5	34.7	44.4	2.7	112.5
Large:														
Cropper[2]	(18)	.8	4.6	--	1.9	--	--	2.5	3.7	18.6	12.5	47.3	2.6	94.5
COMBINATION FARMS:														
Small:														
Operator	(7)	--	4.6	.9	--	--	1.8	2.5	3.7	17.5	12.5	51.4	2.6	97.5
Medium:														
Operator	(5)	.8	4.6	.7	--	--	1.8	2.5	3.7	15.5	12.5	31.8	2.6	76.5
Cropper[2]	(4)	.8	4.6	.7	1.9	--	1.8	2.5	3.7	15.5	12.5	53.4	2.6	100.0
Large:														
Operator	(7)	--	.9	.7	1.9	--	--	2.5	3.7	18.6	12.5	54.2	2.6	97.6
Cropper[2]	(19)	--	.9	.7	--	--	1.8	2.5	3.7	15.5	12.5	50.8	2.7	91.1

[1] Number of records does not equal number of schedules because some schedules contain records of both operators and tenants.
[2] Tenants were combined with croppers.

APPENDIX TABLE 6. POWER REQUIREMENTS PER ACRE FOR PRODUCING COTTON, BY USUAL OPERATIONS PERFORMED, BY SIZE OF COTTON ENTERPRISE, AND BY TYPE OF POWER USED, PIEDMONT AREA OF ALABAMA, 1947

Size of cotton enterprise by power groups	Number of records[1]	Power used per acre by specified operations										
			Land preparation									
		Cut stalks	Flat break	Cultivate after flat breaking	Bed after flat breaking	Bed only	Lay off rows; open furrows	Plant	Fertilize	Cultivate	Haul	Total
	(No.)	(Power requirements [hrs.] per acre)										
WORKSTOCK FARMS:												
Small:												
Operator	(21)	1.6	--	--	--	9.8	--	2.1	2.1	18.6	2.1[2]	36.3
Cropper[3]	(4)	1.6	--	--	--	9.8	--	2.1	2.1	17.5	5.4	38.5
Medium:												
Operator	(22)	1.6	--	--	--	9.8	--	2.1	2.1	18.6	5.4	39.6
Cropper[3]	(11)	3.0	--	--	--	8.8	--	2.1	2.1	17.5	5.4	38.9
Large:												
Cropper[3]	(18)	1.6	9.2[4]	--	3.8	--	--	2.1	2.1	18.6	2.1[2]	39.5
COMBINATION FARMS:												
Small:												
Operator	(7)	--	9.2[4]	.9[5]	--	--	1.8	2.1	2.1	17.5	2.1[2]	35.7
Medium:												
Operator	(5)	1.6	9.2[4]	.7[5]	--	--	1.8	2.1	2.1	15.5	2.1[2]	35.1
Cropper[3]	(4)	1.6	9.2[4]	.7[5]	3.8	--	1.8	2.1	2.1	15.5	2.1[2]	38.9
Large:												
Operator	(7)	--	.9[5]	.7[5]	3.8	--	--	2.1	2.1	18.6	2.1[2]	30.3
Cropper[3]	(19)	--	.9[5]	.7[5]	--	--	1.8	2.1	2.1	15.5	5.4	28.5

[1] Number of records does not equal number of schedules because some schedules contain records of both operators and tenants.
[2] Truck or car power.
[3] Tenants were combined with croppers.
[4] The usual practice was to use workstock to perform this operation.
[5] Tractor power.

APPENDIX TABLE 7. AVERAGE ANNUAL USE AND RATES OF PERFORMANCE FOR SPECIFIED OPORATIONS IN PRODUCING COTTON, BY TYPES OF EQUIPMENT USED, PIEDMONT AREA OF ALABAMA, 1947[1]

Operations performed by size of equipment used	Farms using	Times over	Annual use		Acres per 10-hour day	One time over		
			Acres cov'd	Hours used		Man hours per acre	Mule hours per acre	Tractor hours per acre
	Number	*Number*	*Acres*	*Hours*	*Acres*	*Hours*	*Hours*	*Hours*
Cut stalks:								
1-row (mule)	31	1.0	14.4	21.6	6.7	1.5	3.0	--
2-row (mule)	36	1.0	33.2	26.2	12.5	.8	1.6	--
Hand	9	1.6	11.3	30.7	5.9	1.7	--	--
Flat-break:								
Moldboard:								
1-bottom (1-mule)	20	1.0	19.9	141.3	1.4	7.1	7.1	--
1-bottom (2-mule)	29	1.0	15.0	69.0	2.2	4.6	9.2	--
Disk harrow (tractor)	13	1.0	24.7	19.8	12.5	.8	--	.8
Disk plows (tractor):								
2-disk	5	1.0	46.6	55.9	8.3	1.2	--	1.2
4-disk	10	1.0	39.4	35.5	11.1	.9	--	.9
Cultivate flat-broken land:								
Section harrow (mule)	20	1.1	16.4	25.3	7.1	1.4	2.8	--
Disk harrow (tractor)	19	1.2	34.3	28.8	14.3	.7	--	.7
Section harrow (tractor)	6	1.0	15.8	14.2	11.1	.9	--	.9
Bed after flat break:								
1 time to row (mule)	19	1.0	21.3	40.5	5.3	1.9	3.8	--
3 times to row (mule)	3	1.0	26.0	111.8	2.3	4.3	7.6	--
4 times to row (mule)	9	1.0	12.6	83.2	1.5	6.6	9.9	--
Bed only:								
3 times to row (mule)	14	1.0	14.0	77.0	1.8	5.5	8.8	--
4 times to row (mule)	28	1.0	26.1	169.6	1.5	6.7	9.8	--
Cultivate after bedding:								
Gee-whiz (mule)	11	1.0	17.6	33.4	5.3	1.9	1.9	--
Section harrow (mule)	12	1.0	20.0	24.0	8.3	1.2	2.4	--
Drag (mule)	12	1.0	44.5	44.5	10.0	1.0	1.6	--

(Continued)

[1] Comparable types of equipment in all size and power groups were averaged to obtain rates of performance by types of equipment used for specified operations.

APPENDIX TABLE 7 (*Continued*). AVERAGE ANNUAL USE AND RATES OF PERFORMANCE FOR SPECIFIED OPERATIONS IN PRODUCING COTTON, BY TYPES OF EQUIPMENT USED, PIEDMONT AREA OF ALABAMA, 1947[1]

Operations performed by size of equipment used	Farms using	Times over	Annual use		Acres per 10-hour day	One time over		
			Acres cov'd	Hours used		Man hours per acre	Mule hours per acre	Tractor hours per acre
	Number	*Number*	*Acres*	*Hours*	*Acres*	*Hours*	*Hours*	*Hours*
Lay off rows and open furrows:								
Georgia stock (mule)	29	1.0	21.1	38.0	5.6	1.8	1.8	--
Plant:								
1-row planter (mule)	114	1.0	20.7	43.5	4.8	2.5	2.1	--
2-row planter (tractor)	7	1.0	46.7	18.7	25.0	.8	--	.4
Fertilize:								
1-row distributor (mule)	114	1.0	20.7	43.5	4.8	3.7	2.1	--
2-row distributor (tractor)	5	1.0	42.2	16.9	25.0	1.4	--	.4
Side-dress:								
1-row distributor (mule)	38	1.0	29.3	64.5	4.5	2.3	2.2	--
Hand	43	1.0	17.7	54.9	3.2	3.1	--	--
Cultivate:								
½-row (mule)	69	5.2	25.1	456.8	2.9	3.5	3.5	--
½-row and 1-row (mule)	42	5.0	15.4	238.7	3.2	3.1	3.1	--
1-row (mule)	4	2.8	31.2	235.9	3.7	2.7	5.4	--
2-row (tractor)	5	4.4	41.4	127.5	14.3	.7	--	.7
Chop and hoe:								
1 time over	77	1.0	25.5	306.0	.8	12.5	--	--
2 times over	42	2.0	17.0	380.8	.9	11.1	--	--
Poison:								
Hand	82	4.2	21.9	101.2	9.1	1.1	--	--
2-row duster (mule)	9	3.8	17.5	66.5	10.0	1.0	1.0	--
Haul:								
Mule and wagon	43	--	23.9	64.5	3.7	2.7	5.4	--
Truck and/or car and trailer	53	--	23.7	49.8	4.8	2.6	--	2.1[2]

[1] Comparable types of equipment in all size and power groups were averaged to obtain rates of performance by types of equipment used for specified operations.

[2] Truck or car hours.