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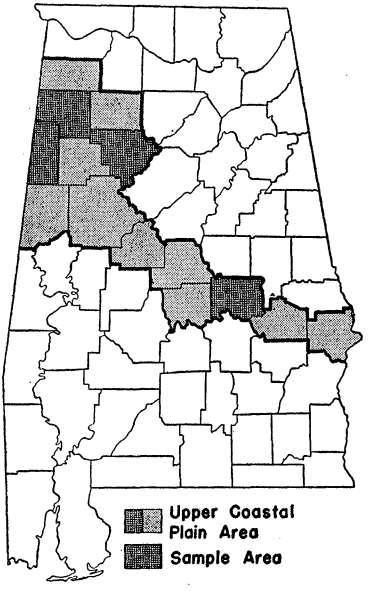
COTTON PRODUCTION PRACTICES *in the* UPPER COASTAL PLAIN AREA *of Alabama*



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CONTENTS

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COTTON PRODUCTION PRACTICES *in the* UPPER COASTAL PLAIN AREA *of Alabama* *

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AMONG THE PRINCIPAL cotton-producing areas of Alabama is the Upper Coastal Plain. While for many years cotton has been the major cash crop produced in this area, its relative importance has declined in terms of both acreage and income in recent years.

Cotton acreage harvested has been reduced almost 52 per cent during the last two decades. In 1944, however, 67 per cent of the Upper Coastal Plain farmers were still producing cotton.[1] Total cotton production in recent years, despite decreasing acreage, has decreased on the average only 20 per cent from the average annual production of 20 years earlier. Decreased cotton acreages have been partly offset by increases in yield per acre, Appendix Table 1.

In the Upper Coastal Plain Area of Alabama, high production costs, high labor requirements, maintenance of satisfactory farm incomes, and maintenance and improvement of soil resources are major problems facing cotton producers. Farmers, therefore, must seriously consider (1) all possible ways of increasing cotton yields, increasing production efficiency, and lowering costs of production; and (2) the addition or expansion of enterprises to supplement cotton and/or a shift to alternative enterprises that may completely exclude cotton from individual farm programs.

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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.

In view of these considerations and of the present importance of cotton in this area, a study of cotton production practices in the Upper Coastal Plain Area was started in the summer of 1948 with a field survey being made in four counties – Elmore, Lamar, Marion, and Walker, (cover).[2] These four counties were selected as being representative of the Upper Coastal Plain Area. Major objectives of the study were:

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

(2) To ascertain variations in current cotton 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 Upper Coastal Plain Area, indicates variations in these practices, and compares present practices with recommendations of the Alabama Agricultural Experiment Station. Unless otherwise stated, all recommendations shown in this report were the same in 1951 as in 1947.

Current production practices as described in this report are based on an analysis of farm records obtained by personal interview with 101 farmers who produced cotton in the Upper Coastal Plain Area in 1947. Approximately the same number of farms with small, medium, and large cotton enterprises were selected as representative of cotton enterprises in this area. For purposes of this study, the range in cotton acreage for each of the three groups was: small, less than 10 acres; medium, 10 to 29 acres; and large, 30 acres or more per farm, Appendix Table 2. Two-thirds of all cotton producers in the Upper Coastal Plain Area of Alabama produced less than 10 acres of cotton per farm in 1944, Table 1. Farms with these small cotton enterprises accounted for 35 per cent of the area's total cotton acreage and 35 per cent of its total production. Farmers who produced 30 acres or more per farm made up only 4 per cent of the total cotton producers

[2] This study is 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, UPPER COASTAL PLAIN 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)	16,988	66	91,814	35	63,989	35	333
Medium (10-29 acres)	7,844	30	107,697	42	72,343	40	321
Large (30 acres or more)	926	4	58,511	23	45,934	25	375
TOTAL (All farms)	25,758	100	258,022	100	182,266	100	338

[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. 30-31. 1945.

in this area. However, the cotton enterprises on these farms accounted for 23 per cent of the area's total cotton acreage, and 25 per cent of the total production of the area.

Wide variations occurred in the average yield of cotton per acre between the three size groups. In 1944, farms with small cotton enterprises produced an average of 333 pounds of lint per acre; farms with medium-sized enterprises produced an average of 321 pounds per acre; and farms with large cotton enterprises averaged 375 pounds per acre. These differences were associated with differences in production practices between farms with small, medium, and large cotton enterprises.

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 79 acres in size, only 26 of which were cropland. Of the 26 acres of cropland, 5 were in cotton.

Farms with medium-sized cotton enterprises in 1947 averaged 122 acres, 43 of which were cropland. Cotton acreage on these farms averaged 15 acres, or almost three times as much as on farms with small cotton enterprises.

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

Item	Size of cotton enterprise		
	Small	Medium	Large
	Number	*Number*	*Number*
Number of farms	35	33	33
	Acres	*Acres*	*Acres*
Land use:			
All land in farms	79	122	701
Owned	56	78	686
Rented in	23	44	15
Total cropland	26	43	124
Permanent pasture	15	17	59
Cropland organization:			
Cotton	5.3	14.7	49.6
Corn	14.3	20.4	52.2
Small grain	.2	1.0	1.8
Peanuts	.1	.0	.2
Lespedeza hay	1.0	.7	2.9
Truck crops	.1	.6	6.1
Other crops	5.0	5.8	11.3
	Number	*Number*	*Number*
Livestock organization:[1]			
Workstock	1.6	2.3	5.3
Milk cows	1.4	1.8	3.0
Other cattle	1.9	2.5	10.0
Brood sows	.3	.6	1.0
Other hogs	1.2	2.8	4.8
Hens and pullets	35.4	40.7	51.7
Tractors per farm, *av. no.*	.1	.1	.5
Labor organization:			
Families:			
Operator	1.0	1.1	.9
Cropper	.1	.1	1.9
Wage hand	.0	.0	.1
Workers:			
Operator	1.8	4.2	1.8
Cropper	.2	.2	5.9
Wage hand	.0	.0	.7

[1] Operator's livestock only.

Farms with large cotton enterprises, all of which were relatively large farm units, and which relied heavily on share cropper, and/or wage labor in 1947, averaged more than 700 acres in size. Over one-sixth of the acreage on these farms was cropland, averaging more than 124 acres per farm. These farms had a high percentage of cropland devoted to cotton, averaging almost two-fifths of the total or about 50 acres per farm.

In 1947, tractors were reported on 10 per cent of the farms with small- and medium-sized cotton enterprises, and on 50 per cent of those with large cotton enterprises. Some farms with large

cotton enterprises used tractors as the only source of power for producing cotton. In the two smaller enterprise groups, tractors when used were used only for breaking and preparing land for planting. In the large enterprise group, tractors, in some cases, were used to perform all cotton production operations except chopping, hoeing, and harvesting.

Most farms with small- and medium-sized cotton enterprises were family farms and in 1947 were operated largely with work-stock power and with family labor. Farms with large cotton enterprises depended heavily on share cropper and/or wage labor; in some cases, tractors were the principal source of power. Consequently, on farms with small- and medium-sized cotton enterprises, corn was relatively more important than any other crop, whereas on farms with large cotton enterprises, cotton and corn were almost equally important from the standpoint of acreage.

All major livestock enterprises handled by operators in 1947 increased in size as size of cotton enterprises increased. In no group, however, was livestock of major importance. Cotton was the principal cash enterprise and the principal user of labor, power, and materials for all groups studied.

With respect to land ownership in 1947, there was no consistent pattern formed by the three groups studied. Generally, farmers on farms with large cotton enterprises owned a larger percentage of the land they operated than did farmers with medium- and small-sized cotton enterprises. Farmers with large cotton enterprises owned 98 per cent of the land they operated; farmers with medium-sized cotton enterprises owned 64 per cent; and farmers with small cotton enterprises owned 72 per cent. Operators were not necessarily "owner operators."

More than 91 per cent of the farms with small- and medium-sized cotton enterprises were operated without share cropper, tenant and/or wage labor in 1947, whereas only 21 per cent of the farms with large cotton enterprises did without such labor. On the remainder of the farms, croppers and tenants alone, or various combinations of operators, tenants, share croppers and/or wage hands 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 pro-

ducing 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 breaking 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 before 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 before planting.

When a cover crop precedes cotton, care should be taken in timing the planting with respect to the time of turning the cover crop. Since germination of cotton planting 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 power in 1947, the usual procedure in preparing land was to cut stalks with a one- or two-row stalk cutter followed by flat-breaking with a moldboard plow. Then, flat-broken land was harrowed with a section harrow or drag and bedded with a middlebuster, or with a Georgia stock. Laying off rows was usually accomplished with 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. However, since most cotton land normally was prepared between the middle of March and the first part of April, many farmers may not have allowed sufficient time for seedbeds to settle between the time land preparation was completed and the crop was planted. Such a practice often results in a loose seedbed, and may seriously affect the stand and 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 and that have most of these characteristics were Stoneville, Stonewilt, Miller 610, Coker 100-Wilt, White Gold, and Deltapine. Since 1947, White Gold has been deleted from the list of recommended varieties and Plains has been added. To insure a reliable source of seed, farmers should purchase 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 when proper precautions can be taken to preserve quality.

The recommended planting rate for the Upper Coastal Plain 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 or not it is 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 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, provided a uniform stand was obtained with both plantings. Cotton should be planted in the northern half of the Upper Coastal Plain Area between April 15 and 25 and in the southern half between April 1 and 15.

Present Practices. Planting rates in 1947 varied somewhat between farms with small, medium, and large enterprises, depending on the method of planting (solid in the drill or hill dropped). The pounds of delinted and non-delinted seed planted per acre solid in the drill and hill dropped in 1947 are shown in Table 3.

There was no significant difference between the amounts of delinted and non-delinted seed planted per acre solid in the drill

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

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	35	33	33
Cotton planted	*Acres*	185	474	1,636
Purchased seed:				
Proportion of farmers using	*Per cent*	50	42	42
Proportion of acreage planted	*Per cent*	48	33	32
Proportion of purchased seed:				
Delinted	*Per cent*	80	64	94
Treated	*Per cent*	57	71	96
Proportion of home-grown seed:				
Delinted	*Per cent*	36	40	64
Treated	*Per cent*	60	59	81
Delinted seed:				
Proportion of farmers using	*Per cent*	54	48	79
Proportion of acreage planted	*Per cent*	53	45	77
Proportion of acreage planted with delinted seed:				
Solid in the drill	*Per cent*	87	82	80
Hill dropped	*Per cent*	13	17	20
Proportion of acreage planted with non-delinted seed:				
Solid in the drill	*Per cent*	85	60	28
Hill dropped	*Per cent*	15	40	72
Pounds of seed per acre:				
Delinted:				
Hill dropped	*Pounds*	25	17	21
Solid in the drill	*Pounds*	24	29	24
Non-delinted:				
Hill dropped	*Pounds*	32	18	29
Solid in the drill	*Pounds*	27	27	31

in 1947; nor was there any apparent relationship between size of cotton enterprise and amount of cottonseed planted per acre. A slightly smaller amount of seed was planted when hill dropped than when planted solid in the drill. Slightly less than two-fifths of the cotton acreage was planted with purchased seed although over two-fifths of the farmers interviewed used some purchased seed.

Over 68 per cent of the purchased seed used in 1947 had been delinted and treated when bought. About two-fifths of the home-grown seed was delinted. Approximately three-fifths of the home-grown seed used on farms with small- and medium-sized cotton enterprises was treated, whereas over four-fifths of the seed used on farms with large cotton enterprises was treated.

The most popular variety of cotton planted in 1947 was Delta-pine. Other important varieties, particularly of home-grown seed, were Coker, White Gold, and Half and Half. Mixed seed was relatively more important on farms with large cotton enterprises where 31 per cent of the purchased seed and 14 per cent of the home-grown seed planted were of unknown varieties. The major portion of home-grown seed was 2 years or more from breeder seed. The major proportion of purchased seed was 1 or 2 years from breeder seed and a small proportion was direct from the breeder. Generally, quality of cotton-planting seed needs to be improved in that only 21 per cent of all seed planted by farmers was 1 year or less from the breeder, and only 38 per cent of planting seed purchased by farmers was 1 year or less from the breeder, Appendix Table 3.

More than 68 per cent of the cotton in the Upper Coastal Plain Area was planted solid in the drill and all of it was hand chopped to a stand in 1947. Most of the cotton planted solid in the drill on workstock farms was planted in 37- to 42-inch rows and spaced 11 to 13 inches in the rows. On the few farms that used tractor power, cotton was planted in 37- to 41-inch rows and spaced 12 to 15 inches in the rows. Hill-dropped cotton on workstock farms was planted in 36- to 40-inch rows with 13- to 19-inch spacing between hills in the rows; on the few farms using tractor power, hill-dropped cotton was planted in 41- to 42-inch rows with 15- to 18-inch spacing between hills in the rows.

Farmers in the Upper Coastal Plain Area in 1947 were usually within the range of recommendations for planting, rate of seeding, variety, and method of planting and spacing. In some cases, farmers planted less than the recommended amount of seed for

certain types of delinted and non-delinted seed. In addition, some farmers planted a variety of seed that is not generally recommended. The yield of cotton in 1947 apparently was not greatly influenced by these small deviations from recommendations. Later planting may affect attaining a stand, and may particularly affect yield when insect infestation is a problem.

Fertilization

Recommendations. In the Upper Coastal Plain 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 at planting time. This could be supplied by using 400 to 800 pounds of 6-8-4 or 4-10-7. 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, all fertilizer recommendations were the same as in 1947 except that somewhat heavier applications of nitrogen were recommended.

On tractor farms, fertilizer may be applied with a fertilizer attachment on the planter. On workstock farms, either a distributor or 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 about the time of the first or second cultivation after chopping.

Present Practices. Some type of commercial fertilizer was used on all of the cotton planted in 1947 by the 101 farmers interviewed in the Upper Coastal Plain Area. The average rate per acre when only complete fertilizer was used varied from 355 pounds on farms with medium-sized cotton enterprises to 465 pounds on farms with small cotton enterprises. The average rate per acre for complete fertilizer where both complete fertilizer and side-dressing were used varied from 391 pounds on farms with small cotton enterprises to 443 pounds on farms with medium-sized cotton enterprises; the rate of side-dressing varied from 108 pounds on farms with small cotton enterprises to 140 pounds on farms with large cotton enterprises. Over 77 per cent of the cotton acreage was fertilized with complete fertilizer only; the balance was fertilized with complete fertilizer in conjunction with some side-dressing. The most popular analysis was 6-8-4, although a considerable proportion of the acreage received

4-10-7, Table 4. The greater use of 6-8-4 was probably due to the shortage of fertilizer materials in 1947.

On workstock farms in 1947, one-row distributors were used in applying fertilizer, while on the few farms using tractor power, one- and two-row distributors and fertilizer attachments on cultivating equipment were used.

The amount of plant food in the fertilizer used in 1947 ranged from 25 to 30 pounds of N per acre, from 33 to 45 pounds of

TABLE 4. FERTILIZER PRACTICES, BY SIZE OF COTTON ENTERPRISE, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	35	33	33
Cotton planted	*Acres*	185	474	1,636
Proportion using complete fertilizer only:				
Farms[1]	*Per cent*	80	74	56
Acreage	*Per cent*	82	74	52
Proportion using complete fertilizer and side-dressing:				
Farms[1]	*Per cent*	20	26	44
Acreage	*Per cent*	18	26	48
Rate of application where used:				
Complete only	*Pounds*	465	355	409
Complete and side-dressing:				
Complete	*Pounds*	391	443	423
Side-dressing	*Pounds*	108	124	140
Rate of application per planted acre:				
Complete	*Pounds*	452	383	410
Side-dressing	*Pounds*	20	28	67
Analysis of complete fertilizer:				
Proportion of acreage receiving[1]:				
4-10-7	*Per cent*	25	22	23
6-8-4	*Per cent*	75	58	72
Other	*Per cent*	0	20	6
Analysis of side-dressing:				
Proportion of acreage receiving[2]:				
Ammonium nitrate	*Per cent*	0	3	10
Sodium nitrate	*Per cent*	18	23	29
Other	*Per cent*	0	0	14
Summary of fertilizer elements:				
N per fertilized acre of cotton	*Pounds*	28	25	30
P_2O_5 per fertilized acre of cotton	*Pounds*	38	33	45
K_2O per fertilized acre of cotton	*Pounds*	21	19	20

[1] Summed percentages do not total the sum of percentages of acreage using complete only and complete with side-dressing, because some of the farmers used two complete fertilizers on the same acreage.

[2] Summed percentages do not total the sum of percentages of acreage using complete fertilizer with side-dressing, because some farmers used more than one kind of side-dressing.

P_2O_5, and from 19 to 21 pounds of K_2O. The approximate average per acre was: 27 pounds of N, 36 pounds of P_2O_5, and 20 pounds of K_2O, Table 4.

The over-all average rate of fertilizer application in 1947 indicates that Upper Coastal Plain farmers were considerably under the minimum recommended rate of 36 pounds of N, 48 pounds of P_2O_5, and 24 pounds of K_2O per acre for soils of this area.

Many farmers in the Upper Coastal Plain Area of Alabama need to increase their cotton fertilization rates to the amounts recommended. Farmers may increase yields by using more fertilizer, and may 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 it 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 crop'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 permanent leaves are present. Chopping should allow a spacing of 12 to 18 inches between hills with two to three stalks per hill. If grass and weeds cannot be controlled by cultivation, hoeing may be necessary.

Present Practices. On workstock farms in 1947, cultivation was usually accomplished with one-row equipment; on tractor farms, two-row equipment was used. On the average, cotton was cultivated about six times. It was chopped once, and on an average, hoed twice.

Farmers who used workstock in 1947 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 cultivation should reduce the number of times that cotton needs to be hoed. As a whole, farmers in 1947 were using recommended types of cultivating equipment, Appendix Table 7.

Insect Control

Recommendations. The following materials were recommended for general use in control of cotton insect pests 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 experimental tests. They are recommended only for tractor or airplane spraying.

For bollworm 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, bollworms 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. Dusting should be done when the air is still and when the cotton plants are dry.

Spray may be applied by tractor or airplane, but row widths must be taken into consideration when tractor poisoning equipment is used, since this equipment is usually designed for specific row widths. 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 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.

¼ pound aldrin plus ½ pounds of DDT.

⅕ pound dieldrin plus ½ pound of DDT.

Calcium arsenate is effective only as a dust.

Insecticides should be applied while 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; more applications may be needed during seasons of heavy infestation and/or frequent rainfall.

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 was the same as that shown for other poisons in 1951 recommendations. The difference between 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 Upper Coastal Plain Area, slightly over 2 per cent of the acreage received one or more applications of poison in 1947. Most of the cotton acreage poisoned received two applications; a very small proportion of the cotton acreage received three or more applications of poison during the growing season. The rate of application ranged from 4 to 10 pounds of calcium arsenate per acre. Approximately 25 per cent of the farmers interviewed had poisoned their cotton one or more years in the last 10 years, but very few had poisoned more than 3 years during this period.

Method *and* Time *of* Harvesting

Recommendations. Cotton if hand harvested should be picked immediately after the bolls are open and dry. Precautions should be taken to prevent picking wet or green cotton. It should be picked as clean as possible, and usually it will require three pickings during the harvest season. Harvesting dates in the Upper Coastal Plain 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 in 1947 about three times. Over three-fourths of the cotton was harvested with family labor. The highest proportion of hired labor used for harvesting was found on farms with large cotton enterprises, ranging from 18 per cent on farms with medium-sized cotton enterprises to 36 per cent on farms with large cotton enterprises. The seed cotton required to make a 500-pound gross-weight bale of cotton in 1947 was about 1,277 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 times. Picking began in September, but most of the cotton was picked during October and the first half of November.

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

LABOR *and* POWER REQUIREMENTS

High labor and power requirements for cotton production are major factors that limit 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 workstock farms power costs amount to approximately 14 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.

On tractor farms power costs are about 10 per cent of total production costs, and labor costs amount to about 38 per cent of the total. Therefore, on tractor farms power and labor costs make up roughly one-half of the cost of producing cotton. Power requirements are greatest for land preparation, planting and cultivating, while labor requirements are greatest during the chopping, hoeing, and harvesting seasons.

With power and labor costs making up from one-half to over two-thirds of the cost of producing cotton, any sizeable reduction in power and labor requirements should both increase efficiency and decrease costs of producing cotton.

Use *of* Power

The use of different kinds and combinations of power varied greatly in 1947 among the farms surveyed. Of the 101 farms, 74 used workstock only, 24 used both workstock and tractors (combination farms), and 3 used tractors only, Table 5. The largest proportion of tractors was found on farms with large cotton enterprises. These farms accounted for 23 per cent of the total cotton acreage in the area. Many of these larger farms used some tractor power in producing cotton, but only 6 per cent used tractor power only.

TABLE 5. DISTRIBUTION OF FARMS, BY SIZE OF COTTON ENTERPRISE, AND BY TYPE OF POWER USED, UPPER COASTAL PLAIN 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	30	86	28	85	16	49
Combination farms[1]	4	11	5	15	15	45
Tractor farms	1	3	0	0	2	6
TOTAL	35	100	33	100	33	100

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

Usual Labor Requirements

The amount of man labor used in 1947 varied from 104 hours per acre on workstock (cropper) farms with large cotton enterprises to 118 hours per acre on workstock (operator) farms with small- and large-sized cotton enterprises. Approximately 44 hours of animal power were required to produce an acre of cotton, Appendix Table 5 and 6.

In comparing labor requirements for various operations among different size and tenure groups in 1947, chopping and hoeing, and harvesting were considered separately, since these operations required a relatively large amount of labor and varied widely among size and tenure groups. Chopping and hoeing required almost a fifth of the total man labor needed to produce an acre of cotton; harvesting required over one-half of the total. Workstock farms with large cotton enterprises, in general, were more efficient in the use of labor than were farms with small- and medium-sized cotton enterprises.

No significant differences were found on workstock, combination, and tractor farms in 1947 between operator and cropper operations other than in labor used in chopping, hoeing, and harvesting. Differences that occurred in these operations were for the most part due to an additional time over for hoeing and picking. These differences were also closely associated with variations in yield.

Appendix Table 5 shows that, in general, less man labor was required in 1947 on workstock farms with medium and large cotton enterprises than on workstock farms with small cotton enterprises. The difference was due chiefly to labor requirements of pre-harvest operations. Operators of farms with large cotton enterprises are often able to make better use of machinery and equipment and thus reduce man labor requirements. Pre-harvest

man labor requirements on farms with small cotton enterprises may be reduced by the substitution of larger equipment.

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, a cotton grower usually has 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 in this area usually begins in February with preparation of the seedbed. Cotton is usually planted during the last part of April and the first part of May. Peak labor requirements normally occur during June mainly because of requirements for chopping and hoeing, and during October and November, which are peak harvest months.

Variation from Usual Operations

A wide variety of machinery and equipment of varying sizes was 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 greatest amount of labor in 1947 were selected for comparison with the more common methods used in performing the same operations. Although the methods ordinarily used in performing usual operations did not involve the use of tractor power only, usual operations in which tractor power only was used were selected for comparison with the greatest labor-saving methods of performing usual operations on workstock farms. These greater labor-saving methods on workstock farms required 105 hours of man labor and 42 hours of animal work to produce and harvest an acre of cotton yielding 348 pounds of lint, Table 6. This represented a saving of about 11 man hours or 9 per cent of usual requirements.

With tractor power and using primarily two-row equipment, approximately 88 hours of man labor and 6 hours of tractor work were required to produce an acre of cotton in 1947, Table 7.

When compared to workstock operations, this indicates that a significant amount of man labor can be saved by use of tractor power for pre-harvest operations, exclusive of chopping and hoeing.

Savings in man and power hours through use of larger equip-

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

Item	Size of equipment	Times over	Hours per acre[1]		
			Man	Animal	Truck
Cut stalks	2-row cutter	1	.9	1.8	.0
Flat-break	2-horse moldboard plow	1	5.0	10.0	.0
Cultivate flat-broken land	Section harrow	1	1.5	2.0	.0
Bed	2-horse middlebuster	1	1.8	3.6	.0
Cultivate beds	Drag	1	1.0	2.0	.0
Plant	1-row planter	1	2.4	2.0	.0
Fertilize	1-row distributor	1	2.7	1.8	.0
Cultivate	1-row cultivator	5	9.5	19.0	.0
Chop and hoe	Hoe	2	21.1	.0	.0
TOTAL PRE-HARVEST			45.4	42.2	.0
Harvest	Hand	3	58.1	.0	.0
Haul	Truck or trailer	--	1.9	.0	1.9
TOTAL			105.4	42.2	1.9
Comparison (usual total)			116.0	40.5	1.9
Labor and power saved			10.6	–1.7	.0
Per cent labor and power saved			9.1	–4.2	.0

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

TABLE 7. SELECTED VARIATIONS FROM USUAL IN PER ACRE LABOR REQUIREMENTS FOR PRODUCING COTTON USING TRACTOR-DRAWN EQUIPMENT, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947[1]

Item	Size of equipment	Times over	Hours per acre[2]		
			Man	Tractor	Truck
Cut stalks	2-row cutter	1	.4	.4	.0
Flat-break	2-disk plow	1	1.5	1.5	.0
Cultivate flat-broken land	Section harrow	1	.6	.6	.0
Plant and fertilize	2-row planter-distr.	1	.9	.4	.0
Cultivate	2-row cultivator	5	3.0	3.0	.0
Chop and hoe	Hoe	2	21.1	.0	.0
TOTAL PRE-HARVEST			27.5	5.9	.0
Harvest	Hand	3	58.1	.0	.0
Haul	Truck or trailer	--	1.9	.0	1.9
TOTAL			87.5	5.9	1.9

[1] A comparison was not made with the usual total for tractor-operated farms because so few farms in this area used tractor power only.

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

ment and by shifting to the use of more tractor power are of major importance in reducing both labor and power costs of producing cotton.

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

The gradual downward trend in the relative importance of cotton as a major farm enterprise in the Upper Coastal Plain Area of Alabama is likely to continue in the future.

Row crop cultivation with mechanical equipment is relatively more difficult in the Upper Coastal Plain 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; and, following this, increased mechanization may take place. However, when topography is not suitable for the use of tractor power and mechanical cultivating equipment, and on small subsistence farms operated with workstock power, cotton is likely to continue to remain a chief source of cash farm income.

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 can help to reduce 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 production of cotton and on this acreage follow practices that will result in the most efficient use of machinery and equipment. The following practices must be emphasized:

1. Leveling of fields and construction of broad type terraces to accommodate all tractor operations.
2. Elimination of hedge rows to increase size of fields and construction of broad drainage channels which can be crossed with tractor 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. The use of either horizontal- or vertical-type cutters is satisfactory for this operation. However, when green stalks are present, the power-driven,

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

rotary-type cutter is more efficient in handling this material. 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.

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

The planting operation will be of particular importance on those farms on which mechanical harvesters are used, because some mechanical cotton harvester manufacturers have designed their equipment to operate best at a standard row width of 40 inches.

Insect control has become increasingly important in this area due to an increase in insect infestation during the last few years. Sprayers and dusters are equally effective equipment for applying insect control materials. Tractor fenders may be necessary to reduce damage to rank cotton.

If Upper Coastal Plain 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. The conventional cotton duster may be used to apply defoliants which are put on at recommended rates per acre. Defoliation is done when most of the cotton bolls are mature. Defoliants should be applied either in late evening or early morning since contact with moisture is essential for maximum effectiveness.

Although the use of mechanical equipment now available requires some adjustments in cotton production practices, the labor-saving aspects of mechanization make a further shift to mechanization appear desirable. On most cotton farms of the Upper Coastal Plain 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 Upper Coastal Plain Area of Alabama. This is particularly true of those machines required for chopping and hoeing, and for harvesting the crop.

Saving man labor will not necessarily mean that cotton can be produced more profitably. The relative costs of labor and ma-

chinery together with the possible effects of mechanical harvesting on cotton quality and price will determine for individual producers the amount of machinery to substitute for labor and workstock power.

SUMMARY *and* CONCLUSIONS

The Upper Coastal Plain Area is among the principal cotton-producing areas of Alabama. In view of the importance of cotton in this area, 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 four counties selected as being representative of the Upper Coastal Plain Area to (1) obtain current information on cotton production practices, and (2) to compare current cotton production practices with Experiment Station recommendations in order to point out where improvement is needed.

In most cases, the equipment used in preparing land in 1947 was the type of equipment recommended. However, there is a possibility that costs can be decreased and efficiency increased through use of larger equipment on some farms, particularly on workstock farms. Most of the land was prepared during the latter part of March and the first part of April. A better seedbed may be obtained by breaking land earlier and allowing more time for it to settle before planting.

The most popular varieties of cotton in 1947 were Deltapine and Coker, both of which were recommended for this 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 quantity of seed was used when hill dropped than when planted solid in the drill. In some cases, farmers were planting a variety of seed not generally recommended. Also, some farmers were planting somewhat later than the dates recommended. Less than half of the acreage was planted with purchased seed. More than 64 per cent of all seed was treated. Improvement in the quality of planting seed, further treatment, and planting earlier may help to increase cotton yields. Although some hill dropping was done, all cotton was hand chopped and hoed. More frequent and thorough cultivation may decrease the number of times that hoeing is necessary and reduce hoe-labor costs accordingly.

Although all cotton was fertilized with some type of commercial fertilizer in 1947, applications per acre were considerably

below recommended rates. The per-acre yield of cotton can be improved by increasing fertilizer applications up to recommended rates. Costs of fertilizer applications may be decreased by using fertilizer attachments on planting and cultivating equipment.

Implements used for cultivation and weed control in 1947 were in most cases the types of equipment recommended. There is a possibility that costs of performing these operations may be reduced by using larger equipment where practicable, and by cultivating earlier and more frequently to decrease hand-labor requirements for hoeing.

Farmers who poisoned in 1947 were using calcium arsenate at somewhat below recommended rates; in 1947, slightly over 2 per cent of the total acreage was poisoned. Recommendations as to frequency of poisoning were not closely adhered to. 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.

Farmers were following recommended harvesting practices in 1947; the majority picked their cotton an average of three times over. On some farms, harvest labor may be reduced by picking thoroughly a minimum number of times. Experimental results have shown that there are possibilities of reducing harvest-labor requirements with mechanical strippers. Before this practice can become economical, however, mechanical strippers, and cleaning and ginning equipment will have to be improved to prevent or offset the loss in grade of machine-stripped cotton.

Power and labor requirements for producing cotton in this area were relatively high in 1947. Many farmers in this area can reduce these requirements through increased and more efficient utilization of the equipment already available on farms. When conditions permit a shift to the use of more mechanical power, additional savings in power and labor requirements can be achieved. The use of two-row equipment instead of smaller equipment on workstock farms can lower production costs and raise efficiency.

Cotton growers are faced today with the problem of the extent to which they should substitute machinery for man labor under existing economic conditions. The extent to which these shifts should be made on individual farms will depend on the topography of cotton land on these farms, future government-control programs, and relative costs of machinery and labor.

APPENDIX TABLE 1. ESTIMATED ACREAGE, YIELD, AND PRODUCTION OF COTTON, UPPER COASTAL PLAIN AREA OF ALABAMA, 1928-47[1]

Year	Acreage	Yield per acre	Production
	1,000 acres	*Pounds*	*1,000 bales*
1928	617.2	139	180.0
1929	622.2	177	230.1
1930	623.7	188	245.3
1931	578.9	208	251.7
1932	556.4	141	164.3
1933	573.6	139	166.4
1934	385.9	212	171.2
1935	404.6	223	188.4
1936	419.2	248	217.5
1937	491.3	295	303.1
1938	384.2	226	181.4
1939	384.5	155	124.3
1940	370.1	146	113.2
1941	316.6	171	113.9
1942	322.7	229	154.5
1943	305.3	275	175.4
1944	263.2	335	184.2
1945	254.9	302	161.1
1946	286.8	200	120.2
1947	259.5	267	144.8

[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, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947

Size of cotton enterprise	Type of power used					
	Workstock		Combination		Tractor	
	Number farms	Acres cotton	Number farms	Acres cotton	Number farms	Acres cotton
	Number	*Acres*	*Number*	*Acres*	*Number*	*Acres*
Small (35)[1]:						
Operator	27	128	4	30	0	0
Cropper	1	8	0	0	1	6
Tenant	2	13	0	0	0	0
Medium (33)[1]:						
Operator	26	366	5	66	0	0
Cropper	2	42	0	0	0	0
Tenant	0	0	0	0	0	0
Large (33)[1]:						
Operator	9	203	6	148	2	92
Cropper	13	506	13	687	0	0
Tenant	0	0	0	0	0	0

[1] Number of schedules included in survey.

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

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	35	33	33
Cotton planted	*Acres*	185	474	1,636
Proportion of purchased seed by varieties:[1]				
Coker	*Per cent*	0	16	24
Deltapine	*Per cent*	70	58	45
Half and Half	*Per cent*	0	11	0
White Gold	*Per cent*	18	7	0
All other	*Per cent*	12	8	0
Mixed seed	*Per cent*	0	0	31
Proportion of home-grown seed by varieties:[1]				
Coker	*Per cent*	32	7	0
Deltapine	*Per cent*	24	48	58
Half and Half	*Per cent*	16	14	3
White Gold	*Per cent*	7	21	18
All other	*Per cent*	21	10	7
Mixed seed	*Per cent*	0	0	14
Years from breeder:				
Home-grown seed				
1 year	*Per cent*	7	11	15
2 years	*Per cent*	47	41	37
3 years and over	*Per cent*	36	43	15
Not known	*Per cent*	10	5	33
Purchased seed				
Direct from breeder	*Per cent*	10	8	0
1 year	*Per cent*	16	35	64
2 years	*Per cent*	49	26	31
3 years and over	*Per cent*	1	24	0
Not known	*Per cent*	24	7	5

[1] Varieties listed are those most commonly used.

APPENDIX TABLE 4. COTTON HARVESTING PRACTICES, YIELD OF LINT COTTON PER ACRE, AND SEED COTTON PER 500-POUND BALE, BY SIZE OF COTTON ENTERPRISE, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947

Item	Unit	Size of cotton enterprise		
		Small	Medium	Large
Number of farms	*Number*	35	33	33
Acres harvested	*Acres*	185	474	1,636
Proportion of cotton:				
Hand picked	*Per cent*	100	100	100
Proportion of cotton hand picked by:				
Family labor	*Per cent*	76	82	64
Hired labor	*Per cent*	24	18	36
Bales produced	*Number*	127	324	1,279
Lint yield per acre	*Pounds*	343	342	391
Seed cotton per 500-lb. bale	*Pounds*	1,278	1,281	1,254

APPENDIX TABLE 5. MAN LABOR REQUIREMENTS PER ACRE FOR PRODUCING COTTON ON WORKSTOCK FARMS, BY USUAL OPERATIONS PERFORMED, AND BY SIZE OF COTTON ENTERPRISE, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947

Size of cotton enterprise	Number of records	Man labor used per acre by specified operations											
			Land preparation										
		Cut stalks	Flat-break	Cultivate after flat-breaking	Bed after flat-breaking	Cultivate beds	Plant	Fertilize	Cultivate	Chop and hoe	Harvest	Haul	Total
	(No.)	*(Man hours per acre)*											
WORKSTOCK FARMS:													
Small:													
Operator[1]	(30)	--	5.9	1.0	4.2	1.6	2.4	2.7	19.2	21.1	58.4	1.9	118.4
Medium:													
Operator[1]	(28)	1.4	5.0	2.0	1.8	--	2.4	2.7	19.2	21.1	57.7	1.9	115.2
Large:													
Operator	(9)	1.4	5.9	2.1	1.8	1.0	2.4	2.7	16.0	21.1	61.7	1.9	118.0
Cropper[2]	(13)	1.4	5.9	2.4	1.8	1.6	2.4	2.7	16.0	11.1	57.1	1.9	104.3

[1] Croppers and tenants were combined with operators.
[2] Tenants were combined with croppers.

APPENDIX TABLE 6. POWER REQUIREMENTS PER ACRE FOR PRODUCING COTTON ON WORKSTOCK FARMS, BY USUAL OPERATIONS PERFORMED, AND BY SIZE OF COTTON ENTERPRISE, UPPER COASTAL PLAIN AREA OF ALABAMA, 1947

Size of cotton enterprise	Number of records	Power used per acre by specified operations											
			Land preparation										
		Cut stalks	Flat-break	Cultivate after flat-breaking	Bed after flat-breaking	Cultivate beds	Plant	Fertilize	Cultivate	Chop and hoe	Harvest	Haul	Total
	(*No.*)	(*Power requirements [hrs.] per acre*)											
WORKSTOCK FARMS:													
Small:													
Operator[1]	(30)	--	5.9	2.0	8.4	3.2	2.0	1.8	19.2	--	--	1.9[2]	44.4
Medium:													
Operator[1]	(28)	2.8	10.0	4.0	3.6	--	2.0	1.8	19.2	--	--	1.9[2]	45.3
Large:													
Operator	(9)	2.8	5.9	2.1	3.6	2.0	2.0	1.8	16.0	--	--	1.9[2]	38.1
Cropper[3]	(13)	2.8	5.9	4.8	3.6	3.2	2.0	1.8	16.0	--	--	1.9[2]	42.0

[1] Croppers and tenants were combined with operators.
[2] Truck or car power.
[3] Tenants were combined with croppers.

APPENDIX TABLE 7. AVERAGE ANNUAL USE AND RATES OF PERFORMANCE FOR SPECIFIED OPERATIONS IN PRODUCING COTTON, BY TYPE OF EQUIPMENT USED, UPPER COASTAL PLAIN 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)	54	1.0	20.0	28.0	7.1	1.4	2.8	--
2-row (mule)	17	1.0	27.1	24.4	11.1	.9	1.8	--
2-row (tractor)	4	1.0	35.5	14.2	25.0	.4	--	.4
Disk harrow (tractor)	3	2.0	18.7	33.7	11.1	.9	--	.9
Flat-break:								
Moldboard:								
1-bottom (1-mule)	34	1.0	13.7	79.5	1.7	5.9	5.9	--
1-bottom (2-mule)	28	1.0	17.2	84.3	2.0	5.0	10.0	--
Disk harrow (mule)	6	1.0	14.3	24.3	5.9	1.7	3.4	--
Disk harrow (tractor)	4	1.2	40.0	33.6	14.3	.7	--	.7
Disk plows (tractor):								
2-disk	18	1.0	27.6	41.4	6.7	1.5	--	1.5
Cultivate flat-broken land:								
Section harrow (mule)	22	1.0	19.8	19.8	10.0	1.0	2.0	--
Disk harrow (mule)	5	1.2	23.7	68.3	4.2	2.4	4.8	--
Scratcher (mule)	18	1.0	18.0	37.8	4.8	2.1	2.1	--
Middlebuster (mule)	6	1.0	10.5	21.0	5.0	2.0	4.0	--
Drag (mule)	14	1.1	17.9	39.4	5.0	2.0	4.0	--
Disk harrow (tractor)	14	1.0	38.7	31.0	12.5	.8	--	.8
Section harrow (tractor)	8	1.0	28.2	16.9	16.7	.6	--	.6
Bed after flat-break:								
1 time to row (mule)	24	1.0	21.9	39.4	5.6	1.8	3.6	--
2 times to row (mule)	4	1.0	6.2	16.1	3.8	2.6	5.2	--
3 times to row (mule)	8	1.0	8.9	36.5	2.4	4.2	8.4	--
4 times to row (mule)	13	1.0	17.5	110.2	1.6	6.3	12.6	--

(*Continued*)

APPENDIX TABLE 7 *(Continued).* AVERAGE ANNUAL USE AND RATES OF PERFORMANCE FOR SPECIFIED OPERATIONS IN PRODUCING COTTON, BY TYPE OF EQUIPMENT USED, UPPER COASTAL PLAIN 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*
Bed only (mule):								
1 time to row	3	1.0	11.3	41.8	2.7	3.7	7.4	--
4 times to row	9	1.0	23.4	17.3	1.4	7.1	14.2	--
Cultivate beds (mule):								
Drag	11	1.0	19.5	19.5	10.0	1.0	2.0	--
Section harrow	14	1.0	17.6	28.2	6.2	1.6	3.2	--
Scratcher	14	1.0	31.5	55.5	5.7	1.8	1.8	--
Georgia stock	3	1.0	23.3	102.5	2.3	4.3	4.3	--
Lay off rows and open furrows:								
Georgia stock (mule)	30	1.0	17.1	34.2	5.0	2.0	2.0	--
Plant:								
1-row planter (mule)	103	1.0	18.8	37.6	5.0	2.4	2.0	--
1-row planter (tractor)[2]	4	1.0	22.8	11.4	20.0	.8	--	.5
2-row planter (tractor)[2]	7	1.0	38.5	15.4	25.0	.9	--	.4
Fertilize:								
1-row distributor (mule)	102	1.0	18.9	34.0	5.6	2.7	1.8	--
1-row distributor (tractor)[2]	4	1.0	22.8	11.4	20.0	.8	--	.5
2-row distributor (tractor)[2]	7	1.0	38.5	15.4	25.0	.9	--	.4
Side-dress:								
1-row distributor (mule)	15	1.0	25.5	45.9	5.6	1.8	1.8	--
Hand	19	1.1	22.5	37.1	6.7	1.5	--	--

(Continued)

APPENDIX TABLE 7 *(Continued).* AVERAGE ANNUAL USE AND RATES OF PERFORMANCE FOR SPECIFIED OPERATIONS IN PRODUCING COTTON, BY TYPE OF EQUIPMENT USED, UPPER COASTAL PLAIN 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*
Cultivate:								
½-row (mule)	81	5.7	16.9	308.3	3.1	3.2	3.2	--
½-row and 1-row (mule)	14	5.9	19.2	339.8	3.3	3.0	3.6	--
½-row and 2-row (mule)	3	7.0	27.3	439.5	4.3	2.3	2.4	--
1-row (mule)	7	6.7	40.0	509.2	5.3	1.9	3.8	--
1-row (tractor)	6	4.5	31.8	157.4	9.1	1.1	--	1.1
2-row (tractor)	7	4.9	39.6	116.4	16.7	.6	--	.6
Chop and hoe:								
1 time over	45	1.0	25.7	282.7	.9	11.0	--	--
2 times over	58	2.0	17.7	339.8	1.0	10.0	--	--
3 times over	8	3.0	13.9	412.8	1.0	10.0	--	--
Poison:								
Hand	12	3.1	15.8	39.2	12.5	.8	--	--
4-row duster (mule)	3	5.0	43.3	86.6	25.0	.4	.4	--
Haul:								
Mule and wagon	31	--	12.8	39.7	3.2	3.1	6.2	--
Truck and/or car and trailer	72	--	22.3	42.4	5.3	1.9	1.9[3]	--

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

[2] Planting and fertilizing equipment were operated on the same tractor and at the same time.

[3] Truck or car hours.