COTTON GROWING
IN EASTERN OKLAHOMA
A Comparison of Present Methods and Recommended Practices

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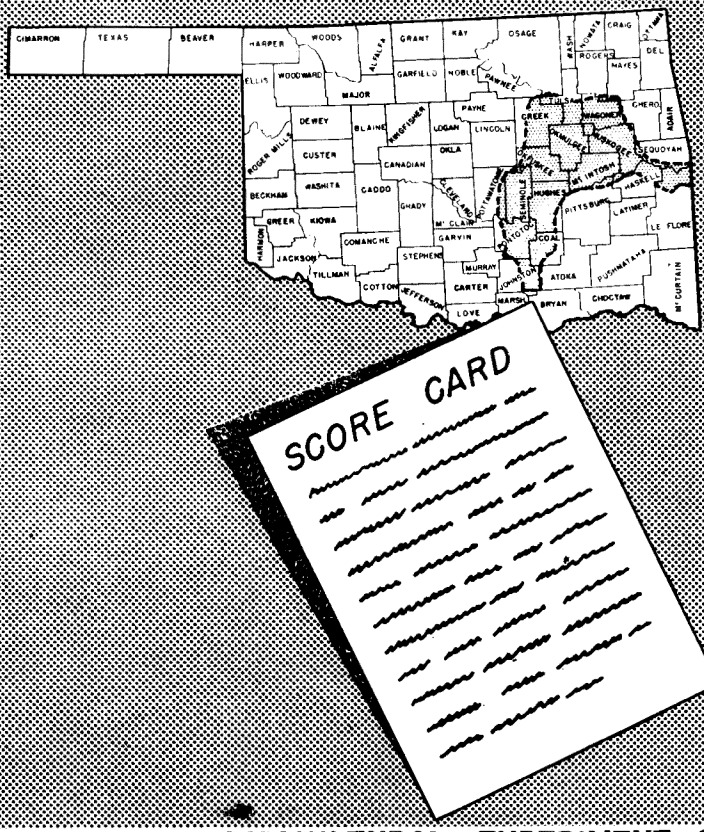
By
WILLIAM F. LaGRONE
Bureau of Agricultural Economics
U.S. Department of Agriculture



OKLAHOMA AGRICULTURAL EXPERIMENT STATION
Oklahoma A. & M. College Stillwater

W. L. Blizzard, Director Louis E. Hawkins, Vice Director

in cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics

SCORE CARD

for

Eastern Oklahoma

COTTON PRODUCTION PRACTICES

How to Use the Score Card

The use of a scoring system will point up strong and weak points in cotton practices and provide a guide for improvement. It will not furnish an easy solution to the problems of cotton growing. Too much depends on weather and other factors beyond the individual farmer's control.

The way cotton is grown on an individual farm may be evaluated by use of the scoring system presented here, by making adaptations to individual farm conditions.

The fertilization score should not be marked down on farms where soil tests show that fertilizer is not needed. Nor will insect control be needed to the same extent on every farm in every year. Land preparation and cultivation operations need to be evaluated from the standpoint of prior crops and type of soil. Man labor requirements for individual farms may be computed from the farmer's own estimates by operations performed, or from the averages (per acre covered) presented in Appendix Tables 6 and 6-A of Oklahoma Agricultural Experiment Station Bulletin No. B-345. Computed labor requirements may then be compared with lowest probable labor requirements, (see Tables 6 to 8, Bulletin B-345). However, proper adjustment in harvest labor requirements in both instances must be made to fit actual yields.

There are other factors in successful cotton production which are even more difficult to measure than the ones considered. For example, rotation of cotton with other crops will aid in controlling insect and plant diseases and reducing soil erosion. In addition, a legume crop in the rotation will help to maintain organic matter and nitrogen and improve physical condition of the soil.

SCORE CARD

for

Cotton Production Practices

(Eastern Oklahoma)

	Possible Score	Your Farm
Seed and Seeding Rate		
Variety	10	
Rate of seeding	5	
Method of planting and spacing	5	
Fertilization	10	
Insect Control	20	
Land Preparation and Cultivation		
Kind of operations	10	
Timeliness of operations	10	
Method and Time of Harvesting	10	
Labor Requirements		
Compared with lowest probable for each power group (horse or tractor) according to importance	10	
Compared with lowest probable using tractor power	10	
TOTAL SCORE	100	

The possible score is based on Experiment Station recommendations and evaluation of information obtained from farmers. Details of how to score the cotton enterprise are presented in Oklahoma Agricultural Experiment Station Bulletin B-345.

What It's All About . . .

Managing a cotton farm to provide a desirable living and an income on investment, and at the same time maintain soil fertility, has been difficult—probably more difficult than for any other important type of farm in Oklahoma. Reduced acreages and acre yields point up the problem.

Yet cotton remains an important source of income to many Oklahoma farm families, and to the State's economy generally. New production methods are appearing which promise to aid cotton in finding a stable place in Oklahoma agriculture. Therefore, research was undertaken to determine the probable value of various new methods as compared to older ways of growing cotton. This bulletin summarizes the results of that research.

The information presented here was obtained by asking more than one hundred representative eastern Oklahoma cotton farmers how they grew cotton. Each farm was visited personally, and considerable time was spent in getting complete details as to the methods used by each farm operator. These reports were then compared with experiment station recommendations, which are based on field tests made by station research workers, and on observation of methods that give good results on farms.

Finally, the knowledge obtained was summarized in score card form, to enable an individual cotton grower to compare his methods with those of others to see in what ways he might save work, increase net income, or both. The score card is given on page 8, and page 6 tells in brief how to use it. Remainder of the publication gives additional information useful in scoring a farm, and in comparing it with other farms in the area.

A general summary of results of the study is given in Table 2 and under the heading "Highlights of the Results" on page 5.

Similar studies have been made of cotton-growing areas in southeastern and southwestern Oklahoma, and reports on those areas are being prepared for publication.

CONTENTS

COTTON GROWING IN EASTERN OKLAHOMA:

A Comparison of Present Methods and Recommended Practices

By WILLIAM F. LAGRONE*
Bureau of Agricultural Economics
U. S. Department of Agriculture

The major cotton section of eastern Oklahoma is located in the Arkansas River Valley, extending from east central Oklahoma to the Arkansas border (Figure 1). Although cotton has decreased in importance on farms in this area, as it has in the rest of the State, cotton remains of major importance to many farm families. In all, two out of three farms in the area are vitally affected by the success or failure of the cotton crop.

The long-time trend in cotton acreage has been downward (Table 1). The decline between the peak year (1928) and 1948 amounted to about 70 percent, as compared to 74 percent for the State as a whole. This drastic decline can be attributed to various reasons, but the more important have been soil erosion and fertility depletion, insect hazards, high labor costs, cotton adjustment programs, and development of other crops and livestock enterprises suited to the area. The low average acre yields for the area point up some of the critical problems facing cotton farmers in maintaining farm incomes and improving soil resources.

With the foregoing considerations in mind, a study of cotton growing methods was begun in the summer of 1948 with a field survey in four counties of the area: Creek, Okmulgee, Muskogee, and McIntosh. The broad objectives of this study were:

(1) to provide a current picture of production practices of cotton and other major crops;

(2) to ascertain the variation in use of fertilizer, insecticides, and other improved practices, and in degree of mechanization; and

(3) to evaluate the economic significance of these production practices and techniques.

This publication describes current methods of growing cotton, presents the variation in these methods, and compares present practices with experiment station recommendations. It also suggests a method of scoring present cotton production practices on individual farms.

HIGHLIGHTS OF THE RESULTS

Table 2 shows composite scores for the farms visited in making this study. In general, farmers were close to experiment station recommendations on variety, rate of seeding, and method of planting and spacing. They were far short of recommendations

* Stationed at Stillwater, Oklahoma, with the Department of Agricultural Economics, Oklahoma Agricultural Experiment Station. This publication is based partly on an analysis of data obtained in a study of cotton growing methods conducted by the Bureau of Agricultural Economics in cooperation with Southern agricultural experiment stations. E. Lee Langsford, BAE, provides national leadership of the project; and Dr. Peter Nelson, Head, Department of Agricultural Economics, Oklahoma Agricultural Experiment Station, is general supervisor of the work in Oklahoma. In addition to the suggestions and helpful criticisms of the above in the planning and analysis of this study, other members of the Department of Agricultural Economics at Oklahoma A. & M. College also helped with the manuscript review, and Ada B. Eden furnished material assistance in assembling, summarizing and checking the data. Valuable aid given by production specialists in the Experiment Station and the Oklahoma Agricultural Extension Service is acknowledged on page 10.

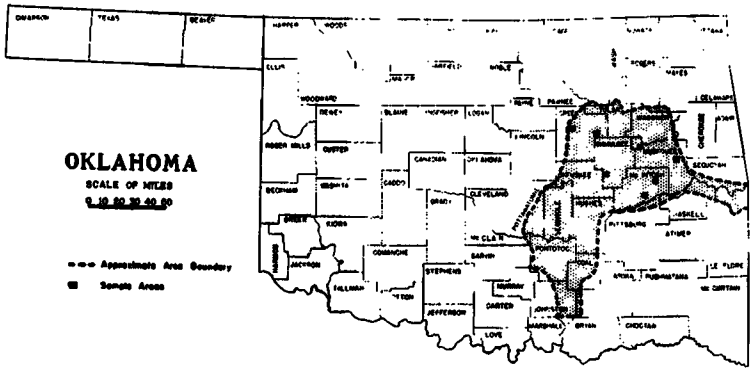


Fig. 1.—Data on cotton growing practices in eastern Oklahoma were obtained in the area indicated on the map. Sample areas are also shown.

with respect to fertilization and insect control.

Out of a possible score of 100, small farms had a score of 57, medium farms a score of 62, and large farms a score of 68.

The higher score for the larger farms was due principally to two factors: (1) good land preparation and cultivation, and (2) low labor requirements per acre and per pound of cotton produced. The high scores for these items were made possible by widespread use of tractors and larger equipment on the larger farms.

Small farms, however, received highest scores for method and time of harvesting.

HOW TO USE THE SCORE CARD

The use of a scoring system will point up strong and weak points in cotton practices and provide a guide for improvement. It will not furnish an easy solution to the problems of cotton growing. Too much depends on weather and other factors beyond the individual farmer's control.

The way cotton is grown on an individual farm may be evaluated by use of the scoring system presented here, if adaptations are made to individual farm conditions. A score card for this purpose has been prepared (see page 8).

The fertilization score should not be marked down on farms where soil tests show that fertilizer is not needed. Nor will insect control be needed to the same extent on every farm in every year. Land preparation and cultivation operations need to be evaluated from the standpoint of prior crops and type of soil. Man labor requirements for individual farms may be computed from the farmer's own estimates by operations performed, or from the averages (per acre covered) presented in Appendix Tables 6 and 6-A for the various operations by size of horse-drawn or tractor equipment. Computed labor requirements may then be compared with lowest probable labor requirements (see Tables 6 to 8). In both instances labor requirements for picking or snapping must be adjusted to actual yields.

There are other factors in successful cotton production which are even

Table 1.—Estimated Cotton Acreage, Production, and Yield Per Acre, Oklahoma and Arkansas Valley and Uplands Area of Eastern Oklahoma, Selected Periods.

Item	Yearly Periods; Average				Changes 1943-47 from	
	1928-32	1935-39	1943-47	1948*	1928-32	1935-39
Oklahoma						
Acreage (Thousand Acres)	3,804	2,197	1,298	1,069	−2,506	−899
Prod. (Thousand Bales)	1,109	544	379	374	−730	−165
Yield (Lbs.)**	139	118	140	168	+ 1	+ 22
Ark. River Valley & Uplands						
Acreage (Thousand Acres)	680	415	245	218	−435	−170
Prod. (Thousand Bales)	183	127	71	46	−112	− 56
Yield (Lbs.)**	129	147	139	100	+ 10	− 8

* Preliminary.
**Yield per acre in cultivation July 1.

Table 2.—Composite Scores for Present Cotton Production Practices on Farms in the Arkansas Valley and Uplands Area of Eastern Oklahoma.

Item	Possible Score*	Small Farms	Medium Farms	Large Farms
Seed and Seeding Rate (20 points)				
Variety	10	8	9	10
Rate of seeding	5	5	5	5
Method of planting and spacing	5	5	5	5
Fertilization (10 points)	10	1	2	3
Insect Control (20 points)	20	0	0	1
Land Preparation and Cultivation (20 points)				
Kind of operations	10	8	9	10
Timeliness of operations	10	9	9	10
Method and Time of Harvesting (10 points)	10	9	8	7
Labor Requirements (20 points)				
Compared with lowest probable for each power group (horse or tractor) according to importance	10	7	8	9
Compared with lowest probable using tractor power	10	5	7	8
Total Score	100	57	62	68

* Based on Experiment Station recommendations and evaluation of information obtained from farmers. The method of rating cotton practices is discussed in detail on page 10 to 22.

SCORE CARD
for
Cotton Production Practices in Eastern Oklahoma.

Item	Possible Score	Your Farm
Seed and Seeding Rate (20 points)		
Variety	10	
Rate of seeding	5	
Method of planting and spacing	5	
Fertilization (10 points)	10	
Insect Control (20 points)	20	
Land Preparation and Cultivation (20 points)		
Kind of operations	10	
Timeliness of operations	10	
Method and Time of Harvesting (10 points)	10	
Labor Requirements (20 points)		
Compared with lowest probable for each power group (horse or tractor) according to importance	10	
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Total Score	100	

The possible score is based on Experiment Station recommendations and evaluation of information obtained from farmers. The method of rating cotton practices is discussed in detail on pages 10 to 22.

more difficult to measure than those included in the score card. For example, rotation of cotton with other crops will aid in controlling insect and plant diseases and reducing soil erosion. In addition, a legume crop in the rotation will help to maintain organic matter and nitrogen and to improve the physical condition of the soil.

PRODUCTION RESOURCES ON SAMPLE FARMS

Methods and equipment used in growing cotton necessarily vary somewhat according to the number of acres grown on any one farm. Therefore, in this study, the farms surveyed were divided into three groups—small, medium, and large—according to the acreage of cotton grown. In 1944, approximately 30 percent of the farms in the area had cotton enterprises of less than 10 acres per farm (Table 3). These small cotton farmers accounted for only 9 percent of the acreage and production. Farmers in the large size group (30 acres or more per farm) accounted for only 17 percent of the total number of farms in the area, but produced 43 percent of the cotton. About half of the farms were in the medium- or middle-size group, and they had about one-half of the cotton acreage and production. In 1944, there were no important differences in cotton yields per harvested acre for the three size groups.

Before a detailed evaluation of the cotton enterprise is undertaken, some of the important characteristics of the entire farm setup should be examined. Indicated in Table 4 is the size of farm, other crops, livestock, and labor on the three groups of farms studied. Small cotton farms were small both in terms of the acres in cotton and the total acreage in all farm land. In 1947, small cotton farms had an average of 7.2 acres of cotton, 38.2

*Table 3.—Cotton Harvested—Farms Reporting, Acreage and Production in Arkansas Valley and Uplands Area of Eastern Oklahoma, 1944.**

Size group (acres in cotton)	Farms reporting		Acres of Cotton		Bales produced	
	Total number	Percent of total	Total number	Percent of total	Total number	Percent of total
Small (under 10)	4,888	29.6	25,228	9.0	11,915	9.1
Medium (10-29)	8,789	53.4	135,388	48.3	63,564	48.3
Large (30 and over)	2,794	17.0	119,705	42.7	55,975	42.6
Total	16,471	100.0	280,321	100.0	131,454	100.0

* Data from Table 1, Special Report—Cotton Farms Classified by Acreage Harvested, U. S. Census, 1945.

Table 4.—Land Use, Cropland, Livestock, and Resident Labor Organization, Average Per Farm, by Size of Farm, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.

Item	Small farms*	Medium farms*	Large farms*
	Acres	**Acres**	**Acres**
Land Use:			
All land in farm	94.2	119.1	252.5
Owned	41.2	41.4	56.6
Rented in	53.0	77.7	195.9
Total cropland	38.2	60.0	142.8
Permanent pasture	35.5	33.4	77.4
Cropland Organization:			
Cotton	7.2	17.8	55.8
Corn	13.3	23.4	50.3
Sorghums	4.1	5.1	13.7
Oats	2.2	6.7	13.0
Peanuts	.8	1.3	2.4
All hay	7.0	2.5	.8
All other crops	2.1	1.4	3.3
	Number	**Number**	**Number**
Livestock Organization:			
Workstock	2.3	2.2	2.1
Milk cows	4.0	3.0	6.0
Other cows	.9	1.2	2.5
All other cattle	2.4	3.8	3.4
Brood sows	.6	.8	1.7
Hens and pullets	51.9	56.9	63.4
Tractor	.1(3)**	.4(14)**	.9(27)**

Labor organization:	No. families	No. workers	No. families	No. workers	No. families	No. workers
Operator	1.0	2.8	1.0	3.1	1.1	3.7
Cropper	None		None		None	
Other tenant	None		None		None	
Wage hand	None		None		None	

* 34 small farms, 35 medium farms, 32 large farms. Small, 1 to 9 acres of cotton, medium, 10 to 29 acres of cotton; large, 30 acres of cotton and over.

**Figures in parentheses refer to number of farmers reporting tractors. In large farm group, 27 farmers reported 29 tractors.

acres of cropland, and 94.2 acres in the entire farm. Although the total farm acreage on medium farms was not quite 25 acres greater than on small farms, about 22 additional acres were in cropland and more than 10 additional acres in cotton. Large cotton farms, all of which were relatively large farm units, had 57 percent of the total farm acreage in cropland. Large farms also had the greatest percentage of cropland in cotton, 39 percent, compared with 30 percent on medium farms, and only 19 percent on small farms. Corn and other feed crops were other important enterprises on cotton farms.

Tractors were used on 9 percent of the small, 40 percent of the medium, and 84 percent of the large farms in 1947 based on this study. These percentages are all greater than in 1944* and reflect the increasing trend toward mechanization, particularly on medium and large cotton farms. On farms reporting, tractors were sufficient to supply all farm power, but almost half of the farms with tractors also reported workstock. On these farms, workstock were used only slightly, mainly for plowing gardens and a little cotton planting, but the work performed would not justify their upkeep. It appears that workstock on these farms are maintained mostly out of habit, and replacement when they die is unlikely.

All of the cotton farmers interviewed reported that they operated their farms with family and incidental hired labor during peak periods; and consequently no wage hands, share croppers, or other dependent tenants were reported. As the size of farm increased, the number of workers per farm also increased. In a few cases there were two operator families on large cotton farms, instances in which a father and son or two brothers were operating in partnership.

The typical ownership pattern in eastern Oklahoma was indicated by the larger proportion of the farm land owned on small cotton farms than on the medium and large units (Table 4). One-half of the small cotton farmers were full or part-owners, compared with slightly more than one-third of the medium and large farmers. Only 19 percent of the large cotton farmers owned all of the land that they operated. The predominant tenure arrangement was share—¼ of the cotton and ⅓ of the feed crops.

COTTON GROWING PRACTICES

The following pages present details of the procedure followed in evaluating the various factors used in developing the scoring system. This will aid in using the score card, and will also serve to give a general picture of cotton production practices now in use and recommended. In preparing the scoring system, and rating present practices, economists were aided by production specialists of the Oklahoma A. & M. College experiment station and extension service** who are familiar with both research results and cotton practices now in use on farms.

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* Based on Data from Table 1, Special Report—Cotton Farms Classified by Acreage Harvested, U. S. Census, 1945.

** I. M. Parrott, superintendent of the Oklahoma Cotton Research Station at Chickasha, and Wesley C. Chaffin, Oklahoma Extension Agronomist, reviewed the entire manuscript and furnished suggestions for the agronomic sections. Dr. Horace J. Harper, Soils Scientist, Oklahoma Agricultural Experiment Station, furnished suggestions for the section on fertilization. Dr. F. A. Fenton, Entomologist with the Experiment Station, furnished suggestions for presentation of the section on insect control. W. J. Oates, Agricultural Engineer in charge of the Experiment Station's cotton mechanization research, reviewed the manuscript and furnished suggestions for the sections on land preparation and cultivation and labor and power requirements.

Seed and Seeding Rate:

Variety, Rate of Seeding and Method of Planting and Spacing

Recommendations

A good cotton variety must be a high yielder, have a good lint turnout, a length of staple in market demand, and a fiber with high tensile strength and good character. A cotton variety with relatively large boll size is important to the hand picker, and a variety that starts blooming early and rapidly is desirable. Some of the more common varieties which appear to meet most of the above tests are Rowden, Deltapine, Stoneville, and Mebane or Lockett 140. To insure varietal purity, the farmer needs a reliable source of planting seed, and the seed should be certified or better. Therefore, the use of purchased planting seed is considered more desirable because home-grown seed involves greater possibility of contamination and mixing. However, farmers with gin and other facilities available to preserve purity of seed should not hesitate to save home-grown seed of high quality.

The usual practice in Oklahoma is to plant 16 to 32 pounds of cottonseed (non-delinted) per acre. Although the average seed planted per acre in the eastern part of the State has been greater than in other areas, 16 pounds of non-delinted seed of improved varieties with high germination is sufficient to plant an acre. About 10 to 12 pounds of mechanically delinted or 8 to 10 pounds of acid delinted seed is sufficient to plant an acre. Spacings of from 8 to 16 inches with 1 to 3 plants in the hill appear to be a superior method of planting and spacing, although experimental results show nothing conclusive on spacing.

Present Practices

The total cottonseed used per acre of cotton planted in 1947, for both planting and replanting, amounted to 21 pounds for small and medium cotton farms and 18 pounds on large farms. A major portion of the cotton acreage was planted with purchased seed, with the percentage of purchased seed greater on the medium and large farms than on small cotton farms. On large cotton farms, 90 percent of the cotton acreage was planted with purchased seed in 1947.

More than 90 percent of the purchased seed had been treated with Ceresan when bought, but a much smaller quantity had been delinted. None of the home-grown seed was treated or delinted. The seeding rate per acre (once over) for delinted seed ranged from about 50 to 80 percent of the rate of cottonseed not delinted. In general, large cotton farms used less seed per acre than the other size groups.

The most popular cotton variety in 1947 was Improved Rowden, which was more important relatively for home-grown seed than purchased. Deltapine and Mebane were other important varieties; and Watson Improved (another Mebane) was purchased for use on a considerable acreage. Operators of small cotton farms reported a considerably greater number of cotton varieties than did other farmers. Most of the cottonseed planted was of recent origin, although 20 percent of the home-grown seed used on small cotton farms was over three years from breeder. Most of the purchased seed was reported as being direct from breeder, although some of it may have been second year certified seed. In general, the quality of planting seed was good.

Practically all cotton in eastern Oklahoma was planted solid-in-drill and hand chopped to a stand in 1947. On medium farms 5 percent of the cotton acreage was hill dropped, and on large farms 4 percent. Only one farmer in the large farm group reported that his cotton was machine chopped; and one other in this group reported he used a 4-row weeder across the rows. These two farms included 5 percent of the cotton acreage in the large-farm group.

Most of the cotton solid-in-drill was planted in 36-inch rows with 8-inch to 14-inch spacing in the row. The small acreage of cotton hill-dropped on medium and large cotton farms was planted in 38-inch and 40-inch rows with a 12-inch spacing in the row.

Details of "Planting Seed and Method of Planting and Spacing" are summarized in Appendix Table 1.

These data indicate that the quality of planting seed was good and followed closely the recommendations of the Oklahoma Experiment Station and Extension specialists.

Rating of Present Practices (20 points)

Variety, with a total of 10 possible points, was evaluated on the basis of kind, source of seed, and years from breeder. A top score of 5 was given for a variety, such as Rowden, Deltapine, Stoneville, and Mebane, which had shown up well in experiment station tests. Other varieties, which were not so good, were rated 4, 3, and down to 2. Purchased seed was given a rating of 2 points and homegrown seed 1 point. Seed which was certified or better (direct from breeder) was given a rating of 3 points. Seed two years from breeder was rated 2 points, and seed three years from breeder, 1 point. Any seed more than three years from breeder was given 0 points. On the basis of these ratings, large farms appeared to have the best seed, followed by medium and small farms.

Rate of seeding (5 points) was based on an average of at least 16 pounds of seed not delinted and 10 pound of delinted seed per acre. All size groups were given a rating of 5 out of 5 possible points but some farmers may be planting less non-delinted cottonseed per acre than is needed to insure adequate stands and full production with the customary solid-in-drill planting. One point should be subtracted for each 2 pounds under the minimum seeding rates of 16 pounds. Since almost all cotton was planted solid-in-drill and chopped to a stand, a rating of 5 out of 5 possible points for method of planting and spacing was given to all size groups.

In summary, large farms received 20; medium farms, 19, and small farms, 18 out of 20 points for this general group.

Fertilization

Recommendations

Use a 4-12-4 or 4-16-0 fertilizer for medium and fine-textured soils and a 5-10-5 fertilizer for sandy soils, with 150 to 200 pounds per acre drilled in row at time of planting. Dark colored prairie soils low in available phosphorus should receive an application of 150 to 200 pounds of superphosphate (20 percent) per acre. Where cotton rust is severe use 200 to 300 pounds per acre of 3-9-18, 5-10-10 or 8-8-8 fertilizer.

Cotton planted on eroded or shallow soils will not respond well to fertilizer treatment. Lack of proper moisture will also prevent full response to fertilizer.

Present Practices

More than one-fifth of the cotton on medium farms and one-fourth on large farms received an application of complete fertilizer in 1947. In contrast, small farmers fertilized only 6 percent of their cotton acreage. The average rate of application per acre where fertilizer was used varied from 101 pounds on medium cotton farms to 147 pounds on small farms, usually applied at time of planting. The most popular analysis was 4-12-4, although a considerable acreage received 5-10-5. None of the farmers interviewed reported any other type of complete fertilizer or any side dressing. The average amount of fertilizer elements (N-P-K) is small, especially on the basis of the total number of acres of cotton planted on all farms in each size group.

Details of "Fertilizer Practices" are summarized in Appendix Table 2.

Rating of Present Practices (10 points)

A rating of 5 was given for the use of proper analysis and 5 for average quantity per acre (175 lbs.) considered desirable. Final rating on this basis was 1 point for small farms, 2 for medium farms, and 3 for large farms, reflecting present low fertilizer use.

Insect Control

Recommendations

"Based on experimental evidence, we recommend two early applications of 3-5-40 (3 percent gamma BHC, 5 percent DDT, 40 percent sulfur) or 20 percent chlorinated camphene plus 40 percent sulfur at the rate of approximately 10 pounds per acre per application. The first application should be made one week after the appearance of the first squares on the plants and the second application a week later."*

In years of frequent rain during the growing season, "it is necessary to protect cotton by three more dust applications using the same materials at the rate of 10 to 12 pounds per acre per application. These later applications should be started about July 21 and should be spaced at 5-7 day intervals."*

For insect control to be of greatest value it should be carried out over a large area. If every cotton grower within a community or other area were to poison, it would be more effective than poisoning of scattered fields.

Present Practices

More than 70 percent of cotton farmers interviewed reported no poison used during the past ten years and only a small percentage reported poison used more than two years in the last ten. In 1947, only 9 percent of the cotton acreage was poisoned by 4 percent of the farmers. The only poison used was calcium arsenate, which was usually applied in one application of about 9 pounds. Farmers reported that they usually applied poison from about the first of July to the middle of August. This indicates clearly the general lack of an effective insect control program in eastern Oklahoma. The principal reasons in the past have been lack of insecticides to provide a complete and adequate job of control, and lack of knowledge for proper application. Apparently, old ideas regarding insect control are in for some significant and probably profitable changes, as indicated by recent figures on insecticide use in the State.** In 1947, calcium arsenate was used more than any other material for cotton insect control; 1,512,493 pounds compared with 403,520 pounds of sulfur, the next most frequently used insecticide. The 3-5-40 mixture consumption jumped from 1,650 pounds in 1947 to 1,091,935 pounds in 1948. Calcium arsenate was second in 1948 with 308,449 pounds. The total amount of insecticides used was 2,025,460 pounds in 1947 and 1,980,597 pounds in 1948. In 1949, 3-5-40 probably ranked first. However, due to shortages there was probably an increase in various calcium arsenate mixtures. Also in 1949 sprays were used for the first time.

Details of "Poison Practices" are summarized in Appendix Tables 3 and 4.

Rating of Present Practices (20 points)

Due to the damage and reduction in yield commonly caused by boll weevils and bollworms in Eastern Oklahoma, the practice of insect control has been given a rating of 20 points. There was little poisoning of cotton in 1947, a heavy boll weevil year, and consequently only the large farms received any rating—of 1 point. The rating for insect control might be proportioned on the basis of 10 points for correct kind and quantity of poisoning material per application, and 10 points for correct number of applications to effect adequate control.

Land Preparation and Cultivation

Recommendations

In general, operations recommended are those which will result in thorough preparation of the seedbed, thoroughness of cultivation to destroy weeds and grass, loosen the soil, and conserve moisture; and chopping to the desired stand. All of these operations also must be performed on time for maximum production.

* Oklahoma A. & M. College Extension Service Cir. No. 499, Control Recommendations for Cotton Insects.

** These figures were obtained by the Oklahoma Extension Service Entomologist from county agents, dealers, etc.

system. A first step in this process is the determination of labor and power requirements for cotton. Therefore, the purpose of this section is to summarize man labor and power requirements for cotton and to provide a standard for evaluating efficiency of labor and power use.

Present Practices

Usual Labor Requirements.—Usual labor requirements on cotton, as reported by the farmers visited, varied from 45.5 man hours per acre on farms with tractor power to 62.4 man hours per acre on farms with horse power (Table 5). About 40 hours of horse power or 6 hours of mechanized power (tractor plus truck) were required to produce an acre of cotton.

Preharvest labor requirements using tractor power were about 40 percent of the man labor requirements with horse power.* Man labor for chopping and hoeing required 15 hours per acre. This one operation accounted for 45 percent of total preharvest requirements on farms with horse power and 75 percent on farms with tractor power. Successful mechanization or better cotton spacing when planted would reduce hoe labor materially.

Picking, the usual method of harvesting cotton on farms with horse power, required a total of 27.1 hours per acre, or 43 percent of total labor per acre needed with a lint yield of 150 pounds (Table 5). Together, chopping and hoeing and picking required 67 percent of all labor used per acre of cotton on farms with horse power. There were considerably more farmers with tractor power who used a combination of picking and snapping than farmers who picked or snapped their entire crop. These farmers, who had a combination of harvesting methods, picked about 54 percent of their cotton and snapped the rest. This type of harvesting required a total of 24.6 hours per acre (based on a lint yield of 150 pounds) and amounted to 54 percent of total labor requirements. The addition of chopping and hoeing to harvest labor requirements resulted in a total equal to 87 percent of the usual labor requirements per acre of cotton on tractor farms. These data point up the reasons for the intensive efforts of researchers and farmers to find means of reducing cotton chopping and harvesting labor through mechanization. In computing harvest labor requirements in 1947, the usual rates were 17.5 pounds of seed cotton and trash (5.50 lbs. lint) picked per hour and 30 pounds of seed cotton and trash (7.15 lbs. lint) snapped per hour.

In general, large cotton farms had tractor equipment and consequently had smaller labor and power requirements than did the smaller farms. Out of a total of 32 large farms, 27 farms (84 percent) were using tractor power. There were 14 medium farms with tractor power out of a total of 35 (40 percent); but there were only 3 small farms with tractor power out of a total of 34 (9 percent). Usual labor requirements, assuming all cotton was picked, indicate that tractor power reduces total man labor requirements per acre 23 percent, but reduces preharvest labor requirements 40 percent. Tractor power reduces man labor required in planting and cultivating 73 percent, which indicates that the operator with a tractor can plant and cultivate almost four times as many acres of cotton as the operator with a team in the same amount of time.

Farmers who substituted snapping for picking reduced harvesting labor about one-fourth. Since harvesting is a large proportion of total labor requirements in cotton production, the substitution of snapping for picking would have a significant effect on

* Preharvest labor on tractor farms is 37 percent of all man labor hours on cotton. However, cost of preharvest man labor was only 29 percent of all man labor costs on cotton, based on labor rates paid by farmers in 1947, which were: For chopping and hoeing, 30 cents per hour; and for tractor driving, 50 cents per hour.

Item	Size of Equipment	Acres per 10 hour day	Times Over	Hours per acre			
				Man	Horse	Tractor	Truck
Animal Drawn Equipment							
Cutting stalks or disc harrowing	1-row 4 foot	8.0	1.0	1.2	2.4		
Flat breaking	2-H (12″)	2.2	1.0	4.5	9.0		
Bedding	2-H	6.0	1.0	1.7	3.4		
Harrowing	2-sect.	10.0	1.0	1.0	2.0		
Planting	1-row	6.0	1.0	1.7	3.4		
Cultivating	1-row	6.0	5.0	8.5	17.0		
Chopping and hoeing	Hand	1.0	1.5	15.0	----		
Total preharvest				33.6	37.2		
Picking	Hand	175*	2-3	27.1	----		
Snapping	Hand	300*	2-3	(21.0)	----		
Hauling to Gin	1 bale wagon	3.2	----	1.7	3.4		
Total (Usual)				62.4	40.6		
Total (if all picked)				(62.4)			
Total (if all snapped)				(56.3)			
Tractor Drawn Equipment							
Cutting stalks or disc harrowing)	7 ft. tandem	20.0	1.0	.5		.5	----
Flat breaking	2-14″	8.0	1.0	1.2		1.2	----
Harrowing	2-sect.	30.0	1.0	.3		.3	----
Planting	2-row	20.0	1.0	.5		.5	----
Cultivating	2-row	20.0	5.0	2.5		2.5	----
Chopping and hoeing	Hand	1.0	1.5	15.0		----	----
Total preharvest				20.0		5.0	----
Picking**	Hand	175*	2-3	14.9		----	----
Snapping**	Hand	300*	2-3	9.7		----	----
Hauling to Gin	1 bale truck	3.2		.9		----	.9
Total (Usual)				45.5		5.0	.9
Total (if all picked)				(48.0)			
Total (if all snapped)				(43.9)			

* Pounds per 10 hour day. Usual per acre yield of cotton is 150 pounds lint which is equivalent to 470 pounds seed cotton picked or 650 pounds snapped.

** Hand picking forms to pick part of the cotton ... Hours per acre reflected the proportion ...

total man labor requirements.* Other factors besides labor-saving are involved in the choice of picking or snapping. Differences in quality of lint secured from snapped and picked cotton may be sufficient to outweigh any labor saving. The spread between the price of picked cotton sold in the seed and snapped cotton sold in the seed may be too great to justify snapping. For example, if picked cotton is worth 8 cents in the seed, snapped cotton must be worth 6 cents for the value per bale to be equal, based on 1500 pounds seed cotton and trash per bale picked and 2000 pounds seed cotton and trash per bale snapped. However, some farmers may be forced to snap because of lack of labor to get the crop picked or the poor quality of cotton in the boll; and many observers believe that it is only a matter of time until cotton is snapped as a means of speeding up the harvest. Modern cleaning machinery must be installed in many additional gins for satisfactory quality of lint from snapped cotton.

Time of Operation.—Timeliness of operation is an important factor in successful cotton production. In a year with no great amount of adverse weather conditions, the average cotton grower in the Arkansas Valley and Uplands area has sufficient leeway in the possible time of operation to produce a cotton crop successfully (Figures 2 and 3). Difficulties in cotton production result principally from adverse weather conditions in combination with labor requirements for harvesting and for chopping and hoeing which are usually greater than the farm family can furnish. Peak labor requirements are concentrated in June, when cotton must be chopped and hoed, and in October and November, the major months of cotton harvest. The usual monthly distribution of labor requirements on cotton indicates that the farm family can plant and cultivate a much larger acreage than they can hoe and harvest. Land preparation usually begins in January and ends with preparation of the seedbed in April or the first half of May. May is usually the planting month in the area, although some farmers report general planting in April. Chopping and hoeing was most common in June, and picking began in late September and lasted usually through November. Snapping was most prevalent in October and November, usually ending about December 15. A comparison of Figures 2 and 3 indicates the wider time range of production operations on farms with tractors than with horse power. Some flat breaking was reported by tractor farmers as a group during 7 months of the year.

Variation from Usual Operations and Equipment.—Farmers used a wide variety of machinery and equipment in producing the cotton crop in 1947. For example, variation in harrowing equipment ranged from 4-foot log drags to 4-section, tractor-drawn harrows (details of these variations and the proportion of the cotton acreage affected are available in Appendix Tables 6 and 6-A). In addition, farmers with workstock varied the number of head attached to the same size implement in order to do a more thorough or faster job. Most horse-drawn operations were performed with two head of workstock, but three and four head were sometimes used. Most of the tractor equipment was 2-row or its equivalent, although there were some 1-row tractor equipment and 3-bottom breaking plows. No 4-row cultivators or planters were reported by the farmers visited in the survey.

Variation from usual hours required to produce an acre of cotton.—An acre of cotton with a lint yield of 150 pounds can be produced with 52.0

* The substitution of snapping for picking reduced costs of harvesting $10.00 per bale and $3.08 per acre, based on 1947 rates reported by farmers for harvesting ($3.00 per hundredweight for picking and $1.75 per hundredweight for snapping.) Snapping increased the cost of ginning $2.50 per bale and $.80 per acre, leaving a net advantage of $7.50 per bale and $2.28 per acre in favor of snapping. As a rule, labor costs can be reduced by substituting snapping for picking whenever the cost for snapping per hundredweight is less than 70 percent of the cost of picking per hundredweight.

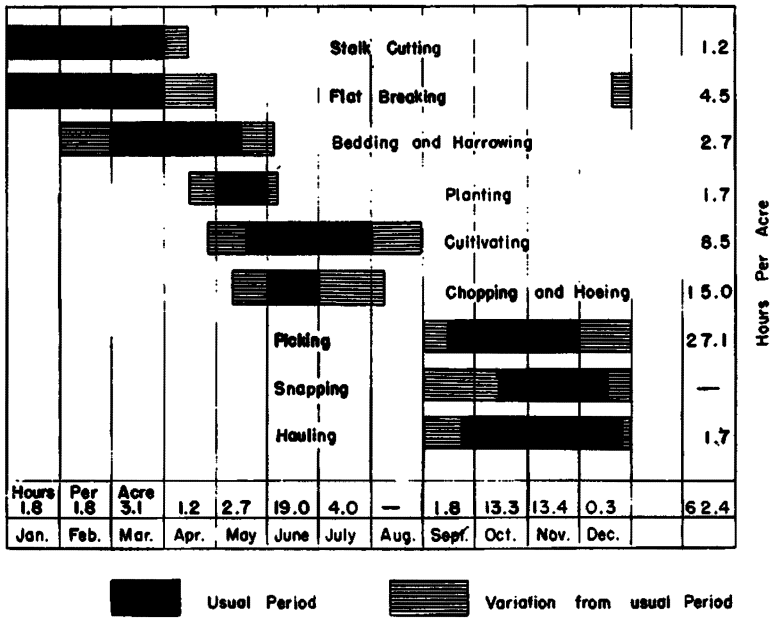

Fig. 2.—Periods in which cotton production operations are usually performed on farms with horse power, Arkansas Valley and uplands areas of Oklahoma.

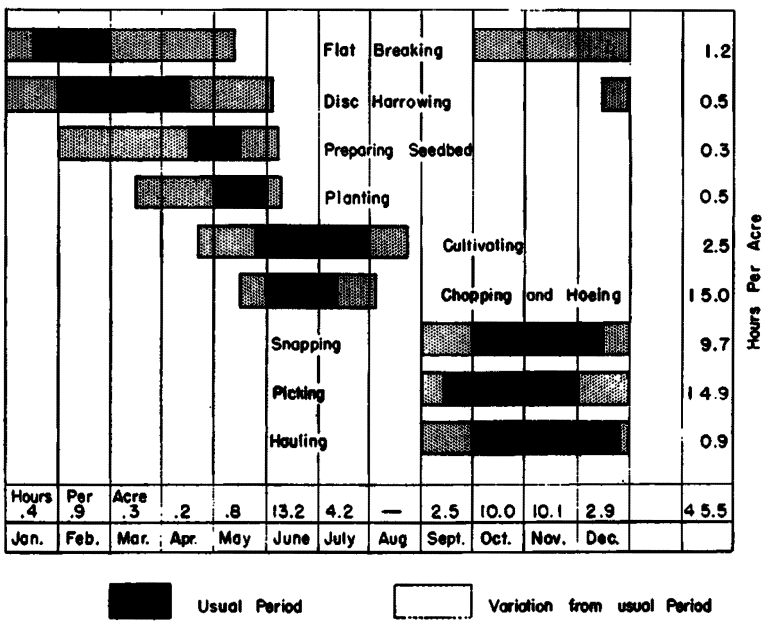

Fig. 3.—Periods in which cotton production operations are usually performed on farms with tractor power, Arkansas Valley and uplands areas of Oklahoma.

hours of man labor and 37.3 hours of horse work by using three horses where possible and snapping the crop instead of picking (Table 6). This is a saving of 10.4 man hours, or 17 percent of the usual requirements. About 60 percent of the saving, 6.3 hours, results from the change in harvesting method alone. The saving in work-stock hours amounts to 8 percent which, although not as large as man labor savings, is significant. However, operations most common in cotton production on farms with horse power are those which require the greatest amount of labor (see second comparison in Table 6). With tractor power, the saving in man labor by using larger equipment was 10 percent (Table 7). There was a greater percentage saving in tractor power, amounting to 16 percent. Man labor required to produce cotton with 1-row tractor equipment amounted to 52.2 hours compared with 45.5 hours with 2-row tractor equipment. However, 2.5 hours of this additional labor is caused by picking the entire crop. Tractor hours required with 1-row equipment are 80 percent greater than with 2-row equipment. The use of one hour of 1-row tractor power in cotton production replaces about 4.1 horse hours, but one hour of 2-row tractor power replaces 7.4 horse hours. The saving of man labor through the use of tractors is one of the major factors in the rapid change from horse to tractor power in the area.

Rating of Present Practices (20 points)

How Standards Were Determined.—The reports of farmers with low labor requirements per acre were used as a guide in determining a desirable standard. Two kinds of comparisons were used and are reported in Table 8. They were:

1. Average man labor requirements per acre of cotton for each size group in 1947 were compared with lowest probable labor requirements per acre calculated on two different bases: (a) If all farms with horse power used all labor-saving operations as reported in Table 6; and (b) if farms with tractor power used all labor-saving operations as reported in Table 7. (In both comparisons harvesting labor was adjusted to 1947 average yields reported). Both the present average and the lowest probable labor requirements were obtained by weighting on the basis of the proportion of cotton produced with horse power and tractor power within each size group. (For example, the average and lowest probable labor requirements for small farms with horses were given a weight of 90 percent and the average and lowest probable labor requirements for small farms with tractor power were given a weight of 10 percent to obtain the weighted average for small farms in Table 8). For the first 8 percent that average requirements were above lowest requirements, 1 point was subtracted, and 1 point for each additional 5 percent. These ratings are the first presented under labor requirements, to the right of "Compared with lowest probable for each power group" in Table 2 on page 7.

2. Average man labor requirements per acre of cotton were compared with what the lowest probable labor requirements per acre would be if all farms within each size group used all labor-saving operations with tractor power as reported in Table 7. For each 10 percent or fraction thereof that average man labor requirements were above lowest probable with tractor power, 1 point was subtracted (Table 8). These ratings are the second presented under labor requirements, to the right of "Compared with lowest probable using tractor power" in Table 2 on page 7.

These comparisons resulted in a rating of 12 points for the small farms included in this study, 15 for the medium-sized farms, and 17 for the large farms.

Method of Scoring Individual Farms.—The score for an individual farm is based on how the labor requirements on that farm compare with the lowest probable requirements as shown by the experience of farmers interviewed. In any individual farm comparison, harvesting labor must be adjusted to the cotton yield on that farm.

In scoring farms using tractor power, both 10-point items under "Labor Requirements" on the score card are fig-

Table 6.—Selected Variations from Usual in Per Acre Labor Requirements on Cotton Using Animal Drawn Equipment, with Comparisons, Arkansas Valley and Uplands Area of Eastern Oklahoma.

Item	Size of Equipment	Times Over	Hours per acre	
			Man	Horse
Most labor-saving operations reported in cotton production				
Cutting stalks or) disc harrowing)	7 ft. disc	1.0	1.0	3.0
Flat breaking	3-H (14″)	1.0	3.3	9.9
Bedding	1-row cult.	1.0	1.2	2.4
Harrowing	3-sect. (3-H)	1.0	.5	1.5
Planting	2-row	1.0	1.0	2.0
Cultivating (1st)	3-sect. (3-H)	1.0	.5	1.5
Cultivating (later)	1-row cult.	4.0	6.8	13.6
Chopping & hoeing	Hand	1.5	15.0	----
Total pre-harvest			29.3	33.9
Snapping*	Hand	2-3	21.0	----
Hauling	(1 bale wagon)	----	1.7	3.4
Total			52.0	37.3
Comparison (Usual total)			62.4	40.6
Labor & Power saved			10.4	3.3
Pct. labor and power saved			16.7%	8.1%
Most labor-using operations reported in cotton production				
Cutting stalks or) disc harrowing)	1 row log drag	1.0	1.7	3.4
Flat breaking	2 H (12″)	1.0	4.5	9.0
Bedding	2 H lister	1.0	1.7	3.4
Harrowing	log drag	1.0	1.2	2.4
Planting	1-row	1.0	1.7	3.4
Cultivating	1-row	5.0	8.5	17.0
Chopping & hoeing	Hand	1.5	15.0	----
Total pre-harvest			34.3	38.6
Picking*	Hand	2-3	27.3	----
Hauling	(1 bale wagon)		1.7	3.4
Total			63.3	42.0
Comparison (Usual total)			62.4	40.6
Additional labor & power used			0.9	1.4
Pct. additional labor & power used			1.4	3.4

* All cotton yields 150 pounds lint per acre.

Table 7.—Selected Variations from Usual in Per Acre Labor Requirements on Cotton Using Tractor Drawn Equipment, with Comparisons, Arkansas Valley and Uplands Area of Eastern Oklahoma.

Item	Size of Equipment	Times Over	Hours per acre		
			Man	Tractor	Truck
Most labor-saving operations reported in cotton production					
Cutting stalks or) disc harrowing)	7 ft. tandem	1.0	.5	.5	----
Flat breaking	3-14"	1.0	.8	.8	----
Harrowing	4-sect.	1.0	.2	.2	----
Planting	2-row	1.0	.5	.5	----
Cultivating (1st)	4-sect.	1.0	.2	.2	----
Cultivating (later)	2-row	4.0	2.0	2.0	----
Chopping & hoeing	Hand	1.5	15.0	--	----
Total pre-harvest			19.2	4.2	----
Snapping*	Hand	2-3	21.0	----	----
Hauling	(1 bale truck)	----	.9	----	.9
Total			41.1	4.2	.9
Comparison (Usual total)			45.5	5.0	.9
Labor & power saved			4.4	0.8	----
Pct. labor & power saved			9.7%	16.0%	----
Most labor-using operations reported in cotton production					
Cutting stalks or) disc harrowing)	5 ft. disc	1.0	.7	.7	
Flat breaking	1-16"	1.0	2.0	2.0	
Harrowing	2-sect.	1.0	.3	.3	
Planting	1-row	1.0	1.0	1.0	
Cultivating	1-row	5.0	5.0	5.0	
Chopping & hoeing	Hand	1.5	15.0	-- -	
Total pre-harvest			24.0	9.0	
Picking*	Hand	2-3	27.3	----	
Hauling	(1 bale truck)		.9	----	.9
Total			52.2	9.0	.9
Comparison (Usual total)			45.5	5.0	.9
Additional labor & power used			6.7	4.0	----
Pct. additional labor and power used			14.7%	80.0%	----

* All cotton yields 150 pounds lint per acre.

ured in one operation. For example, take a farm where man labor requirements per acre total 46 hours. Forty-six hours is 112 percent of the "most labor-saving operations" reported in Table 7 (41.1 hours). The 12 percent represents two fractional ten-percents, hence 2 points is subtracted from each 10-point item in the score, leaving 8 for each item or a total labor requirement score of 16 out of 20 possible points.

In scoring farms using horse power, the two 10-point score items must be figured separately. The first item is figured by comparing the farm's labor requirement with the lowest probable using horse power, from Table 6, which is 52.0 hours. The second item is figured by comparing the farm's labor requirement with the lowest probable using tractor power, 41.1 hours. For example, take a farm where man labor requirements are 58.2 hours. This is 112 percent of 52.0 hours, or two fractional ten-percents, hence 2 points is subtracted from the first item, leaving a score of 8. The farm's labor requirement of 58.2 hours is 142 percent of the lowest probable using tractor power (41.1 hours), which is 5 fractional ten-percents, hence 5 points is subtracted from the second item, leaving a score of 5. Now the two scores, 8 and 5, are added, which gives the farm with horse power a score of 13 points out of the possible 20.

Table 8.—Method for Rating Labor Requirements for an Acre of Cotton, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.

Size-Equipment group	Percent of cotton acres	Av. lbs. lint per acre	Av. man hours per acre	Lowest probable hours per acre*	Percent av. labor requirements are of lowest probable	Rating
Comparison weighted by proportion of horse and tractor power						
Small farms:						
With horses	90	147	60.76	51.50		
With tractors	10	220	61.36	51.40		
Weighted average	xx	154	60.82	51.49	118	7
Medium farms:						
With horses	53	161	61.45	53.60		
With tractors	47	171	48.32	44.20		
Weighted average	xx	166	55.28	49.18	112	8
Large farms:						
With horses	14	99	47.70	44.30		
With tractors	86	125	40.43	37.40		
Weighted average	xx	121	41.45	38.36	108	9
Comparison with lowest probable hours per acre with tractor power						
Small farms	xx	154	60.82	41.80	146	5
Medium farms	xx	166	55.28	43.50	127	7
Large farms	xx	121	41.45	36.90	112	8

* Harvesting labor was adjusted to average yields reported.

Appendix Table 1.—*Planting Seed, Seed Treatment and Rate of Seeding, Arkansas Valley and Uplands Area of Eastern Oklahoma,* 1947. (*Percent, except where indicated*)

Item	Small Farms	Medium Farms	Large Farms
Number of farms	34	35	32
Acres of cotton planted	246	623	1786
Pounds seed used per acre for planting and replanting	21	21	18
Seed per acre for planting (seeding rate)			
pounds delinted seed	10	14	10
Pounds non-delinted seed	20	18	16
Purchased seed:			
Proportion of farmers using	62	74	94
Proportion of acreage planted	64	73	90
Proportion of purchased seed:			
Delinted	10	15	30
Treated	96	93	94
Proportion of home-grown seed:			
Delinted	0	0	0
Treated	0	0	0
Proportion of purchased seed by varieties:			
Rowden Improved	46	51	60
Deltapine	11	13	24
Watson Improved (Mebane)	11	10	8
Mebane	7	26	2
All other*	25	0	6
Proportion of home-grown seed by varieties:			
Rowden Improved	51	69	80
Deltapine	18	16	20
Mebane	20	0	0
Stoneville	0	15	0
All other**	11	0	0
Years from breeder:			
Purchased seed			
Proportion 1 year (direct breeder)	96	100	98
2 years from breeder	2	0	2
3 years from breeder	0	0	0
Over 3 years from breeder	0	0	0
Not known	2	0	0
Home-grown seed			
Proportion 2 years (increased seed)	48	62	88
3 years from breeder	28	38	12
Over 3 years from breeder	20	0	0
Not known	4	0	0

* All other purchased seed: Small farms, Stoneville—17 percent, Northern Star—5 percent, Gin Run—3 percent; Medium farms, none; Large farms, Stoneville—3 percent, Paymaster—3 percent.

**All other home-grown seed: Small farms, Acala—7 percent, Unknown—4 percent; Medium farms, none; Large farms, none.

Appendix Table 2.—Fertilizer Practices by Size of Farm, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.

Item	Unit	Small Farms	Medium Farms	Large Farms
Farms	Number	34	35	32
Cotton Planted	Acres	246	623	1786
Proportion using complete fertilizer only:*				
Farms	Percent	6	20	25
Acreage	Percent	6	21	26
Rate of application:				
Per acre fertilized	Pounds	147	101	119
Per acre planted**	Pounds	9	21	31
Analysis:				
Proportion acreage using				
4-12-4	Percent	100	57	62
5-10-5	Percent	0	43	38
Summary of fertilizer elements:				
Nitrogen				
Per acre fertilized	Pounds	5.9	4.5	5.2
Per acre planted**	Pounds	.4	.9	1.3
Phosphorus				
Per acre fertilized	Pounds	17.6	11.3	13.3
Per acre planted**	Pounds	1.1	2.3	3.4
Potash				
Per acre fertilized	Pounds	5.9	4.5	5.2
Per acre planted**	Pounds	.4	.9	1.3

* Only complete fertilizer was used on cotton.
**Total amount of fertilizer used on cotton divided by total acres of cotton planted by farmers in each group.

Appendix Table 3.—Number of Years During Last 10 Poison Was Used, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.
(Percent)

Number years poison used during last ten	Small farms	Medium farms	Large farms
0	88	71	69
1	12	26	19
2	0	3	6
3	0	0	3
4	0	0	3

Appendix Table 4.—Poison Practices, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.

Item	No. or Percent
Farms (Number interviewed)	101
Cotton planted on these farms (acres)	2655
Proportion of acreage poisoned (percent)	9
Proportion of farms using calcium arsenate (percent)	4
Proportion of acreage poisoned with calcium arsenate	
1 time (percent)	8
2 times (percent)	1
Application per acre once over (pounds)	9

Appendix Table 5.—Cotton Harvesting Practices, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947.

Item	Small farms	Medium farms	Large farms
Number of farms	34	35	32
Acres harvested	237	617	1716
Bales produced	79	216	452
Pounds lint yield per acre	160	167	126
Percent of cotton:			
Hand picked	84	76	45
Hand snapped	16	24	55
Percent of cotton hand picked by:			
Family labor	47	52	42
Hired labor	53	48	58
Percent of cotton hand snapped by:			
Family labor	23	39	12
Hired labor	77	61	88
Pounds seed cotton and trash per bale:			
Hand picked	1489	1480	1498
Hand snapped	1967	1988	2057
Pounds cotton seed per bale:			
Hand picked	833	892	876
Hand snapped	879	884	885

Appendix Table 6.—Operations Performed, Labor and Power Used Per Acre of Cotton, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947; Major Source of Power—Horses, 57 Farms.

Operation and size of equipment	Proportion of farmers reporting	Proportion of planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hours	Hours	Hours	Hours	Hours	Hours
Cutting stalks:	(25)	(23)							
1-row cutter	25	23	1.00	1.25	2.50		.29	.58	
Dragging stalks	(4)	(1)							
Log drag	4	1	1.00	1.67	3.34		.02	.03	
Disc Harrowing:	(41)	(38)							
4-foot disc	(22)	(16)							
With 2 horses	18	13	1.33	1.25	2.50		.22	.43	
With 3 horses	2	2	2.00	1.25	3.75		.05	.15	
With 4 horses	2	1	1.00	1.25	5.00		.01	.05	
6-Foot disc	(15)	(14)							
With 2 horses	2	1	1.00	1.30	2.60		.01	.03	
With 3 horses	9	11	1.48	1.10	3.30		.18	.54	
With 4 horses	4	2	1.50	1.33	5.32		.04	.16	
7-Foot disc (3-H)	2	2	1.00	1.00	3.00		.02	.06	
9-Foot disc (4-H)	2	6	1.00	1.50	6.00		.09	.36	
Flat Breaking:	(85)	(83)							
2-Horse plow	56	47	1.00	4.55	9.10		2.14	4.28	
3-Horse plow	25	33	1.00	3.33	9.99		1.10	3.30	
Tractor, 2-plow*	4	3	1.00	1.43		1.43	.04		.04
Bedding:	(77)	(69)							
2-Horse lister	61	45	1.24	1.67	3.34		.93	1.86	
3-Horse lister	2	6	1.00	1.67	5.01		.10	.30	

* Custom hired.

Appendix Table 6 (Continued)

Operation and size of equipment	Proportion of farmers reporting	Proportion planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hours	Hours	Hours	Hours	Hours	Hour
3-Horse lister	(2)	(3)	1.00	1.67	5.01		.05	.15	
2-H shovel plow	14	18	1.03	1.25	2.50		.23	.46	
2-H shovel plow	(12)	(12)	1.27	1.25	2.50		.19	.38	
1-H Turning plow	(2)	(3)	1.00	1.30	1.30		.04	.04	
Harrow or cultivate before planting:	(80)	(84)							
2-section harrow	(69)	(78)							
With 2 horses	53	55	1.21	1.00	2.00		.67	1.33	
With 3 horses	16	23	1.37	.80	2.40		.25	.76	
3-section harrow (3-H)	2	2	2.00	.50	1.50		.02	.06	
Go-Devil (1-row, 2-H)	2	1	1.00	1.67	3.34		.02	.03	
Log drag (2-H)	5	2	1.00	1.25	2.50		.03	.05	
Log drag (2-H)	(4)	(4)	1.00	1.25	2.50		.05	.10	
Tractor, 3-sect.*	2	1	2.00	.30		.30	.01		.01
Fertilizing:	(6)	(5)							
1-row (1-H)	4	2	1.00	1.25	1.25		.03	.03	
2-row comb. planter and distributor	2	3	1.00	(Combined with planting)					
Planting:	(100)	(100)							
1-Horse	39	34	1.00	1.49	1.49		.51	.51	
2-Horse	(58)	(64)							
1-row	44	37	1.00	1.67	3.34		.62	1.24	
2-row	14	27	1.00	1.00	2.00		.27	.54	
Tractor, 2-row*	3	2	1.00	.50		.50	.01		.01
Replanting:	(15)	(9)							
1-Horse	4	2	1.00	1.49	1.49		.03	.03	
2-Horse	(9)	(6)							

* Custom hired.

Appendix Table 6 (Continued)

Operation and size of equipment	Proportion of farmers reporting	Proportion planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hours	Hours	Hours	Hours	Hours	Hours
1-row	7	3	1.00	1.67	3.34		.05	.10	
2-row	2	3	1.00	1.00	2.00		.03	.06	
Tractor, 2-row*	2	1	1.00	.50		.50	.01		.01
Cultivating:	(100)	(100)							
1-row cultivator (2-H)	100	100	4.43	1.67	3.34		7.40	14.80	
2-section harrow	(14)	(11)							
With 2 horses	(9)	(7)	1.00	1.00	2.00		.07	.14	
With 3 horses	(5)	(4)	1.00	.80	2.40		.03	.10	
1-row Go-Devil (2-H)	(2)	(2)	1.00	1.67	3.34		.03	.07	
Chopping & hoeing:	(100)	(100)							
Hand	100	100	1.54	10.00			15.40		
Total Preharvest							31.29	33.11	.07
Harvesting:	(98)	(99)							
hand picked (135 lbs. lint per acre)	89	84		24.54			20.61		
hand snapped (166 lbs. lint per acre)	. 9	(15		(23.22			(3.48		
hand snapped (166 lbs. lint per acre)	(16)			(			(		
Hauling:	(98)	(99)							
Wagon (1-bale)	70	76		1.93	3.86		1.47	2.93	
Truck (1-bale)	12	10		1.16		1.16	.12		.12
Truck (.75 bale)	(2)	1		2.00		2.00	.02		.02
Auto-trailer (1-bale)	5	6		.89		.89	.05		.05
Custom (1-bale truck)	11	6		1.00		1.00	.06		.06
Total							57.10	36.04	.32**

*Custom hired.
**Includes .20 truck hours and .05 auto hours.

TRACTOR POWER

Appendix Table 6-A.—Operations Performed, Labor and Power Used Per Acre of Cotton, Arkansas Valley and Uplands Area of Eastern Oklahoma, 1947; Major Source of Power—Tractor, 44 Farms.

Operation and size of equipment	Proportion of farmers reporting	Proportion planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hours	Hours	Hours	Hours	Hours	Hours
Cutting or dragging stalks:	(22)	(33)							
2-row cutter	9	8	1.00	.50		.50	.04		.04
2-sect. harrow	2	1	1.00	.33		.33	.01		.01
4-sect. harrow	9	22	1.00	.25		.25	.06		.06
1-row (horse drawn)	2	2	1.00	1.25	2.50		.03	.05	
Disc Harrowing	(86)	(92)							
4-foot disc	2	1	3.00	.50		.50	.02		.02
5-foot disc	2	3	2.00	.67		.67	.04		.04
6-foot disc	30	24	1.78	.60		.60	.26		.26
7-foot disc	27	40	1.38	.50		.50	.03		.03
8-foot disc	16	13	2.02	.50		.50	.13		.13
9-foot disc	2	2	2.00	.50		.50	.02		.02
10-foot disc	7	9	3.20	.50		.50	.14		.14
Flat breaking	(94)	(97)							
1-plow	7	7	1.00	2.00		2.00	.14		.14
2-plow	(80)	(86)							
10″	2	1	1.00	1.67		1.67	.02		.02
12″	32	25	1.02	1.43		1.43	.36		.36
14″	41	54	1.00	1.25		1.25	.68		.68
16″	5	6	1.00	1.00		1.00	.06		.06
3-plow	2	1	1.00	.83		.83	.01		.01
2-disc	5	3	1.00	1.30		1.30	.04		.04

Appendix Table 6-A (Continued)

Operation and size of equipment	Proportion of farmers reporting	Proportion planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
Bedding:	(27)	(22)							
2-row lister	27	22	1.19	.50		.50	.13		.13
Harrowing before planting:	(72)	(73)							
2-section	45	32	1.26	.33		.33	.13		.13
3-section	16	16	1.15	.25		.25	.05		.05
4-section	9	24	1.20	.20		.20	.06		.06
Horse drawn (2-sect.)	2	1	1.00	1.00	2.00		.01	.02	
Fertilizing:	(31)	(31)							
2-row	18	24	1.00	.50		.50	.12		.12
2-row with planter	11	5	1.00	(.50)		(.50)			
2-row horse drawn (with planter)	2	2	1.00	(1.00)	(2.00)				
Planting:	(100)	(100)							
1-row	2	1	1.00	1.00		1.00	.01		.01
2-row	91	90	1.00	.50		.50	.45		.45
2-row (horse drawn)	7	9	1.00	1.00	2.00		.09		.18
Replanting:	(18)	(16)							
2-row	16	9	2.25	.50		.50	.10		.10
2-row (horse drawn)	2	7	1.00	1.00	2.00		.07	.14	
Cultivating:	(100)	(97)							
1-row cult.	2	1	6.00	1.00		1.00	.06		.06
2-row cult.	98	96	4.84	.50		.50	2.32		2.32
2-sect. harrow	(2)	(3)	1.00	.30		.30	.01		.01
3-sect. harrow	(5)	(4)	1.00	.39		.39	.02		.02
Chopping and hoeing	(100)	(97)							
Hand	100	97	1.46	10.00			14.16		
2-row chopper	(2)	(3)	1.00	.60		.60	.02		.02
4-row weeder	(2)	(2)	1.00	.30		.30	.01		.01

Appendix Table 6-A (Continued)

Operation and size of equipment	Proportion of farmers reporting	Proportion planted acres covered	Times Over	Labor and Power					
				Per acre covered			Per acre planted		
				Man	Horse	Tractor	Man	Horse	Tractor
	Percent	Percent		Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
Poisoning:	(9)	(15)							
Hand	7	12	1.05	1.00			.13		
5-row machine	2	3	2.00	.96		.48	.06		.03
Total preharvest hours							20.10	.21	5.76
Harvesting:	(100)	(96)							
Hand picked (144 lbs. lint per acre)	82	44		26.18			11.52		
Hand snapped (135 lbs. lint per acre)	18	(52		(18.88			(9.82		
Hand snapped (135 lbs. lint per acre)	(50)	(		(			(		
Hauling:	(100)	(96)							
Tractor-trailer (1 bale)	18	8		1.30		1.30	.10		.10
Tractor-trailer (2 bales)	25	38		.74		.74	.28		.28
Truck (1 bale)	50	45		.82		.82	.37		.37
Custom (Truck, 2 bales)	7	5		.44		.44	.02		.02
Total							42.21	.21	6.53