THE ECONOMIC ADVANTAGE OF COTTON PRODUCTION IN SOUTHEASTERN OKLAHOMA AS COMPARED TO SOUTHWESTERN OKLAHOMA

THE ECONOMIC ADVANTAGE OF COTTON PRODUCTION IN SOUTHEASTERN OKLAHOMA AS COMPARED TO SOUTHWESTERN OKLAHOMA

BY

ALBERT ROLLAND CONLEY

BACHELOR OF SCIENCE

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE

STILLWATER, OKLAHOMA

1936

Submitted to the Department of Agricultural Economics

Oklahoma Agricultural and Mechanical College

In Partial Fulfillment of the Requirements

For the degree of

MASTER OF SCIENCE

1941

APPROVED

In Charge of Thesis

Head, Department of Agricultural Economics

Dean of the Graduate School

ACKNOWLEDGEMENT

Acknowledgement is hereby made of the invaluable advice and assistance received of Professor Desmond L. W. Anker of the Department of Agricultural Economics, in the writing of this thesis.

The writer also wishes to acknowledge the faithful guidance of Dr. Peter Nelson, Head, Department of Agricultural Economics and Professor Adlowe L. Larson of the Agricultural Economics Department in planning the study and in the preparation of this thesis.

Thanks are also due Randall T. Klemme, former Professor of the Department of Agricultural Economics, Mr. K. C. Davis, and Mr. E. A. Tucker of the Department of Agricultural Economics, for their helpful suggestions following a reading of the manuscript.

The services rendered by Miss Inez Conley, Miss Tyana Marshall, and Mrs Martha Delaney in connection with the mechanics of the study are gratefully acknowledged.

PURPOSE OF STUDY

It is the purpose of this study to determine and contrast the advantages and disadvantages of producing cotton in Southwestern Oklahoma and Southeastern Oklahoma.

In carrying out this purpose various research works will be analyzed to detect contrasting conditions existing between the two Areas which result in cotton being produced in one area more economically than in the other area.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

TABLES (Continued)

FIGURES

FIGURES

INTRODUCTION

In an effort to determine and contrast the advantages and disadvantages of producing cotton in Southwestern and Southeastern Oklahoma, it is the purpose of this paper to direct attention to the need of considering cotton, not as a single commodity, but rather as two or more commodities. Before one attempts to solve the problems of the cotton producer, especially in the United States, the apparently single commodity, cotton, should like wheat be divided into classes, for example:

> "Common wheat is divided into two great classes, known as hard and soft wheats. The hard wheats are grown in the drier regions of the Plains and in the hard-red-spring-wheat sections of the Dakotas and Minnesota, and are especially valuable for bread-making purposes. The soft wheats are the plump starchy wheats, and are grown in the humid regions. They produce a flour that is especially desirable for pastries, crackers, and biscuits, but less desirable for bread-making. 1/

Just as there are two wheat producing areas in the United States, so are there two cotton producing areas in this country. Also like wheat, the cotton areas are divided according to the type of product produced; for example, an area comprising the Western half of Oklahoma and the Northwestern section of Texas (Figure I) produced nearly one-half of the total amount of short staple cotton produced in the United States during 1938. Within this western dry land cotton producing area usually more than one-half of the cotton produced is of the shorter staple lengths.

During the more recent years (1933 to 1941) cotton production in the United States has been operating under a planned agriculture.

1/ Henry Jackson Waters, Essentials of the New Agriculture, 1924, p. 81.

Cotton Acreage

Year	Area	Acres Harvested	Pounds of Lint Cotton Per Acre	Gross Cost Per Acre: Prepare and Plant	Cultivate and Hoe	Total including cost of Rent
1933	Dry-Land cotton Area	6,265,000	203	$ 5.20	$ 2.98	$ 18.00
	All other U.S. Areas	23,690,000	222	3.17	4.63	23.64
1937	Dry-Land cotton Area	5,800,000	218	2.65	3.19	21.79
	All other U.S. Areas	28,171,000	291	4.06	5.61	33.17

Source: U.S.D.A., Agri. statistics Reports of 1935 and 38

FIGURE I. Changes In Cotton Production Under A Planned Agriculture: Western Dry-Land Cotton Producing Area as Compared To The Other Cotton Section of The United States.

Year	Area	Number of Bales Production	Production 23/32" or Less Staple Number of Bales	Percentage of Total Production 23/32" or Less Staple	Percentage Cotton Production of Dry-Land is of Total U.S. Production: All Staple Lengths	Percentage Cotton Production of Dry-Land is of Total U.S. Production: 23/32" or Less Staple Lengths
1933	Western Dry-land Area	2,472,200	1,338,003	54%	20%	17%
	other U.S. Sections	10,182,000	3,705,400	40%		
1938	Western Dry-Land	2,039,535	1,054,986	51%	17%	42%
	other U.S. Sections	9,564,883	1,461,121	22%		

Source; U.S. Dept. of Agric. Agricultural Marketing Service, Grade and Staple Length of Cotton Produced In United States. Reports of 1933 and 1938.

According to administration leaders planned agriculture was introduced to insure the farmers of America a more "just share" of the total national income. Under this plan the basic means of increasing the income of the cotton farmer has been by bringing about a reduction in the acreage planted to the crop, to reduce the amount of cotton he produced.

This paper is not an attempt to judge the merits of the present Agricultural Program. Reference to the program is made only to acquaint the reader with the fact that cotton production during recent years has operated under a planned agriculture, and thus that there is the probability that some of the changes which have taken place in recent years in the production of cotton as between the two Areas discussed may be the result either of natural or economic factors, or of changes which occurred when agriculture shifted from an unrestricted to a restricted type.

The writer has been connected with agricultural programs in the Cotton Delta of Arkansas, the "Dust Bowl" of Texas, and the entire State of Oklahoma. In the Delta of Arkansas most of the farmers are of the opinion that cotton is "their" crop and that farmers in other regions should be encouraged to plant other crops. On the other hand, the farmers of Western Texas are of the opinion that they are able to produce cotton cheaper than anybody else and many farmers of the Area can present evidence of moderate fortunes which have been acquired through the production of cotton. On the basis of historical data which tends to prove that cotton production has been successful in the two Oklahoma areas under consideration this study is an attempt to determine the advantage of cotton production in these two "unlike" areas.

Areas have been chosen from Oklahoma for this study because interstate studies of cotton production present certain limitations; for example, they are often for different periods of time, and often the method of study differs so widely that data from the studies cannot be compared. Also, the two Areas of Oklahoma, which almost adjoin are chosen in order to show that changes in the type of cotton production are not gradual but abrupt. Thus it can be possible to isolate the two Areas in planning the future policies for cotton production. As late as 1936 the State of Oklahoma ranked third in the nation in the number of acres of cotton harvested.[2/] The culture of cotton was probably introduced in the area now comprising the State of Oklahoma by transplanted tribes of Eastern Indians. Several of these tribes had been engaged in the production of cotton prior to their settlement in the Indian Territory, and early accounts mention cotton as a crop among the Choctaws as far back as 1850. However, the development of cotton production on a large scale did not take place until the influx of the white man in the latter part of the 19th century.[3/]

Cotton production on an important scale developed first in the Southeastern section of the State and gradually shifted to the Western section, especially the Southwestern part. The boll weevil caused a decrease in the acreage planted to cotton in the Eastern Area when it infested this Area as early as 1905 (Figure V). The increase in the importance of Oklahoma as a cotton producing State has resulted largely from the westward shift in cotton production. This shift, in turn,

---

2/ United States Department of Agriculture, Agricultural Statistics, 1937. Table 106, p. 90.

3/ James L. Watkins, King Cotton. p. 272.

resulted from changes in the method of production, the type of product produced, and the establishment of new markets. As will be shown in this paper, the combination of climatic and economic factors caused variance in the Western Area from the pattern for cotton production in the Eastern Area.

The Eastern Area chosen for this study, consisting of Love, Bryan, Marshall, Choctaw, and McCurtain counties, includes all of the land in type-of-farming area 16,[4/] and also includes the northern portion of of McCurtain County. The Western Area, consisting of Beckham, Harmon, Greer, and Jackson counties, are all included within the boundaries of type-of-farming area 11.[5/]

County boundaries will be followed in this study in order that county data given in the Census reports can be used. Tillman County will be omitted from the Western Area since less than one-half of the County is included in type-of-farming area 11. However, due to the importance of McCurtain County to type-of-farming area 16, McCurtain County will be included in the Eastern Area of this study even though less than one-half of the County is included in type-of-farming area 16.

4/ Peter Nelson, Current Farm Economics, Vol. 9, No. 1, February, 1936. (Type of Farming Map of Oklahoma). p. 4.

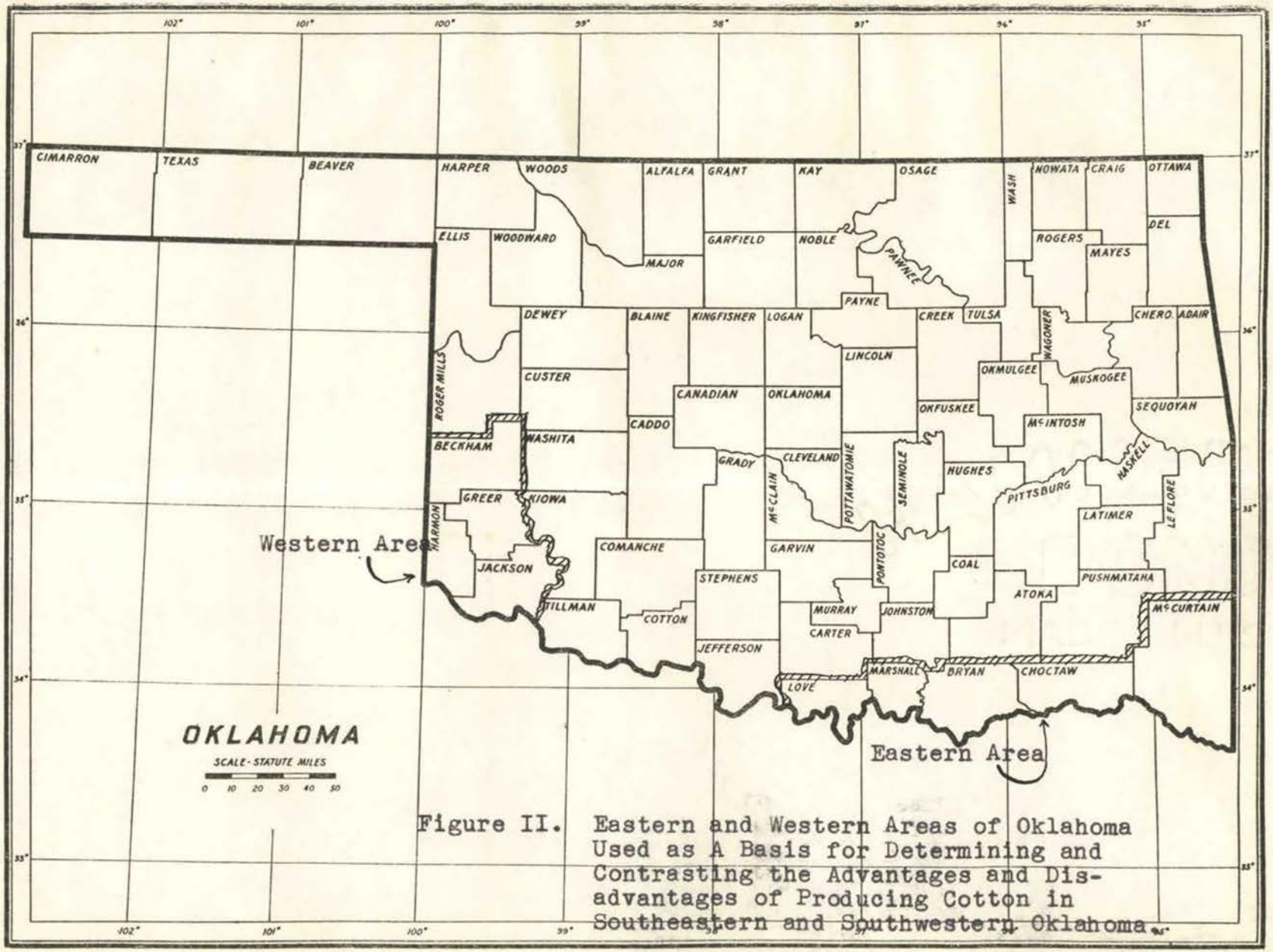


Figure II. Eastern and Western Areas of Oklahoma Used as A Basis for Determining and Contrasting the Advantages and Disadvantages of Producing Cotton in Southeastern and Southwestern Oklahoma

CHAPTER I

PHYSICAL RESOURCES AND ADVANTAGES OF EACH AREA

In this chapter are discussed the physical resources, such as type of soils, amount and distribution of rainfall, and general weather conditions, as they affect the economic advantage of cotton production in the two Areas.

Type of Soils: The Western Area (Figure III) is made up chiefly of the Miller, the Vernon, the Amarillo, and the Amarillo Sand types of soils. The Miller or alluvial soils, which usually have a top soil 12 inches or better in depth, make up approximately 13 percent of the Area studied. These soils are found in river or creek beds and usually are made up of the top soil of the hills and slopes leading to the valley. The valleys of the Western Area are usually narrow and in most cases are only cultivated on one side of the stream, the other side is in most cases a bluff or is very rough land.

The Miller soils have on the average a hydrogen-ion concentration (pH) of 8, contain 0.058 percent total nitrogen, about 1 percent organic matter and on the average have a very low count of readily available phosphorus.[1/]

The Amarillo type of soil in the Western Area is a moderately heavy soil. This type of soil on the average contains about 0.118 percent nitrogen, 4 to 5 percent organic matter and usually contains

---

1/ Data used to describe the types of soils were secured from class notes retained by the writer who completed "Soils Management," Soils 364, under H. F. Murphy, Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. Spring term 1935-36.

FIGURE III. SOIL TYPES OF AREAS STUDIED

Source: Bennett, H. H., " Soils of The United States, Bureau of Soils, U. S. Dept. of Agriculture, Washington, D. C. 1936.

more than 120 parts per million of readily available phosphorus. These soils, on the average, have a pH of 8.

The Amarillo Sand type of soil is a light colored loose sandy soil and in strong winds these soils blow and drift unless protected by growing crops. This type of soil has a pH of 8.5, usually contains 0.105 percent total nitrogen, 2.26 percent organic matter and, on the average, has a high count of readily available phosphorus, averaging about 120 parts per million. This type of soil makes up approximately 20 percent of the Western Area.

The thin and eroded soils, which make up the remainder of the Western Area, are of the Vernon and Quinlan series. These soils are marginal in their use for cultivated crops and for the most part are better suited to pasture.

In the Eastern Area cotton culture is practiced chiefly on the Miller type of soil. The Miller soils of the Eastern Area are lower in nitrogen content than are the same type of soils located in the Western Area, this difference being due to a relatively larger amount of rainfall in the Eastern Area. The Durant loam and the Durant sandy loam types of soils which make up more than 50 percent of the total land area of the Eastern Area, are also low in nitrogen. However, in areas where there is heavy rainfall nitrogen may be added to the soil in the form of organic matter, while in dry areas nitrogen may be added only in the form of inorganic matter.

Cotton culture is greatly dependent on the amount of easily soluble phosphorus contained in the soil. The early growth of any plant is affected by the amount of easily soluble phosphorus contained in the soil because this material is needed for cell division, thus

Table 1. Phosphorus Content of The Soils, Eastern and Western Areas of Oklahoma Studied.

	Eastern Area		Western Area	
	Ave. Phos. in Parts Per Million	Percent of All Soils	Ave. Phos. in Parts Per Million	Percent of All Soils
		Surface Soils		
Very high	124.1	14.2	117.8	47.6
High	32.1	12.2	37.8	26.4
Med.	19.1	13.6	20.8	9.3
Low	10.0	29.9	10.3	9.8
Very low	3.2	29.9	4.3	6.7
		Sub-Surface Soils		
Very high	133.8	8.8	105.9	38.8
High	35.0	4.7	38.3	21.7
Med.	18.5	4.1	20.4	10.3
Low	10.7	12.9	10.0	11.3
Very low	1.8	69.3	1.6	17.6

SOURCE: Horace J. Harper, Easily Soluble Phosphorus in Oklahoma Soils, Oklahoma Experiment Station Bulletin No. 205, September, 1932, Table VI., p. 16.

soils having a large supply of soluble phosphorus will produce in a shorter period of time a foliage plant.[2] The early developed cotton plant is very desirable in both sections of Oklahoma because late "set" bolls usually sweat off as the result of hot winds during the month of September.

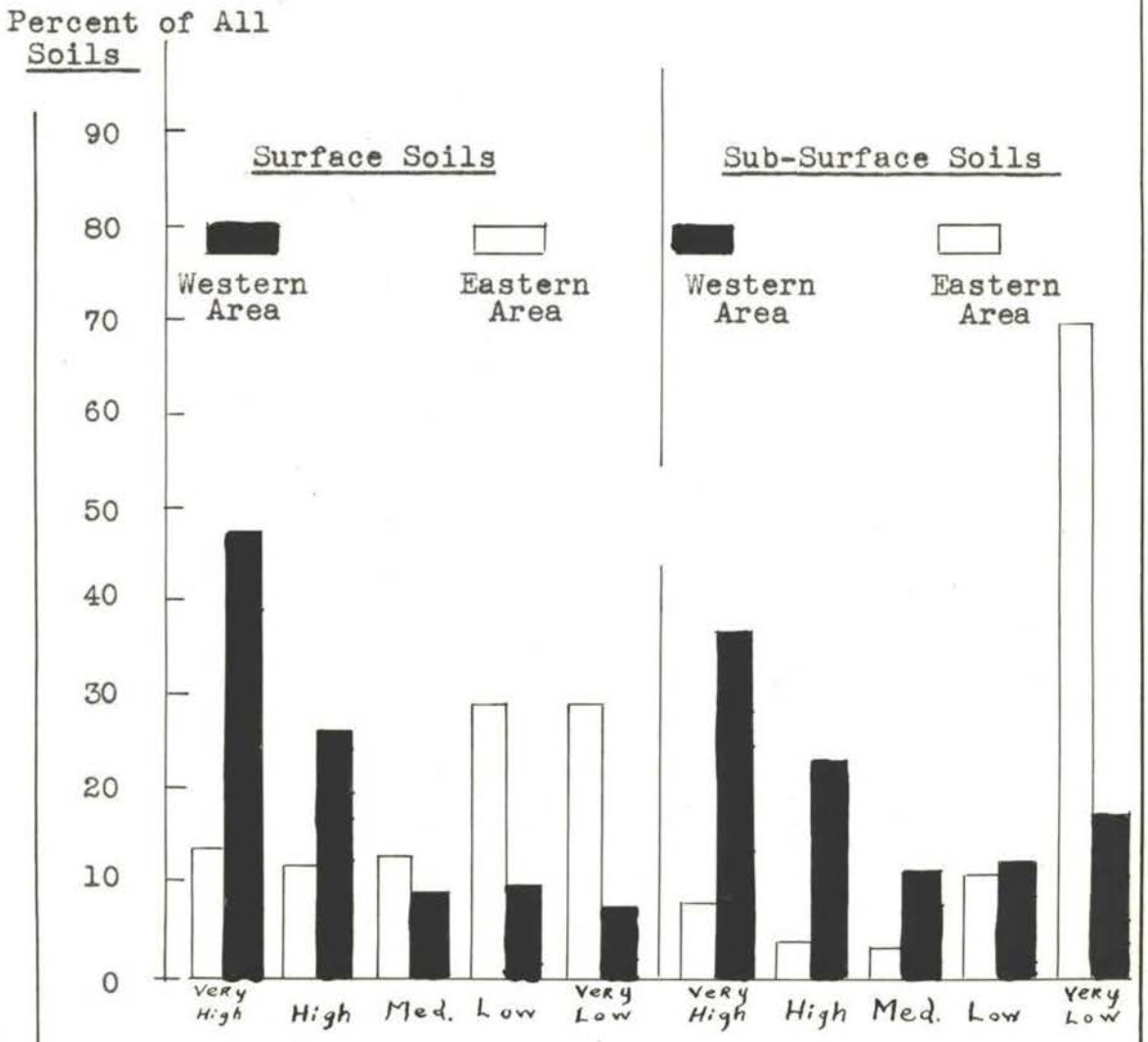
For the production of cotton approximately 30 to 40 pounds of easily soluble phosphorus are needed per acre.[3] Soils which have this amount of readily available phosphorus are classified as medium in Table 2. Only 26.4 percent of the soils of the Eastern Area (Table 1 and Figure VI) have a sufficient amount of phosphorus for the production of cotton. In eastern Oklahoma the phosphorus deficiency is not associated with difference in soil texture but is more closely related to upland and bottom land soils. The major portion of the bottom land soils in eastern Oklahoma are not deficient in phosphorus because of the fact that these soils have been derived from the erosion of surface soils occurring at higher elevations. Under virgin conditions, the surface layer of soil which is affected by sheet erosion is high in organic matter. When this organic matter is deposited along with the mineral portion of the soil on the flood plains of streams, the organic matter gradually decays and the phosphorus which it contains is changed from an organic to an inorganic form which is readily available for plants.[4]

2/ Horace J. Harper, Easily Soluble Phosphorus in Oklahoma Soils, Oklahoma Experiment Station, Stillwater, Oklahoma, Bulletin No. 205, September, 1932, p. 20.

3/ Ibid. Table 1, p. 5.

4/ Harper, op. cit. p. 8.

Figure IV. Phosphorus Content of The Soils, Eastern and Western Areas of Oklahoma Studied.



SOURCE: (Table 1).

Experiments which have been conducted in Western Oklahoma have seldom given any response to applications of phosphorus fertilizers. 5/ This fact agrees quite accurately with data presented in Figure IV, which show that the major portion of the soils of the Western Area are high in easily soluble phosphorus.

Climatological Conditions: In presenting results of experiments, especially with reference to crop production, the temperature and the rainfall of the Area in question should be given some consideration. In addition, the velocity of the wind has an influence in making one Area more suitable than the other for the production of cotton.

A careful survey of literature available results in no mention of wind as a damaging effect to cotton production in the Eastern Area, whereas, in the Western Area of Oklahoma numerous references are made to the effect of strong winds, such as the following:

> ".....1917- The cotton crop was injured in June by strong winds and extreme fluctuation of temperature..... 6/
>
> ".....1928- Wide and sudden fluctuations in temperature, deficient precipitation, and prevailing wind of high velocity all contributed to an unfavorable spring for the production of cotton..... 7/

The prevailing winds of the Western Area are from the south and northwest. Those from the south are generally much more severe than those from the northwest. At times during the spring, the south winds

---

5/ Ibid. p. 21.

6/ W. M. Osborn, Cotton Experiments at the Lawton (Oklahoma) Field Station, 1916-1931. Oklahoma Experiment Station Bulletin No. 209, March, 1933, p. 8.

7/ Ibid. p. 9.

occur with such velocity that much of the loose soil material in the plowed fields, especially that of the sandy soils, is violently blown about. Growing crops are sometimes injured by the shifting material.[8/]

A comparison of cotton yields with climatic records indicates that there is a close correlation between the total annual rainfall, the distribution of rainfall, and cotton production.

According to Moorehouse and Nicholson:[9/]

> "A wet, cold spring retards early maturity. An excessive supply of moisture, accompanied by warm weather, will produce an abundant stalk and thus may exert a detrimental influence on the formation of fruit. Cotton is a warm weather plant; hence, the temperature should be such during the growing season that the plant will make a reasonably strong and rapid growth.

In the Western Area the annual amount of rainfall ranged from 14.02 inches to 36.16 inches for the period of years 1924 to 1938, averaging approximately 27 inches for the period. (Table 2) The annual amount of rainfall for the Eastern Area ranged from 27.69 inches to 56.48 inches during the afore-mentioned period of years, averaging approximately 43 inches.

While there is a higher amount of annual rainfall in the Eastern Area than in the Western Area, farmers in the Western Area can, by water conservation, partially offset the disadvantages resulting from the semi-arid conditions.

8/ A. W. Goke and R. E. Penn, Soil Survey of Greer County, Oklahoma, Bureau of Chemistry and Soils, Series 1932, No. 21, October, 1937, p. 3.

9/ L. A. Moorehouse and J. F. Nicholson, Cotton Culture, Oklahoma Agricultural Experiment Station Bulletin No. 77, p. 37.

Table 2. Rainfall, Annual Amount and Amount During The Cotton Harvesting Season, Eastern and Western Areas of Oklahoma Studied, Years 1924-1938.

Year	Amount of Rainfall During the Cotton Harvesting Season (inches)		Total Annual Amount of Rainfall (inches)	
	Eastern Area	Western Area	Eastern Area	Western Area
1924	8.00	5.60	29.05	23.17
1925	12.92	10.48	28.32	27.58
1926	14.14	14.59	52.35	36.13
1927	15.94	6.21	53.47	24.01
1928	11.40	6.11	36.91	23.51
1929	17.89	8.66	43.20	25.31
1930	13.31	10.45	33.69	23.88
1931	10.76	10.27	28.27	25.65
1932	7.87	7.32	42.34	23.91
1933	6.15	5.12	35.27	17.36
1934	13.27	4.72	32.05	18.28
1935	13.75	4.90	56.48	29.81
1936	16.97	8.73	27.69	14.02
1937	11.25	5.43	31.97	24.14
1938	5.65	5.53	33.04	19.69
Ave. 1924-1938	11.83	7.53	37.23	23.53

Source: United States Department of Agriculture, Bureau of Weather, Climatological Data, Reports for the Years 1924 through 1938.

Results on the conservation of water, obtained from an experiment conducted on Foard silty clay loam at the Reformatory Farm located near Mangum, Greer County, in 1935, show the importance of this phase of a soil management program.

Table 3. Comparison of Acre Yields of Cotton By Three Methods of Cultivation, 1935

(Greer County, Oklahoma)

Experiment Number	Method of Planting	Pounds of Seed Cotton Per Acre
1	Rows parallel with slope	392
2	Rows planted on contour	595
3	Rows planted on contour and run-off water diverted to land from adjacent area	557

SOURCE: A. W. Goke and R. E. Penn, Soil Survey of Greer County, Oklahoma, Bureau of Chemistry and Soils, Series 1932, No. 21, p. 29.

The inference from the above table is that the proper conservation of water will greatly increase the cotton yield per acre in the Western Area.

The length of the growing season is approximately the same for the two Areas. In the Western Area the average date of the last killing frost is March 25, and of the earliest November 6, giving an average frost-free season of 226 days.[10/] The last killing frost in the Eastern Area on the average occurs March 30, and the first frost

10/ Goke and Penn, Op. Cit. p. 3.

occurs, on the average, about November 25, giving an average frost-free season of 240 days. [11]

Table 4. Normal Monthly, Seasonal, and Annual Temperature, Eastern 1/ and Western 2/ Areas of Oklahoma Studied

Month	Temperature of					
	Mean		Absolute Maximum		Absolute Minimum	
	Eastern Area	Western Area	Eastern Area	Western Area	Eastern Area	Western Area
December.....	43.6	40.7	79	83	1	6
January.....	41.4	39.4	80	86	- 5	- 7
February.....	41.9	42.9	81	95	- 3	-17
Winter.....	42.3	41.0	81	95	- 5	-17
March.....	56.1	51.9	99	94	21	8
April.....	61.7	61.7	92	102	35	22
May.....	69.1	69.7	100	104	33	31
Spring.....	62.3	61.1	100	104	21	8
June.....	77.2	78.4	103	112	51	42
July.....	80.0	82.7	105	111	57	54
August.....	81.4	82.2	105	114	50	47
Summer.....	79.5	81.1	105	114	50	42
September.....	74.8	74.8	100	108	38	34
October.....	63.0	64.4	96	106	33	16
November.....	53.3	50.8	84	90	16	9
Fall.....	63.7	63.3	100	108	16	9
Year.....	62.0	61.6	105	114	- 5	-17

SOURCE: William T. Carter, Jr., and A. L. Patrick, Soils Survey of Bryan County, Oklahoma, Bureau of Soils, November, 1915, p. 9.

1/ Durant Station, Bryan County, Oklahoma.

SOURCE: A. W. Goke and R. E. Penn, Soil Survey of Greer County, Oklahoma, Bureau of Chemistry and Soils, Series 1932, No. 21, p. 4.

2/ Mangum Station, Greer County, Oklahoma

11/ William T. Carter, Jr., and A. L. Patrick, Soils Survey of Bryan County, Oklahoma, Bureau of Soils, November 1915, p. 9.

Variations in temperature are greater in the Western Area (Table 4) than in the Eastern Area, a condition which causes the Western Area to be less favorable for the production of cotton. According to Osborn, sudden and extreme fluctuations in temperature are not desirable;

> "The crop was injured in June by extreme fluctuations in temperature....." 12/

> "Cool weather during the first half of May delayed planting until about two weeks later than normal....." 13/

> "Wide and sudden fluctuations in temperature.....contributed to an unfavorable spring....." 14/

The annual amount of rainfall has a direct effect on the amount of insect damage to the cotton crop. In the Eastern Area cotton's greatest enemy is the boll weevil; and as early as 1907, the cotton crop of the Area was damaged as much as 2 percent by this pest. The greatest damaging effect is usually attributed to the boll weevil during years of much moisture, as is explained in the following observation by Ligon:

> ".....The abundant supply of rainfall in June stimulated growth during June and July so that a plentiful supply of bolls were set before the reappearance of the boll weevil in August. The yield of all late maturing, slow growing varieties suffered most from the boll-weevil damage during August and September. Some of the late varieties produced only a very small crop in consequence....." 15/

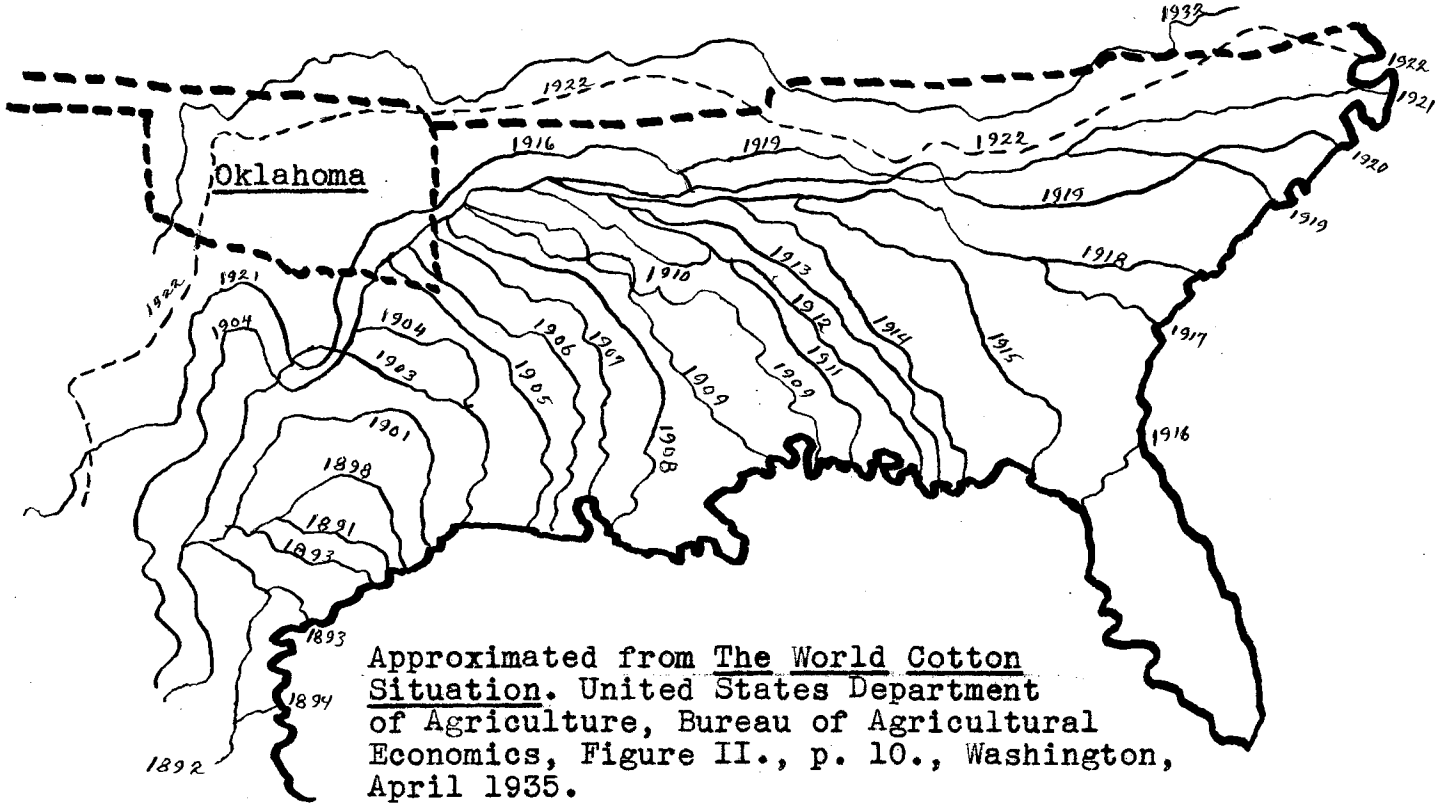
12/ Osborn, Op. Cit. p. 9.

13/ Ibid.

14/ Ibid.

15/ L. L. Ligon, Varieties of Cotton for Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 175, April, 1928, p. 10.

Figure V. Spread Of The Boll Weevil In The United States, 1892-1932



Approximated from The World Cotton Situation. United States Department of Agriculture, Bureau of Agricultural Economics, Figure II., p. 10., Washington, April 1935.

"The Boll Weevil entered the United States from Mexico in 1892 and spread northward and eastward at the rate of 40 to 160 miles annually, except in a few cases when winters were too severe."

A careful survey of literature available reveals no damage attributable to the boll weevil in connection with cotton production in the Western Area. In fact, there is reference to the dry weather controlling the weevil in the Western Area. Although the boll weevil invaded the Western Area for the first time in 1922, no damage to cotton production was reported (Figure V), quoting Osborn: 16/

> "1922- A few weevils were present during the early part of the season but the intense drought of July, August, and September controlled them.

According to an analysis of studies available, the greatest damaging insect to cotton production in the Western Area is the grasshopper, an insect usually found only in dry areas.

> "1923- Cotton was injured by.....and by drought and grasshoppers in July....." 17/

> ".....A heavy invasion of grasshoppers and two infestations of webworms constituted the chief menaces to cotton production in 1924. Many fields were entirely lost by grasshopper damage." 18/

> ".....owing to the favorable weather conditions, particularly the long, dry ideal egg-laying periods during the fall and the dry ideal weather for young 'hoppers during June, they often increase to tremendous numbers." 19/

The grasshopper usually appears during extreme dry years when the cotton crop is worth so little as a consequence of the dry season, that control measures are useless. The boll weevil, on the other hand, appears during moist years when the worth of the cotton crop in most

---

16/ Osborn, Op. Cit. p. 8.

17/ Ibid. p. 8.

18/ Ibid. p. 9.

19/ A. G. Ruggles, and T. L. Aamodt, Grasshopper Control, Minnesota Extension Division Circular No. 17, July 1936, p. 1.

cases justifies control measures. Thus, as a contrast between these two areas it is apparent in most cases that it is economically feasible to control or lessen insect damage to cotton production in the Eastern Area, while in the Western Area the greatest damage to cotton production as the result of insects usually occurs during those years when the worth of the crop does not justify control measures.

Summary: In judging the soils of these two Areas one might say that today the soils of the Western Area from the point of view of fertility have an advantage in regard to cotton production. This would be especially true when speaking of the nitrogen and phosphorus content of the soils. In this chapter it was found that the high amount of rainfall has tended to deplete the fertility of the soils of the Eastern Area; it could, therefore, be said that the lower amount of rainfall in the Western Area indicated an advantage for the Area. However, it was shown that due to the lower amount of rainfall in the Western Area, plant food could be added to the soil only in organic form, while because of the relatively larger amount of rainfall in the Eastern Area it was possible to add plant food needed for cotton production in inorganic form.

It will be shown later that the amount of rainfall has an influence on cotton yields. Thus, it might be said, since there was a higher amount of rainfall in the Eastern Area, that there was an advantage in the Eastern Area, and this is true under certain conditions. In studying the damage to cotton production in these two Areas as the result of insects, it was found that in the Eastern Area the boll weevil caused the most damage and that this damage was greatest during years of high rainfall. It was also found in this chapter that the

drought conditions of the Western Area served as a check to the invasion of the boll weevil. Therefore, it might be said that because of the lower amount of rainfall, the Western Area enjoyed an advantage in the production of cotton. However, it was found that the grasshopper caused much damage to cotton in the Western Area and the damage was greatest during the drier years. In contrasting the two Areas in regard to the damage resulting from the grasshopper, it was found that the moist conditions of the Eastern Area served as a check to the invasion of the grasshopper.

Thus in contrasting the amount of annual rainfall and insect damage between these two Areas and attempting to determine which of the Areas has an advantage in the production of cotton, one can only say that there is a slight advantage in the Eastern Area in that the greatest damage usually occurs when it is profitable to practice control measures.

CHAPTER II

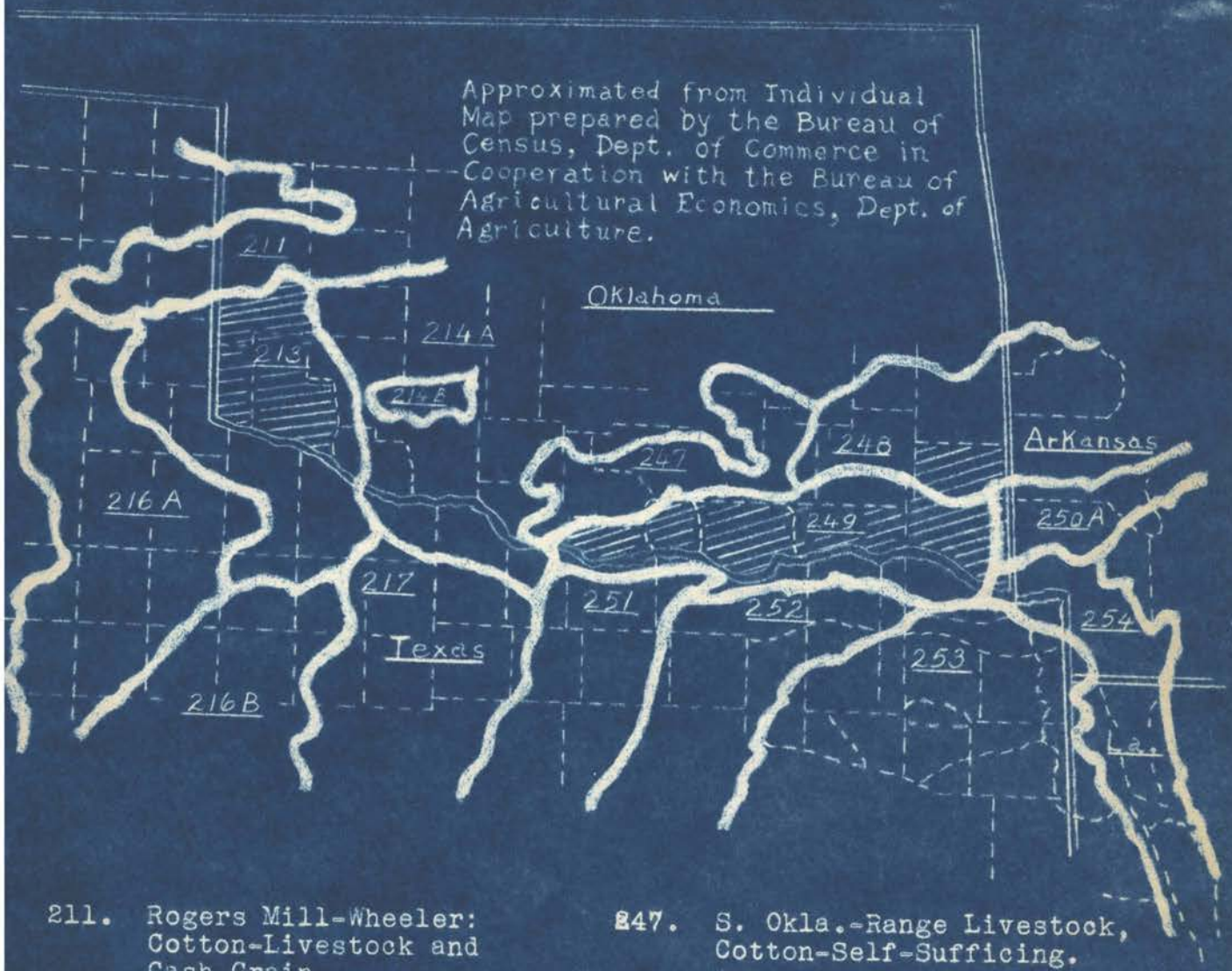
THE AGRICULTURAL PATTERN

As the agricultural pattern of the two Areas is reviewed, various factors will be studied in order to portray a clear picture of the type-of-farming found in each of the Areas.

Both of the Areas have been classified as cotton type-of-farming Areas, each appears to be the focal point of cotton production for two larger Areas. (Figure VI) That is to say, cotton farming and some other farming are carried on in the areas surrounding the Areas studied. The other farming activities engaged in by the farmers surrounding the Areas studied indicate that there is a distinct difference between the Eastern and Western Areas even though both have been classified as cotton producing areas.

The Eastern Area used for this study (Figuve VI) is bordered on the northwest by an area where there are range livestock, self-sufficing, and cotton type-of-farming. Circling the Area to the northeast, the border consists of the Ouachita Mountains, a section where there are self-sufficing, general, and cotton type-of-farming; the border on the east comprises an area where there is much fruit production along with cotton farming; and to the southeast the Area is bordered by the Red River Delta, an area producing much corn and cotton. The Piney Woods of Texas, an area of fruit and cotton production, and the Black Prairies of Texas, a cotton producing area, form the southern border. On the southwest, the Area is bordered by a general farming, cash grain, and cotton producing area.

FIGURE VI. TYPES OF FARMING AREAS: SECTIONS OF OKLAHOMA, TEXAS, ARKANSAS AND LOUISIANA.



211. Rogers Mill-Wheeler: Cotton-Livestock and Cash Grain.

213. S.W. Okla.-Texas: Cotton.

214A. S.W. Okla., Cotton.

214B. Wichita Mountains.

216A. Low Rolling Plains:

216B. Similar to 216A, more farming.

217. N.C. Texas: Range Livestock some cotton.

247. S. Okla.-Range Livestock, Cotton-Self-Sufficing.

248. Ouachita Mts.- Self-Sufficing-Cotton-General

249. S. Okla., Cotton.

250A. S.W. Ark., Cotton-Fruit.

251. Grand Prairie Texas: Cotton*General-Cash Grain.

252. Black Prairie: Cotton.

253. Piney Woods: Cotton-Fruit.

254. Red River Delta: Cotton.

The Eastern Area is divided from the Western Area on the south by a large area where there is much livestock production along with cotton raising. Also between the Eastern and Western Areas are the Wichita Mountains, an area of little agricultural activity.

The northern border of the Western Area (Figure VI) portrays a type-of-farming area where there is much livestock, cash grain, and some cotton produced. To the west of this area, there are the low rolling plains of Texas where livestock raising, grain sorghums, and some cotton production are carried on.

The striking difference between the farming areas surrounding the two Areas studied is that the Eastern Area is surrounded by type-of-farming areas which show great self-sufficiency, while for the Western Area the types are of a nature which are usually associated with large individual farms, or large scale farming.

Within the boundaries of the Areas studied the average farm of the Western Area has always been larger than the average farm located in the Eastern Area. In 1910, three years after Oklahoma became a State, nearly all the land of the Western Area was divided into farming units. At this date, there were 9,077 farming units in the Western Area, and the land in these farms made up more than 85 percent of all the land comprising the Area. (Table 5) At this same date, there were 10,256 farming units in the Eastern Area, but the sum total of land within the boundaries of these farms accounted for less than one-third of the land comprising the Area.

The average farm located in the Western Area in 1910 was 171 acres in size, while the average size farm located in the Eastern Area for this date was only 92 acres. (Table 5)

Table 5. Number of Farms, Total Land in Farms, and Average Size of Farms, Eastern and Western Areas of Oklahoma Studied, 1910, 1920, 1930, and 1940

Year	Number of Farms	Total Number of Acres In Farms	Average Size of Farms (Acres)
	Western Area		
1910	9,077	1,556,749	171
1920	8,293	1,584,019	193
1930	10,316	1,647,288	159
1940	7,409	No report	---
	Eastern Area		
1910	10,256	944,544	92
1920	16,276	1,412,834	86
1930	14,119	1,368,740	97
1940	13,659	No report	--

SOURCE: United States Department of Commerce, Bureau of Census, Agricultural Census, Vol. I, for the years 1910, 1920, 1930, and Census News Release of 1940.

During the years following the influx of the white man into the Area now comprising the State, the average farm in the Western Area has decreased in size, while the average farm of the Eastern Area is today slightly larger than the first farms located in the Area.

In the Western Area there has been a decrease in the average size farm; however, there has been an increase in the average acreage of cropland per farm. In the Eastern Area there has been an increase in the average size farm, but the acreage of cropland per farm has decreased during the past 30 years. (Table 6) The decrease in the acreage of cropland per farm in the Eastern Area can be accounted for in part by the fact that the farm land in the Eastern Area has been cultivated for a great number of years, and a large acreage of land is

Table 6. Number of Farms, Total Acres of Cropland, and Average Acreage of Cropland Per Farm, Eastern and Western Areas of Oklahoma Studied For Selected Years

Year	Number of Farms	Total Acres of Cropland	Average Acreage of Cropland Per Farm
		Western Area	
1907 1/	7,040	631,650	89
1910 2/	9,077	908,880	100
1920 2/			
1925 2/	9,175	878,443	96
1930 2/	10,361	1,019,779	98
1935 2/	9,381	1,061,250	113
		Eastern Area	
1907	5,350	293,277	55
1910	10,256	599,086	56
1920			
1925	15,253	770,820	50
1930	14,119	663,146	45
1935	15,931	709,085	45

1/ Oklahoma State Board of Agriculture, First Biennial Report, 1909-10, p. 222.

2/ United States Department of Commerce, Bureau of Census, Agricultural Census, Vol. I, for the years 1910, 1920, 1925, 1930, and 1935.

being abandoned in the Area. Also, as will be shown later in this paper, the livestock industry has developed in the Eastern Area during more recent years. Thus, the increase in the average size of the farm has resulted in part from the addition of land for pasture; a large acreage of cropland has been taken from crop production and seeded with pasture crops.

In the Western Area, as will be shown later in this paper, the livestock industry has been declining in importance and as the result much land that was formerly used for pasture has been broken and is

today used for crop production. Also, the number of work stock has decreased, and land which was formerly used as pasture for work stock is now used for the production of crops. Furthermore, the average farmer in the Western Area has the potential equipment power for the cultivation of a large acreage of land and will tend to farm poorer grades of land than he would if his supply of power were limited.

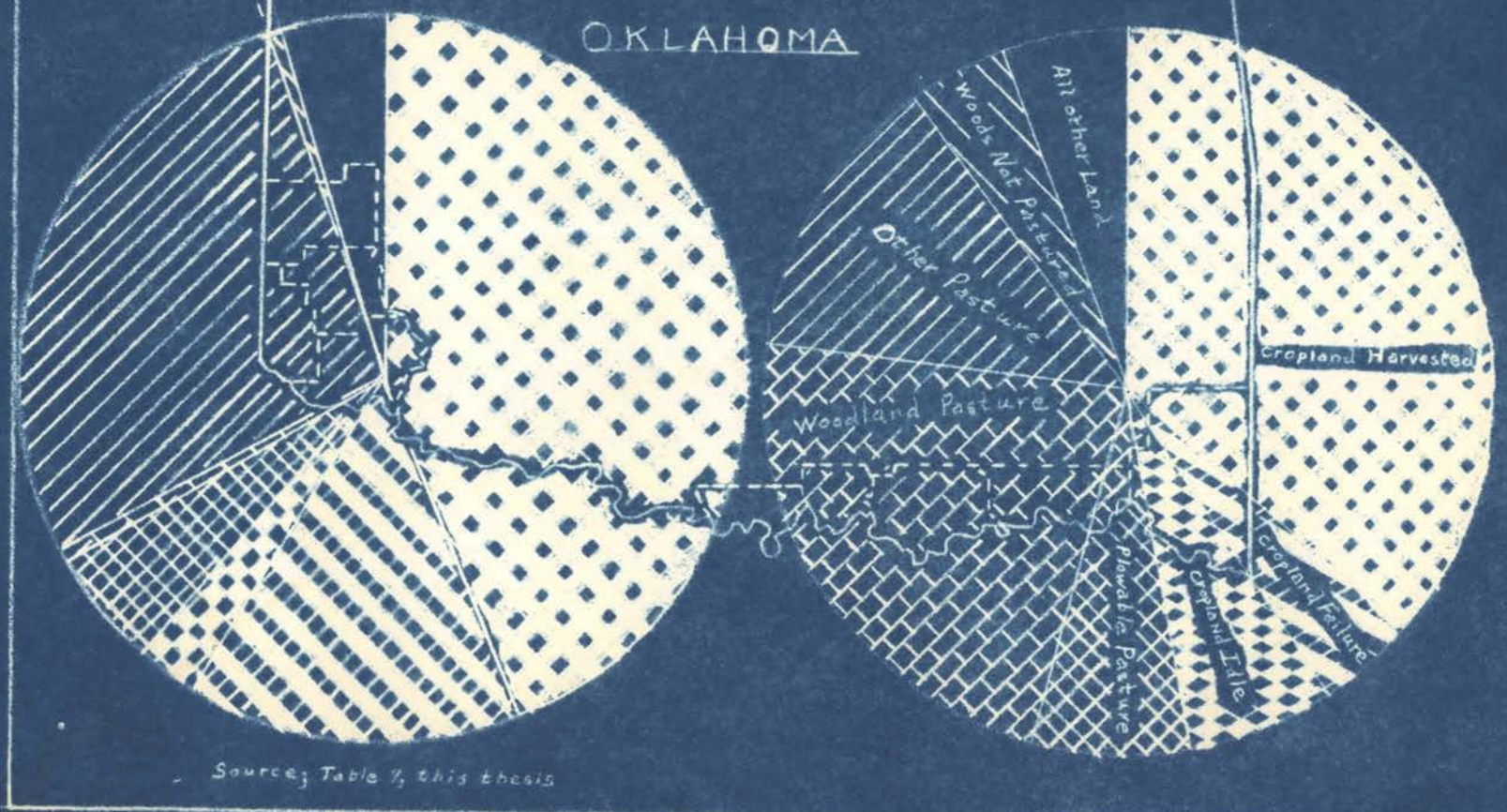
The 1935 Agricultural Census gives the latest complete data in regard to the use of farm land comprising the Areas studied. According to this report, a larger percentage of all farm land in the Western Area is available for crops as compared to the Eastern Area. (Table 7)

Table 7. Farm Land Use, 1934, Eastern and Western Areas of Oklahoma Studied

Land Use	Eastern Area		Western Area	
	Number of Acres	Percent of all land in farms	Number of Acres	Percent of all land in farms
All land in farms	1,524,472	100.0	1,720,174	100.0
Cropland harvested	549,297	36.0	762,838	44.4
Cropland failure	64,031	4.2	253,573	14.8
Cropland idle or fallow	95,757	6.3	44,839	2.6
Plowable pasture	109,404	7.2	89,398	5.2
Woodland pasture	352,649	23.1	11,175	0.6
Other pasture	197,851	13.0	487,281	28.3
Woods not pastured	71,601	4.7	4,034	0.2
All other land	83,882	5.5	67,036	3.9
Land available for crops, cropland harvested, cropland failure, cropland idle and plowable pasture.....	818,489	53.7	1,150,648	66.9

SOURCE: Based on Agricultural Census Data, Bureau of Census, United States Department of Commerce, Vol. I, 1935.

FIGURE VII. PERCENTAGE OF ALL FARM LAND ACCORDING TO USE, 1934, EASTERN AND WESTERN AREAS STUDIED.



Source; Table 7, this thesis

Normally there is a larger percentage of cropland idle in the Eastern Area as compared to the Western Area, but a large acreage of cropland failure is reported for the Western Area. 1/

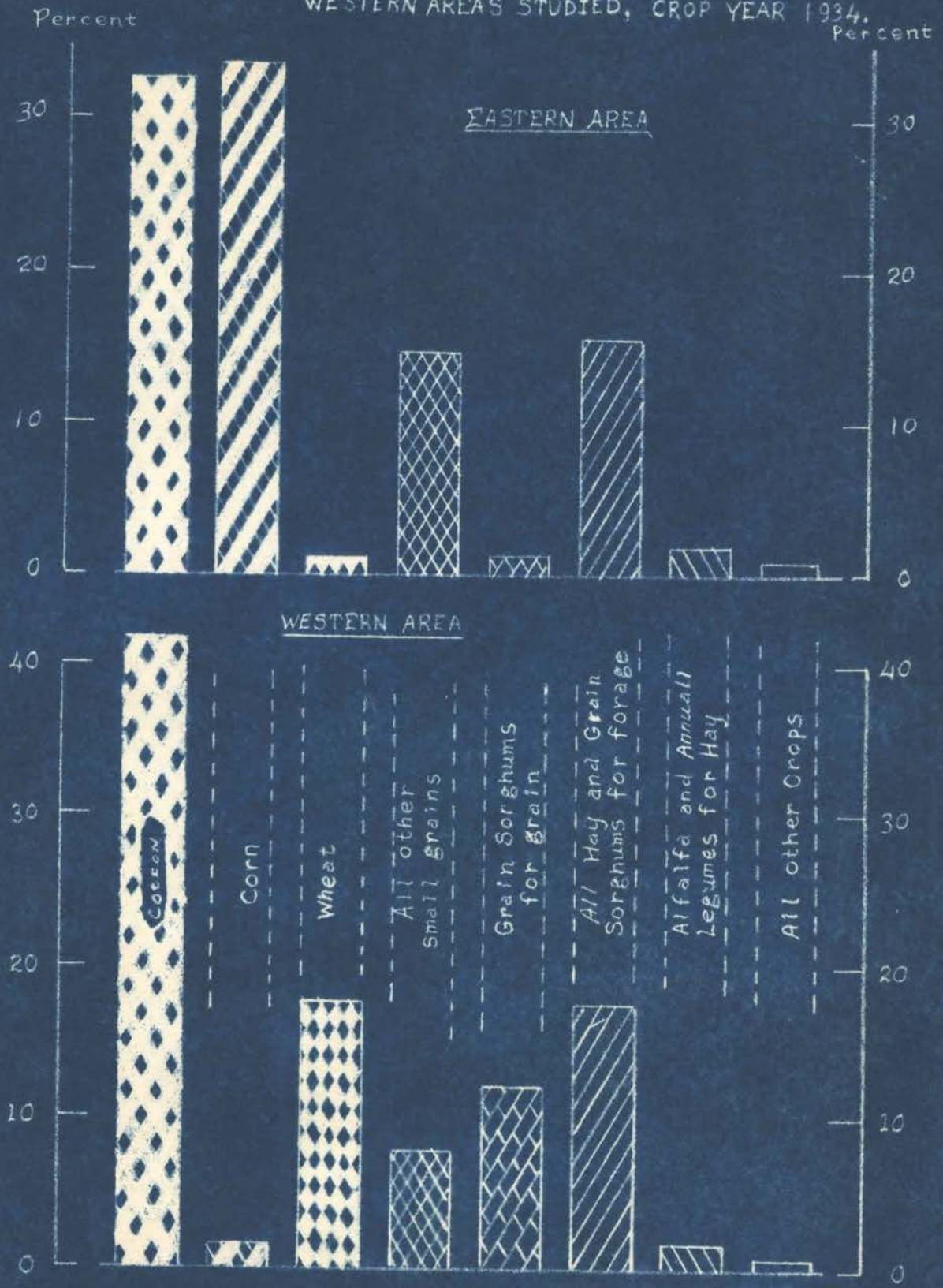
Table 8. Use of Cropland, 1934, Eastern and Western Areas of Oklahoma Studied

Use of Cropland	Eastern Area		Western Area	
	Number of Acres	Percent of all Cropland	Number of Acres	Percent of all Cropland
Total acres of cropland	709,085	100.0	1,061,250	100.0
Failure	64,031	9.0	253,573	23.9
Cropland harvested	549,297	77.5	762,838	71.9
Cropland idle	95,757	13.5	44,839	4.2
	Percent of Acres Harvested		Percent of Acres Harvested	
Wheat threshed	3,500	0.6	135,034	17.7
Oats threshed	56,796	10.3	30,553	4.0
Oats not threshed	14,226	2.6	7,566	1.0
Barley threshed	1,373	0.2	13,866	1.8
Rye threshed	26	0.0	493	0.1
Mixed small grains threshed	657	0.1	475	0.1
Grain sorghums for grain	5,489	1.0	91,660	12.0
Grain sorghums for forage	86,142	15.7	134,813	17.7
Alfalfa	3,192	0.6	10,348	1.3
Small grains for hay	5,185	0.9	3,046	0.4
Annual legumes for hay	3,921	0.7	1,342	0.2
All other hay	1,432	0.3	3,842	0.5
Corn	182,651	33.3	12,229	1.6
Cotton	179,208	32.6	317,571	41.6

SOURCE: Agricultural Census, Bureau of Census, United States Department of Commerce, Vol. I, 1935.

1/ Based on Census data, for the years 1920, 1925, and 1930.

FIGURE VIII PERCENT ACREAGE OF VARIOUS CROPS IS OF ALL CROPLAND HARVESTED, EASTERN AND WESTERN AREAS STUDIED, CROP YEAR 1934.



Source; Table 7, this thesis.

From the standpoint of acreage harvested, cotton is by far the most important single crop in the Western Area. (Figure VIII) In the Eastern Area, corn competes strongly with cotton in number of acres planted. (Figure VIII) In the Western Area wheat is the second crop of importance, followed closely by hay crops which are also planted on a large percentage of the cropland of the Eastern Area. In this latter Area there is a relative large acreage of oats harvested, while in the Western Area, except for wheat, there is a small acreage of small grains. (Table 8)

The distribution of various crops on the individual farms of each Area is shown by the following table. It is noted that cotton is produced on approximately the same percentage of farms in both Areas.

Table 9. Number of Farms Harvesting Various Crops, 1934, Eastern and Western Areas of Oklahoma Studied

Name of Crop	Eastern Area	Western Area
Total number of farms	15,931	9,381
Wheat threshed	130	2,471
Oats threshed	1,574	1,321
Oats not threshed	1,928	583
Barley threshed	78	774
Rye threshed	1	28
Mixed small grains threshed	14	19
Grain sorghums for grain	915	3,720
Grain sorghums for forage	11,673	8,097
Alfalfa	287	606
Small grains for hay	459	273
Annual legumes for hay	3,921	143
All other tame and wild hay	1,432	288
Corn	11,574	1,256
Cotton	12,257	7,009

SOURCE: Agricultural Census, Bureau of Census, United States Department of Commerce, Vol. I, 1935.

Table 10. Livestock Inventory as of January 1, 1935
Eastern and Western Areas of Oklahoma Studied

	Number of Head	Number of Farms Reporting	Percent of all Farms	Average Per Farm Reporting	Number of Head	Number of Farms Reporting	Percent of all Farms	Average Per Farm Reporting
Number of farms		15,931	100.0			9,381	100.0	
Horses and Mules	50,683	13,102	82.2	3.9	37,334	7,306	77.9	5.1
Horses and Colts	26,730	8,707	54.7	3.1	21,891	6,396	68.2	3.4
Mules	23,953	10,121	63.5	2.4	15,443	4,811	51.3	3.2
Cattle and Calves	126,250	13,177	82.7	9.6	72,979	8,439	89.9	8.6
Calves under 1 year	35,779	10,343	64.9	3.5	21,664	6,324	67.4	3.4
Cows 1 and under 2	16,376	5,073	31.8	3.2	8,289	2,875	30.6	2.9
Cows 2 and over	61,717	12,922	81.1	4.8	40,072	8,393	89.5	4.8
Steers and bulls	12,652	2,617	16.4	4.8	2,954	1,479	15.8	2.0
Milk Cows (included in cows over 2 years)	34,332	12,621	79.2	2.7	30,789	8,209	87.5	3.7
Sheep and Lambs	3,447	100	0.6	34.3	6,028	88	0.9	69.5
Swine all ages	57,699	10,519	66.0	5.5	18,346	4,574	48.7	4.0
Chickens	442,328	14,443	90.7	30.6	431,576	8,330	88.8	52.3

SOURCE: Bureau of Census, United States Department of Commerce, Census of Agriculture, Vol. I, 1935.

Contrary to popular belief, the livestock inventory is of greater importance in the Eastern Area than in the Western Area. While a slightly larger percentage of the farms of the Western Area reported cattle and calves, the average number of cattle and calves per farm reporting was one unit larger for the farms of the Eastern Area. In the Western Area a larger percentage of the cattle are milk cows. The keeping of milk cows is usually associated with higher standards of farm living.

Swine are kept on a larger percentage of the farms of the Eastern Area and the average number per farm reporting is larger for the Area than for the Western Area.

Sheep are kept on a very few farms of either Area, the average number of sheep per farm reporting is greater in the Western Area.

Chickens are raised on most all the farms of both Areas, the average number per farm reporting being larger for the Western Area.

Work stock are found on a larger percentage of the farms of the Eastern Area, but the average number of work animals per farm reporting is greater in the Western Area. Horses are more frequent than mules in the Western Area, while in the Eastern Area, mules are more frequent than horses. In 1935, (Table 10) the average number per farm is greater for horses than mules in both Areas.

Tractors and other mechanical equipment are used on a greater percentage of the farms of the Western Area as of the Eastern Area. In 1939, the Western Area reported 2,511 tractors as compared to 410 farm tractors for the Eastern Area.[2/]

2/ "The Service Man," a published answer to a letter written by the writer of this thesis, requesting the number of farm tractors for certain counties of Oklahoma, Oklahoma City Times, October 1, 1940.

Table 11. Number of Farms, Acres of Cropland, Total Value of Machinery and Implements, Average Value of Machinery and Implements per Farm, Average Value of Machinery and Implements per Acre of Cropland, Value of Cropland per Acre, and the Ratio of Machinery Value to Cropland Value, Eastern and Western Areas of Oklahoma Studied For Selected Years

Year	Number of Farms	Acres of Cropland	Total Value of Machinery and Implements	Value of Machinery and Implements per Farm	Value of Machinery and Implements per Acre of Cropland	Value of Cropland	Ratio of Machinery and Implement Value to Cropland Value
				Western Area			
1910	9,077	907,880	1,574,030	173.40	17.33	38.22	45.3
1925	9,175	878,443	3,786,000	412.64	43.10	53.32	80.8
1930	10,361	1,019,779	5,950,000	574,27	58.34	64.69	90.6
				Eastern Area			
1910	10,256	599,086	768,036	74.89	12.82	24.65	52.0
1925	15,253	770,820	2,261,000	148.23	29.33	51.70	56.7
1930	14,119	633,146	2,189,000	155.03	34.57	46.90	73.7

SOURCE: United States Census, Vol. III; 1910, 1925, and 1930.

The average farm of the Western Area (Table 11) has machinery and implements valued at $574, while the value of these items on the average farm of the Eastern Area is only approximately $155.

Notwithstanding the fact that there is a larger outlay of capital for machinery and implements for the average farm of the Western Area, as compared to the Eastern Area, cotton is produced at a lower cost per acre in the Western Area. The total cost of producing an acre of cotton in the Eastern Area is approximately $23.21, as compared to an average per acre cost of approximately $16.11 in the Western Area.

Table 12. Cost of Cotton Production, Average 1934-1936

Operation	Eastern Area 1/ Cost per Acre	Western Area 2/ Cost per Acre
Total cost	$23.21	$16.11
Prepare and plant	3.44	2.38
Cultivate and hoe	5.04	2.89
Harvest	3.80	2.45
Fertilizer	0.91	0.07
Seed	0.90	0.76
Ginning	1.46	1.25
Miscellaneous	2.71	2.56
Land Rent	3.93	3.69
Yield per acre	137	82

SOURCE: Agricultural Statistics, United States Department of Agriculture, 1935 and 1937.

1/ The "Eastern Area" includes Eastern Oklahoma, the hilly lands of Arkansas, Southern Missouri, and Eastern Texas.

2/ The "Western Area" includes the dry land Areas of Western Oklahoma, Western Texas, and Eastern New Mexico

Excluding rent, the largest costs of producing cotton in either Area are the amounts expended in preparing the seed bed, planting, and cultivating the crop. To prepare the seed bed and plant the crop, the

average cost is $3.38 per acre for the Western Area as compared to an average cost of $3.44 per acre for the Eastern Area. To cultivate and hoe the crop the average cost is $2.89 per acre for the Western Area and $5.04 per acre for the Eastern Area. (Table 12)

While there may be some question as to how near the data of the preceding table truly represents conditions of the Eastern Area, with few limitations, it can be said that the data truly represent the cost of cotton production in the Western Area. The Area used for this study is a part of the larger Area and from observation it has been noted that the type of production is very similar in the western cotton producing section of the United States. The costs of harvesting and ginning cotton are on a per pound basis, thus, the total cost for the production of cotton would need be adjusted on these cost items when studying smaller areas of this western section if the yield per acre differed greatly from the average yield for the entire Area.

In discussing the application of the data presented in Table 12 to the Eastern Area under consideration, it might be pointed out that for the year 1935, the per acre cost of cotton production for the United States, excluding the Western Area, was $27.52, and that the per acre cost for the Western Area as used in Table 12 was only $18.27. For this same year the average per pound cost of cotton was 8.3 cents for the United States, excluding the Western Area and was 6.8 cents per pound for the Western Area. The per pound figures excluded, in both cases, the cost of rent.[3/] The cost of rent as shown for the

---

3/ Agricultural Statistics, 1937, United States Department of Agriculture, 1937, p. 398.

Eastern Area in Table 12, cannot be used when considering the two Areas used for this study. In comparing the two Areas used in this study it was found that the land was more valuable in the Western Area. (Table 13)

Table 13. Total Value, Value per Farm, and Value per Acre of Farm Land, Eastern and Western Areas of Oklahoma Studied for Selected Years

Year	Total Value	Value Per Farm	Value Per Acre
	Eastern Area		
1910	$34,706,318	$3,823	$22.35
1920	51,948,753	6,264	32.79
1925	46,843,000	5,106	28.51
1930	65,683,000	6,339	39.24
1935	42,158,000	4,683	24.90
	Western Area		
1910	14,773,334	1,440	15.65
1920	66,857,894	4,108	47.32
1925	39,850,000	2,613	30.31
1930	29,669,000	2,104	21.70
1935	18,748,001	1,171	12.69

SOURCE: Census of Agriculture, Vol. I, Reports for the census years 1910, 1920, 1925, 1930, and 1935. Bureau of Census, Department of Commerce.

Data as to cost of producing cotton were introduced in the paper not only to show that there was a difference in the per acre cost between these two areas but also to show the changes in per acre cost when there was a change in the acreage planted to cotton. In the dry-land Area (Figure I) a reduction in the acreage of cotton harvested resulted in an increase of $3.79 in the per acre cost of production, while in all other cotton producing areas of the United States there was an increase of nearly $10.00 in the per acre cost of production.

Summary: The agriculture of the Western Area is of the large scale type while the agriculture of the Eastern Area is more self-sufficing and is practiced on smaller units. While there is a smaller percentage of the land in the Eastern Area now in farms it is believed that the percentage of cultivable land could be increased easier in the Western Area; in the Eastern Area a large percentage of the land not in crops is woods and woods pasture.

In the Western Area cotton is a more important crop on the individual farm; in the Eastern Area, cotton is still the cash crop, but since the type of farming is more nearly self-sufficing, other crops play an important part in the crop organization. While the Area is not considered as an important commercial livestock region, the livestock enterprise is of more importance on the average farm of the Eastern Area than in the Western Area.

During recent years the tractor has replaced horses and mules on a greater number of the farms of the Western Area. With the use of tractors much time can be saved in the production of cotton. A lower cost per acre can be achieved. Without limitations, it can be said that cotton can be produced at a lower cost per acre in the Western Area. This can be considered as an advantage only as long as the differences in the yield of lint per acre between the Areas does not increase to the point where the per pound cost of production would be cheaper in the Eastern Area. Also the advantage would remain in favor of the Western Area only as long as the cheapness of production did not reduce the quality of the product to the point where the discount for quality did not offset the savings in cost of production.

CHAPTER III

TRENDS IN THE PRODUCTION OF COTTON

In the preceding pages of this paper, those factors which are usually associated with cotton production have been described. In this chapter data are presented to show the importance of these factors as they influence the production of cotton in each of the Areas. In studying the trends of cotton production the (1) acreage, (2) yield per acre, and (3) total production will be individually studied.

Trends in the Acreage Planted to Cotton: The two Areas chosen for this study were parts of the area which became the State of Oklahoma in 1907. Data as to acreage planted to cotton are not available prior to the date Oklahoma became a State.

During the year 1907, there were planted in the Western Area more than 200,000 acres to cotton. (Table 14) while in the Eastern Area there were only 135,846 acres planted to cotton. This acreage represented approximately one-fourth of the total cultivated land in each of the Areas. As previously stated in this paper, the boll weevil invaded the Eastern Area during the year 1907. The damaging effect to cotton was so great that the acreage planted greatly decreased in the Area for the years 1908 and 1909.

The acreage planted to cotton in the Western Area for the years 1908 and 1909 was approximately 25 percent greater than the acreage of 1907. However, during the ten year period, 1909 to 1919, the acreage planted to cotton increased at a greater rate in the Eastern Area than in the Western Area. In 1919, the Eastern Area was planting 334,525 acres to cotton as compared to 287,729 acres for the Western Area; however, five years later the Western Area was reporting a larger acreage

Table 14. Price of Cotton, Acreage Harvested in the United States and Acreage Harvested in the Eastern and Western Areas of Oklahoma Studied, For Selected Years

Year	Price, Cents per Pound 1/	Acres Harvested: United States 1,000 Acres 2/	Eastern Area	Western Area
1906	9.58			
1907	10.36	30,729	135,846 3/	200,399 3/
1908	9.01	31,091	73,954 3/	258,185 3/
1909	13.60	30,555	92,483 3/	259,876 3/
1910	13.95	31,508	137,070 3/	242,899 3/
1911	9.60	34,916	165,708 3/	245,915 3/
1912	11.49	32,557		
1913	12.51	35,206		
1914	7.36	35,615		
1915	11.22	29,951	188,936 3/	235,569 3/
1916	17.33	33,071	200,249 3/	251,758 3/
1917	27.12	32,245	346,363 3/	250,491 3/
1918	28.92	35,038	329,584 3/	246,574 3/
1919	35.41	32,906	334,525 4/	287,729 4/
1920	15.92	34,408		
1921	17.01	28,678		
1922	22.87	31,361		
1923	28.69	35,550		
1924	22.91	39,501	401,638 4/	458,212 4/
1925	19.59	44,386		
1926	12.47	44,608		
1927	20.19	38,342		
1928	17.99	42,434	304,300 5/	669,000 5/
1929	16.79	43,232	216,500 5/	693,000 5/
1930	9.46	42,444	250,000 5/	640,000 5/
1931	5.66	38,704	221,100 5/	518,000 5/
1932	6.52	35,891	198,500 5/	482,300 5/
1933	10.17	29,383	253,600 5/	609,700 5/
1934	12.36	26,866	189,600 5/	371,600 5/
1935	11.09	27,335	147,900 5/	388,100 5/
1936	12.30	30,054	175,500 5/	398,500 5/
1937	8.41	33,623	195,200 5/	386,900 5/
1938	8.59	25,018	128,480 5/	321,610 5/
1939	9.22		126,000 5/	313,000 5/

1/ United States Department of Agriculture, Agricultural Statistics, 1939, pp. 88-89.

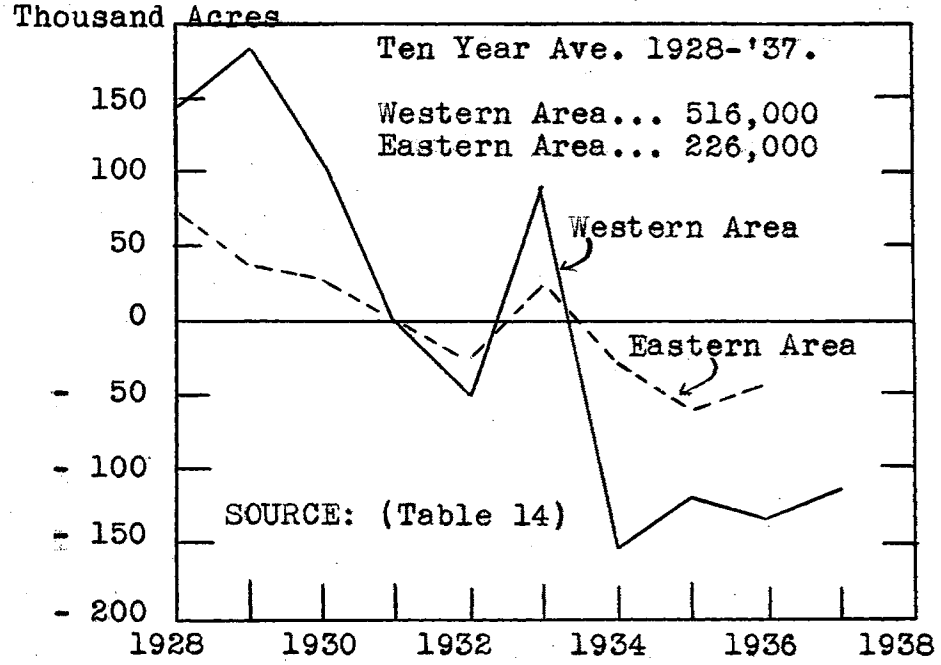
2/ Ibid.

3/ Oklahoma State Board of Agriculture, Biennial Reports, 1909-10, 1910-11, 1915-16, and 1917-18.

4/ Bureau of Census, Agricultural Census, 1920 and 1925.

5/ K. D. Blood, Unpublished Data, Agricultural Marketing Service, Federal Building, Oklahoma City, November, 1940.

Figure IX. Deviation From Ten Year Average Acreage of Cotton Harvested, Eastern and Western Areas of Oklahoma Studied, Ave, 1928-37.



(Thousand Acres)

Eastern Area

K	M	F	FM
100 - 139	120	0	0
140 - 179	160	2	320
180 - 219	200	3	600
220 - 259	240	3	720
260 - 299	280	1	280
300 - 339	320	1	320
340 - 379	360	0	0
		10	2260

Western Area

K	M	F	FM
300 - 339	320	0	0
340 - 379	360	1	360
380 - 419	400	3	1200
420 - 459	440	0	0
460 - 499	480	1	480
500 - 539	520	1	520
540 - 579	560	0	0
580 - 619	600	1	600
620 - 659	640	1	640
660 - 699	680	2	1360
		10	5160

$$Ma = \frac{\Sigma FM}{N}$$

$$Ma = \frac{2260}{10}$$

$$Ma = 226$$

$$Ma = \frac{5160}{10}$$

$$Ma = 516$$

and the farmers of this Area have continued, year after year, to plant a larger acreage of cotton than have the farmers of the Eastern Area. (Table 14)

Factors Affecting the Acreage Planted to Cotton: Generally speaking, those factors affecting the acreage planted to cotton in the entire United States exerted a strong influence on the individual farmers of the two Areas studied, with respect to the number of acres planted to cotton from year to year.

A very strong factor determining the acreage planted to cotton in the United States is the price the farmers received for their product the preceding year. (Table 14) With a decrease in price there was a decrease in the acreage planted to cotton the forthcoming year. Decreases and increases in the acreage planted to cotton in the Areas studied corresponded closely with the changes in the price of cotton. There were exceptions between the two Areas (Figure IX and Table 14) which implies that there are factors operating in one Area which are not effective in the other Area.

It has been previously stated in this paper that wheat was the second crop of importance in the Western Area, while in the Eastern Area, corn occupies this position. Generally speaking, where there is equal choice between two or more crops within an area, that crop commanding the highest relative price will be planted on the largest number of acres the forthcoming season. Thus, in the Western Area when wheat commanded a relatively higher price than cotton, there appeared a corresponding increase in the acreage planted to wheat and a decrease in the acreage planted to cotton. In the Eastern Area the relative price of wheat has no effect on the acreage planted to cotton, but in

this Area, the price of corn as compared to the price of cotton is the determining factor as to the choice of crops. (Table 15)

The correlation between the acreage planted to cotton and the acreage planted to corn has not been as close as the correlation between the acreage planted to cotton and the acreage planted to wheat. This can be explained by the fact that wheat is chiefly a cash crop to the farmers of the Western Area, and in this connection it might be considered as a substitute crop, that is, a crop which often entirely replaces cotton on individual farms when there is a greater economic advantage in its production. In the Eastern Area, corn, the second crop of importance, is more or less a subordinate crop to cotton. Usually cotton serves the farmers of this Area as a cash crop, and corn and other crops are produced to supply feed for home needs.

The greater spread in the acreage planted to cotton between these two Areas in more recent years, as compared to the spread during the early years, can be accounted for in part by the change in the motivity power used for the cultivation of cotton in one of the Areas when compared to the other Area. For the year 1909, horses and mules were used in most cases for the cultivation of cotton in both Areas. In this year there were 37,408 horses and mules on the farms of the Eastern Area, and the farmers of the Western Area reported 45,368 horses and mules.[1/] At this date there was on the average one horse or mule for each 16 acres of cropland in the Eastern Area and one horse or mule for approximately each 20 acres of cropland in the Western Area.[2/]

1/ Based on the United States Census Data, 1910.

2/ Ibid.

Table 15. United States Prices For Corn and Wheat, Acreage of Corn and Cotton Harvested in the Eastern Area of Oklahoma, And Acreage of Wheat and Cotton Harvested in the Western Area of Oklahoma Studied, For Selected Years

Year	Corn		Cotton		Wheat	
	Price, Cents per Bushel 1/	Acreage Eastern Area	Acreage Eastern Area	Acreage Western Area	Acreage Western Area	Price, Cents per Bushel 2/
1906	31.7					66.0
1907	44.7	172,679 3/	135,846 3/	200,399 3/	66,025 3/	86.6
1908	49.2	167,996 3/	73,954 3/	258,185 3/	38,231 3/	96.7
1909	42.8	205,695 4/	92,483 4/	259,876 4/	29,314 4/	99.1
1910	35.6	163,743 3/	137,070 3/	242,899 3/	32,322 3/	90.8
1911	44.9	170,214 3/	163,708 3/	245,913 3/	7,936 3/	86.9
1914	43.9					97.4
1915	38.3	195,380 3/	188,936 3/	235,569 3/	106,704 3/	96.1
1916	48.7	199,500 3/	200,249 3/	251,758 3/	123,611 3/	143.4
1917	70.1	236,055 3/	346,363 3/	250,491 3/	129,730 3/	204.7
1918	68.5	247,978 3/	329,581 3/	246,574 3/	106,302 3/	205.0
1919	76.7	250,101 4/	334,525 4/	287,729 4/	248,250 4/	216.3
1927	47.1					119.0
1928	40.7		304,300 5/	669,000 5/	68,600 5/	99.0
1929	41.8	228,922 4/	216,500 5/	693,000 5/	56,780 5/	103.6
1930	32.2		250,000 5/	640,000 5/	45,400 5/	67.1
1931	21.3		221,100 5/	518,000 5/	115,700 5/	39.0
1932	15.7		198,500 5/	482,300 5/	119,600 5/	38.2
1933	33.5		253,600 5/	609,700 5/	136,000 5/	74.4
1934	48.0		189,600 5/	371,600 5/	135,034 5/	84.8
1935	26.3		147,900 5/	388,100 5/	98,800 5/	83.2
1936	44.2		175,500 5/	398,500 5/	88,000 5/	99.7
1937			195,200 5/	386,900 5/	196,000 5/	
1938			128,480 5/	321,610 5/	248,300 5/	
1939			126,000 5/	313,000 5/	139,100 5/	

1/ United States Department of Agriculture, Agricultural Statistics, 1937, pp. 39-41.

2/ Ibid. pp. 9-10.

3/ Oklahoma State Board of Agriculture, Biennial Report, 1907-08, 1909-10, 1911-12, 1915-16, 1917-18.

4/ Bureau of Census, United States Department of Commerce, Census of Agriculture, Reports of 1910, 1920, 1925, 1930, and 1935.

5/ K. D. Blood, Unpublished Data, Agricultural Marketing Service, Federal Building, Oklahoma City, November, 1940.

Twenty years later, in 1930, the number of horses and mules had increased in the Eastern Area; and although there had been an increase in the acreage of cropland there was one horse or mule for each 14 acres of cropland in the Area. During the period of years, 1910 to 1930, the number of horses and mules on the farms of the Western Area had decreased, and with an increase in the acreage of cropland there was in 1930 only one horse or mule for each 24 acres of cropland.

By the latter year, tractors had replaced horses and mules on a large number of farms in the Western Area, while in the Eastern Area only a small percentage of the farms reported this change in motivity power. The number of farm tractors in 1930 was 1,086 for the Western Area and 219 for the Eastern Area.[3/] During more recent years the number of farm tractors have been increasing in both Areas; however, the increase in numbers has been greater for the Western Area as compared to the Eastern Area. In 1939, there were 2,511 farm tractors in the Western Area and 410 in the Eastern Area.[4/]

With the use of tractors much time can be saved in the production of cotton, for example,

> ".....Many farmers using tractors in the Western Area do all the machinery work growing an acre of cotton in five hours. Where small mule-or-horse drawn equipment is used, the time required to produce an acre of cotton, aside from the chopping and picking, often runs ten times this amount or five days instead of five hours....." 5/

3/ Based on United States Census Data, 1930.

4/ "The Service Man," a published answer to a letter written by the writer of this thesis requesting the number of farm tractors for certain counties of Oklahoma, Oklahoma City Times, October 1, 1940.

5/ J. T. Sanders, Current Farm Economics, Oklahoma Agricultural Experiment Station, April, 1933, Table 3, p. 3.

Because of the relatively small acreage of cotton per farm in the Eastern Area, it is improbable that the tractor will replace the horse in the production of cotton within the Area, quoting Stephens; 6/

> ".....Tractors are economical in their use of labor. However, this avails nothing unless both the tractor and the labor of the farmer can be used profitably to the limit of their capacity. Where a tractor is used less than 500 hours or 50 days a year, its costs are usually prohibitive, larger than the cost of other source of power. The same is true of other labor saving equipment."

During the past 30 years there has been an increase in the per acre cost of cotton production in both of the Areas. The increase, however, has been greater in the Eastern Area. (Table 16)

During the 1907 season, the cost of preparing the seed bed, planting the seed, and cultivating the crop was approximately one-third of the total cost of production, excluding rent. (Table 16) These costs increased in greater proportions in the Eastern Area, and during the season 1936 the fore-mentioned cost represented more than one-half the total cost of cotton production. By keeping down these costs, the Western Area is today producing cotton at a lower cost per acre than the Eastern Area. However, if the lower costs are to be maintained in the Area, in all probability, the larger acreage must be retained. In the Western Area, with a noticeable decrease in the acreage planted to cotton there is an increase in the per acre cost of the machinery work. For the year 1936 there was a decrease of approximately 100,000 acres planted to cotton as compared to the crop within the Area for the year 1934. Accompanying this decrease in

---

6/ P. H. Stephens, Current Farm Economics, Oklahoma Agricultural Experiment Station, December, 1931, p. 18.

Table 16. Selected Cost per Acre of Cotton Production, 1907 as Compared to 1936, Eastern and Western Areas Studied

(Dollars Per Acre)

	Eastern Area		Western Area	
	1907*	1936**	1907*	1936**
Prepare and plant	1.92	3.26	2.05	2.50
Cultivating	2.67	5.11	2.40	2.99
Picking (Adjusted) 1/	4.58	4.58	4.58	4.58
Ginning (Adjusted) 2/	1.79	2.67	1.79	4.38
Total Cost Excluding Rent	10.96	15.62	10.82	14.45

1/ For a comparative study, since the cost of picking cotton is computed on a pound basis, uniform yield per acre was assigned both areas for the two years studied, prevailing cost per pound for picking cotton were the same for both of the years studied thus since the same per acre yields were used the cost per acre for this item of expense was the same for the two years.

2/ For a comparative study, since the cost of ginning cotton is on a per pound basis, uniform yields were assigned both areas for the two years studied. The prevailing cost of ginning cotton was greater for the year 1936 as compared to 1907. Also the cost of ginning cotton was greater in 1936 for the Western Area as compared to the cost in the Eastern Area for the same year.

SOURCE: *Oklahoma State Board of Agriculture, First Biennial Report, Part IX, p. 7.

**United States Department of Agriculture, Agricultural Statistics, 1937, p. 398.

acreage there was an increase of 10 percent in the per acre cost of machinery work. 7/

Trends in The Yield of Lint Per Acre: During the early years of cotton production in Oklahoma the Eastern Area produced a greater number of pounds of lint per acre. The average yield of lint per acre obtained from Oklahoma farms during the six year period commencing with 1895 and ending with 1900, was 0.46 bale per acre. During this period "Oklahoma" was that territory lying west of a line running north and south, dividing in equal parts that area which today is the State of Oklahoma. That territory lying east of the line was known as Indian Territory and had an average yield of lint for the six year period of 0.51 bale per acre. 8/

The Eastern Area, used in this study, reported in 1909, an average of 156 pounds of lint cotton per acre as compared to an average of 122 pounds of lint cotton per acre in the Western Area. (Table 17)

Since Oklahoma became a State in 1907, the average yield of lint per acre for the Western Area has varied from a high of 230 pounds to a low of 32 pounds. During this same period of years the Eastern Area has reported a high of 342 pounds of lint cotton per acre and a low yield of 71 pounds per acre.

For the ten year period, 1929 to 1938, the average yield per acre for the Western Area has been 128 pounds as compared to an average of 120 pounds per acre for the Eastern Area. Since the year 1933, the decrease in average yield of lint per acre has been much greater in the Western Area than in the Eastern Area. (Figure X)

7/ United States Department of Agriculture, Agricultural Statistics, 1937 and 1935.

8/ Moorehouse and Nicholson, Op. Cit. p. 36.

Table 17. Total Amount of Cotton Produced and Average Yield of Lint Cotton per Acre, Eastern and Western Areas of Oklahoma Studied, For Selected Years

Year	Production, 1,000 Pounds 1/		Pounds of Lint Per Acre	
	Eastern Area	Western Area	Eastern Area	Western Area
1907	14,075	39,036	104 2/	195 2/
1908	8,619	30,042	116 2/	116 2/
1909	14,450	31,813	156 2/	122 2/
1910	35,186	55,811	257 2/	230 2/
1911	56,057	40,377	342 2/	164 2/
1912	52,455	61,218	---	---
1913	53,057	21,273	---	---
1914	45,716	83,117	---	---
1915	29,538	45,044	156 2/	191 2/
1916	45,728	38,750	228 2/	154 2/
1917	57,225	30,281	---	---
1918	40,073	18,396	---	---
1919	53,750	63,712	161 3/	221 3/
1920	47,421	52,785	---	---
1921	8,162	41,846	---	---
1922	26,896	41,850	---	---
1923	35,499	48,431	---	---
1924	66,390	119,932	165 3/	262 3/
1925	72,669	99,620	---	---
1926	28,178	143,705	---	---
1927	15,004	136,362	---	---
1928	31,810	101,200	104 4/	151 4/
1929	28,260	108,805	108 4/	157 4/
1930	24,100	60,850	96 4/	95 4/
1931	43,150	92,200	195 4/	178 4/
1932	25,665	96,700	129 4/	200 4/
1933	32,115	96,100	127 4/	159 4/
1934	14,745	14,950	78 4/	40 4/
1935	10,470	48,750	71 4/	126 4/
1936	20,195	12,680	115 4/	32 4/
1937	35,015	57,200	179 4/	148 4/
1938	18,672	36,386	145 4/	113 4/
1939	19,169	34,641	152 4/	110 4/

1/ K. D. Blood, Unpublished Data, Agricultural Marketing Service, Federal Building, Oklahoma City, November, 1940.

2/ Oklahoma State Board of Agriculture, Biennial Reports. Calculated from reports of 1909-10, 1911-12, and 1915-16.

3/ Bureau of Census, Department of Commerce, Census of Agriculture, Reports of 1920 and 1925.

4/ Blood. Op. Cit.

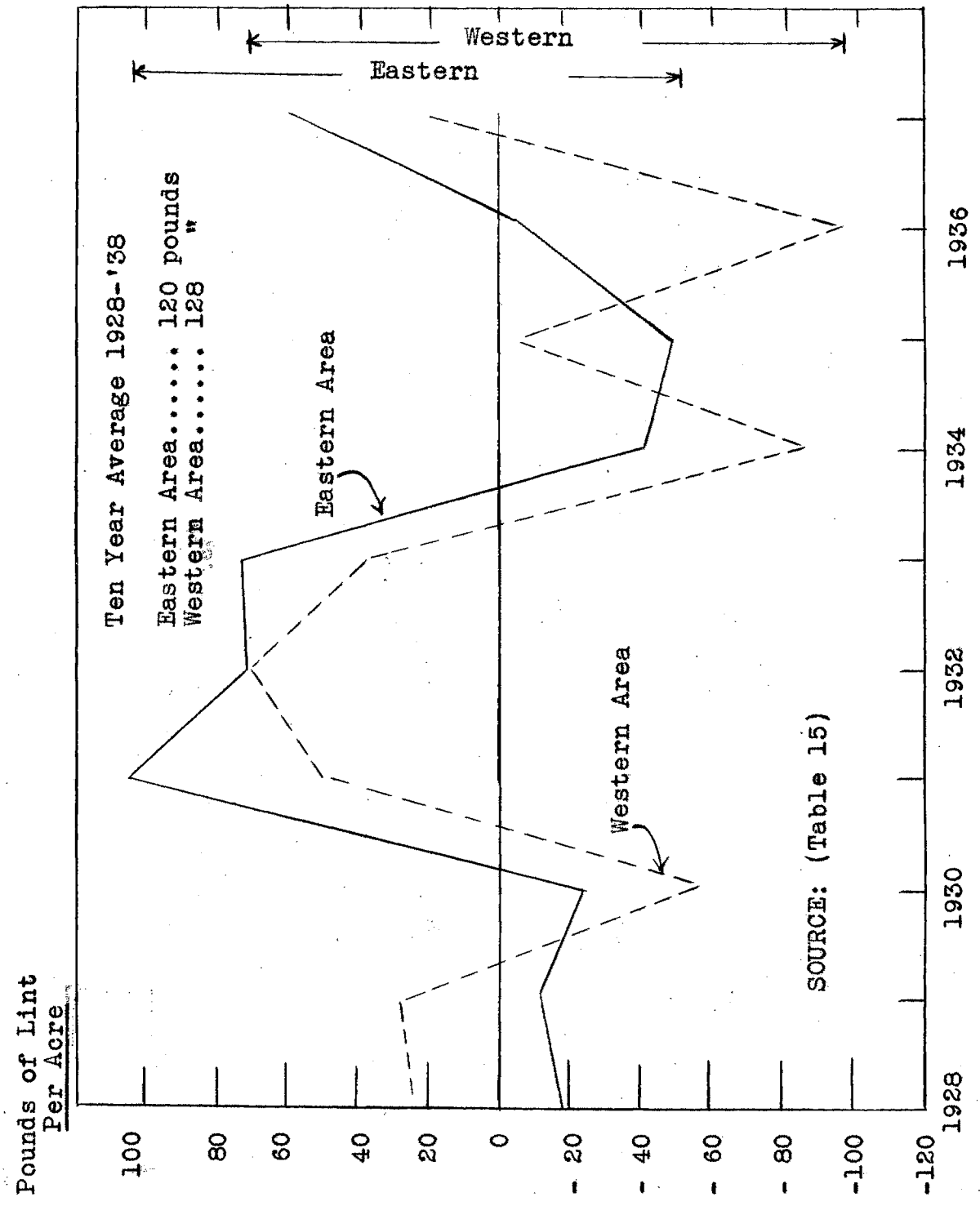


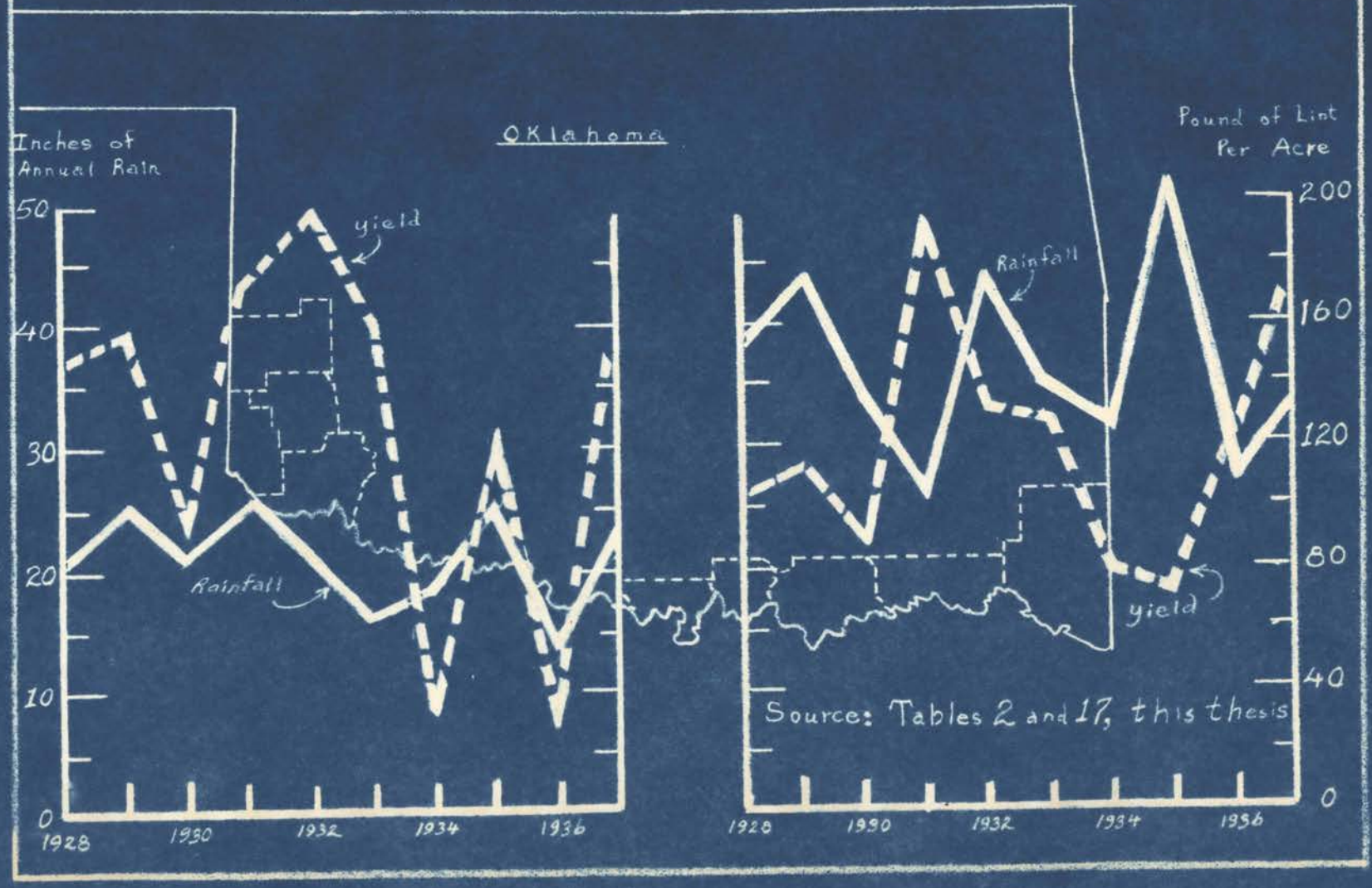
Figure X. Deviation From the Average Cotton Yield Per Acre, Eastern and Western Areas of Oklahoma Studied.

Factors Affecting The Yield Per Acre: In some cotton producing Areas of the United States an attempt is made to increase the yield of lint per acre by the application of fertilizers. While no data are available, it is the opinion of the writer that few of the cotton farmers in either of the Areas used for this study practice this type of farming. For the most part, the yield of cotton in either Area is influenced largely by weather conditions, and in this connection it should be remembered that weather conditions have a strong influence on the insect damage to cotton production in both Areas.

For the Western Area there seems to be a very close correlation between the annual amount of rainfall and the average yield of lint cotton per acre. (Figure XI) In 1929, the annual amount of rainfall was greater than for the preceding year and likewise the yield per acre was greater. The annual amount of rainfall for the Area was less for the year 1930, and accompanying this decrease in rainfall was a decrease in the average yield of lint per acre. This same correlation has held true during more recent years, the higher yields of lint for the Area being produced in those years of relatively high amounts of annual rainfall.

In the Eastern Area there appears the same correlation between the annual amount of rainfall and yield of lint per acre. (Figure XI) In the Eastern Area, however, when the annual amount of rainfall is excessive there is an inverse correlation between the yield and the amount of rainfall. During the season 1935, this Area witnessed the largest amount of rainfall for any year since 1924, and it was for this year that the Eastern Area reported the lowest yield of lint per acre as compared to any of the years 1924 to 1939.

Figure XI. Annual Rainfall And Cotton Yields, Eastern And Western Areas Studied, 1928 to 1938



The highest average yield of lint cotton per acre for the Eastern Area during the past 10 years was recorded in 1931, which was the driest year for the Area of the ten year period. The highest average yield for the Western Area was produced during the year of 1932, when the annual amount of rainfall was approximately normal for the Area. (Figure XII)

Trends in Total Cotton Production: Since the year 1907, the Western Area has produced a sum-total of approximately 2,113,898,000 pounds of lint cotton as compared to a sum-total of only approximately 1,109,516,000 pounds for the Eastern Area. (Table 17)

In 1919, the Western Area was producing 31,813,000 pounds of lint cotton; (Table 23) 30 years later, in 1939, this same Area was producing 34,641,000 pounds. However, for certain years during this thirty year period the Western Area has produced three times this amount of lint or more than 100,000,000 pounds for some years. The highest amount of cotton produced in the Western Area was produced during the year 1926 (Table 23) when the Area reported a production of 143,705,000 pounds, which is twice as much cotton as was ever produced in the Eastern Area during any one year. The Eastern Area produced its greatest amount of lint cotton during the season of 1925, when the total production was 72,669,000 pounds of lint cotton.

During the past five years the decrease in total cotton produced has been greater in the Western Area than in the Eastern Area. (Figure XII) This greater decrease in total production has resulted from a greater decrease both in the acreage planted to cotton and in the average yield of lint per acre in the Western Area; within the Western Area the decrease in acreage has been the stronger of the two factors

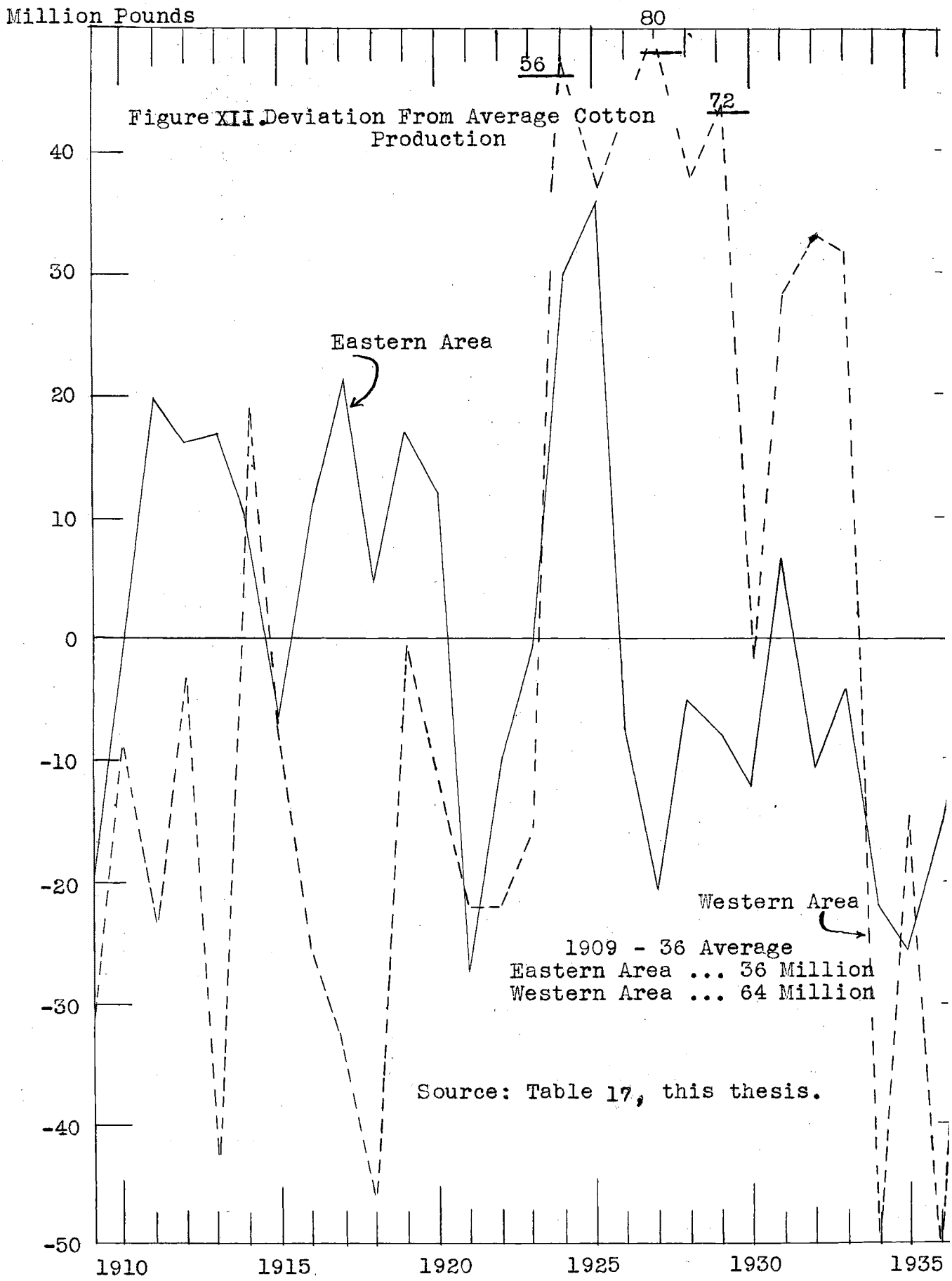


Figure XII. Deviation From Average Cotton Production

in reducing the total amount of cotton produced in the Area. The acreage has decreased approximately one-half, while the yield has decreased only one-third.

Summary: The boll weevil has probably accounted for a decrease in the acreage planted to cotton in the Eastern Area during certain years, while in the Western Area there has not occurred as yet a natural force which has decreased the acreage planted to cotton. In this latter Area the acreage planted to cotton has been reduced chiefly by economic forces. In this Area farming is of a specialized type, and only when there is an economic advantage in the production of some other cash crop is there a reduction in the acreage planted to cotton.

The physical nature of the Western Area allows for large scale farming, and from this type of farming has grown a style of farming which is dependent on machinery as a means of increasing the capacity of the individual operator. The success of this style of farming is dependent largely on the continued large scale type of farming, and in this connection yields per acre may be sacrificed in order to maintain a large total farm income. In the Eastern Area farming is more intensified, the units are smaller, and a decrease in the average yield per acre has a greater effect on the total farm income.

Thus, in contrasting the economic advantages in the production of cotton between these two Areas, it is apparent that in one case the greatest need is to maintain the larger acreage, while in the other Area the greatest need is to maintain a relatively large yield per acre. In this connection many men of the field have expressed the belief that the amount of cotton cannot be reduced merely by reducing the number of acres planted. As they point out, in many sections of

the Cotton Belt it is possible to produce as great an amount of cotton on a less number of acres my merely applying the same total amount of fertilizer and time in cultivation on the lesser number of acres. If this be true, there is great need for individual study of these two Areas. It has been pointed out that no gain could be secured by the application of fertilizer to the soils of the Western Area; it has also been pointed out that plant food could be added to the soils of the Western Area only in the organic form, while in the Eastern Area yields per acre have been increased by the application of fertilizer, and plant food can be added in the inorganic form.

There is an inverse relationship between the amount of annual rainfall and the average yield per acre between these two Areas. In the Western Area the problem of the cotton farmer is a means of conserving the moisture, while in the Eastern Area the problem of the average cotton farmer is finding an offset to the damage of e cessive moisture which in most cases amounts to controlling the damage of the bool weevil. In the Eastern Area the larger yields per acre have been reported for those years when the annual amount of rainfall was light, the low rainfall contributing to a lower damage resulting from the boll weevil.

CHAPTER IV

QUALITY OF COTTON PRODUCED

In the preceding chapter data have been presented which show that there has been an increase in the growth of cotton production in both of the Areas studied, a fact which in itself tents to show that there is an equal economic advantage in the production of cotton in either of the Areas. However, since the growth of cotton production has resulted from such widely different circumstances, there appears to be a need for further study in order to discover all factors contributing to the comparative advantage of cotton production in the two Areas.

In this chapter the quality of cotton, both as to grade and staple length, produced in each of the Areas will be studied. To stress further the need for dividing the Cotton Belt into two Areas before attempting to study the problems of the cotton farmers a study will be made of physical factors affecting both the grade and staple length of the cotton produced in the two Areas. This chapter will also be devoted to finding the value of the cotton produced in each of the Areas. It has already been shown that cotton can be produced at a lower cost per pound in the Western Area, but it remains to be seen whether the quality of cotton produced in the two Areas has any bearing on the matter of price-cost relationships.

Measures of Quality of Cotton (a) Grade: In speaking of the quality for cotton (Table 18) color and the amount of foreign matter and the preparation or ginning of the cotton are considered, quoting an authority:

> ".....Grade denotes a cimbination of the color, luster, and the brightness: the nature and the amount of foreign matter present

Table 18. Grades and Colors for American Upland Cotton

Extra White	Blue Stained	Gray	White	Spotted	Tinged Yellow	Light Stained	Yellow Stained
			1. Middling Fair				
			2. Strict Good Middling		2. Y. T.		
3. E. W.	3. B.	3. G.	3. Good Middling	3. Sp.	3. Y. T.	3. L. S.	3. Y. S.
4. E. W.	4. B.	4. G.	4. Strict Middling	4. Sp.	4. Y. T.	4. L. S.	4. Y. S.
5. E. W.	5. B.	5. G	5. Middling	5. Sp.	5. Y. T.	5. L. S.	5. Y. S.
6. E. W.			6. Strict Low Middling	6. Sp.	6. Y. T.	6. L. S.	
7. E. W.			7. Low Middling	7. Sp.	7. Y. T.		
			8. Strict Good Ordinary				
			9. Good Ordinary				

The grades shown above the black line are deliverable on future contracts according with section five of the United States Cotton Future's Act of 1914, those below the line are not deliverable.

SOURCE: Bureau of Agricultural Economics, United States Department of Agriculture, Grade, Staple Length, and Tenderability of Cotton in the United States, 1928-29 to 1936-37, July, 1937, Table 1, p. 2.

in the lint, such as leaves, dust, motes, or other foreign matter, and the preparation or ginning of the cotton..... 1/

".....Color is a term used to describe the hue, such as yellow or blue, the brilliance or brightness and the chroma, such as the degree of the strength of color, which is the degree of creaminess or stain in cotton. Color is graduated progressively from extra white, white, spotted, yellow tinged, light yellow stained to yellow stained, and from white through gray to blue stained, these colors being the major color schemes on which grade standards are based. 2/

".....Foreign matter in the form of leaves, parts of limbs and burrs, dirt, motes, and other forms, increase in quantity from the higher to the lower grades. Foreign matter is constant in corresponding grades of different colors such as middling white and middling tinged." 3/

The Grade of Cotton Produced: Generally speaking, the cotton produced in the Eastern Area is of higher quality than the cotton produced in the Western Area. However, there is a great variation in the grade of cotton produced, from year to year, in both of the Areas.

In the Eastern Area there have been years when more than 80 percent of the total production graded white middling or better. Also, within this Area, there have been years when less than 40 percent of the cotton reached the standard for white middling cotton. (Table 19)

Only twice, however, during the past 10 years has as much as one-half of the cotton produced in the Western Area graded white middling or better.

During the ten year period, 1928 to 1938, the trend has been toward the production of a better grade of cotton in the Eastern Area,

---

1/ A. W. Palmer, Commercial Classification of American Cotton, United States Department of Agriculture, Circular No. 278, pp. 2-23.

2/ United States Department of Agriculture, Handbook for Licensed Classers, United States Standard Act, Mimeographed Report, October, 1930, pp. 6-10.

3/ Palmer, Op. Cit. Loc., cit.

Table 19. Grades of Cotton Produced: Percentage Each Grade is of Total Production, Eastern and Western Areas of Oklahoma Studied, For Selected Years

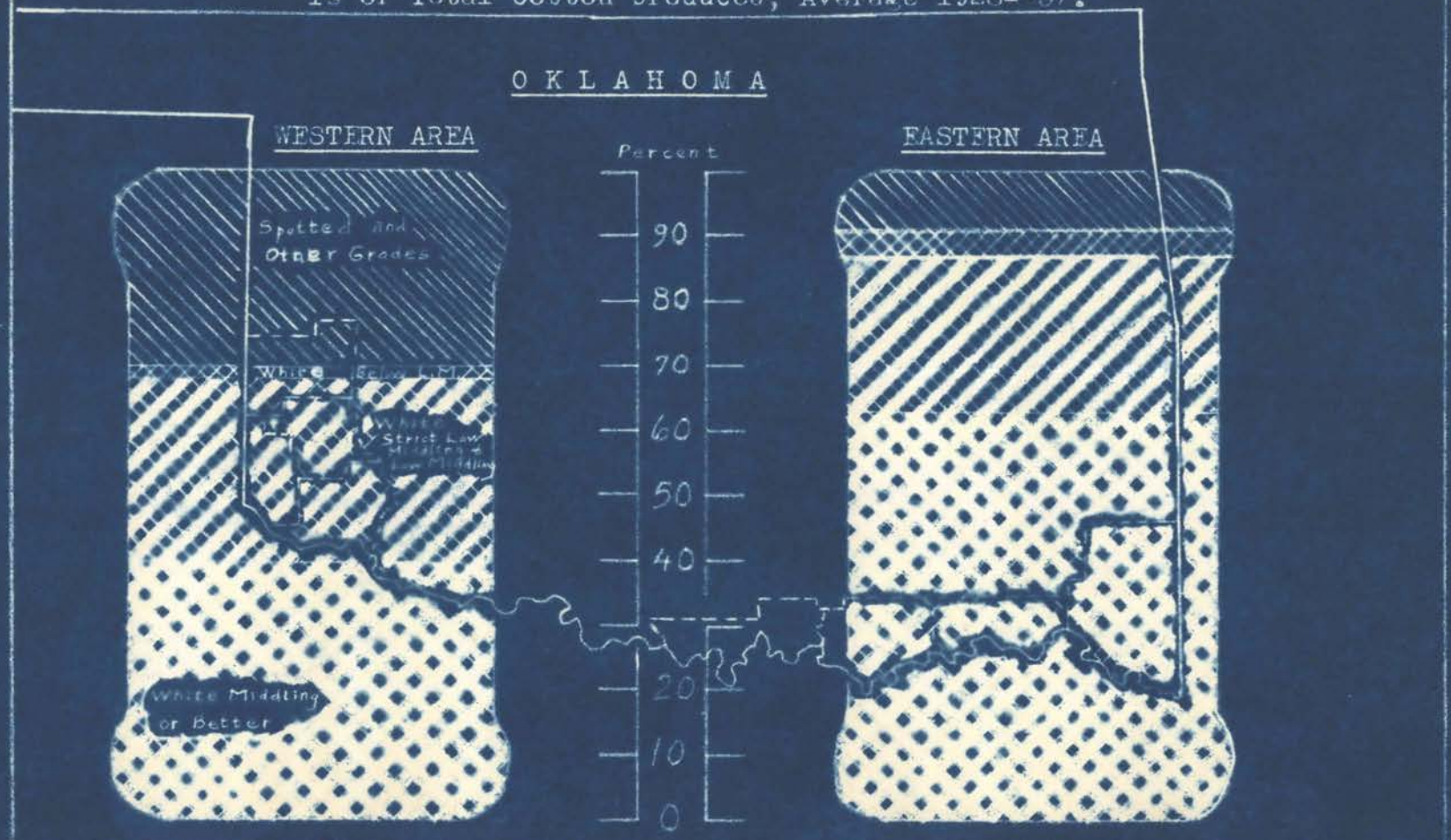
Year	Total Production 1/ 1,000 Pounds		White Middling or Better		White Strict Middling and Low Middling		White Below Low Middling		Spotted, Yellow and Other Grades	
	Eastern	Western	Eastern	Western	Eastern	Western	Eastern	Western	Eastern	Western
1928	31,810	101,200	81.0 2/	56.7 2/	11.0 2/	27.8 2/	5.5 2/	3.5 2/	2.5 2/	12.0 2/
1929	28,260	108,805	43.2	35.2	45.7	46.6	7.7	3.7	3.4	14.5
1930	24,100	60,850	73.1	44.3	26.4	43.3	0.1	0.3	0.5	12.0
1931	43,150	92,200	67.4	48.3	19.7	35.2	11.3	2.4	0.0	2.6
1932	25,865	96,700	70.7	54.7	27.3	16.2	1.3	0.1	1.0	29.0
1933	14,745	14,950	40.8 3/	19.1 3/	32.9 3/	13.3 3/	0.6 3/	0.6 3/	25.7 3/	66.9 3/
1934	10,470	48,750	81.7	21.3	14.0	6.9	0.0	0.0	4.3	70.6
1935	20,195	12,680	74.1	19.5	24.1	25.2	0.0	4.7	1.8	49.1
1936	35,015	57,200	59.4	18.6	34.8	28.8	0.7	0.9	4.4	41.7

1/ See Table 17, (This Thesis).

2/ Roy A. Ballinger and Clyde C. McWhorter, Economic Aspects of The Grade and Staple Length of Cotton Produced in Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 212, Table 7, p. 18.

3/ J. L. McCollum, F. E. Nelson, and C. C. McWhorter, Quality of Cotton Ginned in Oklahoma, Crops 1933-36, Bureau of Agricultural Economics, United States Department of Agriculture.

Figure XIII. Quality Of Cotton Produced in Eastern and Western Areas of Oklahoma Studied, Percentage Each Grade (nine year average) Is of Total Cotton produced, Average 1928-'37.



Source: Table 20, this thesis.

while in the Western Area the trend has been toward a lower grade of cotton. Since the season 1933 there has been a great increase in the percentage of cotton of the Western Area being placed in the "weaker" classes. (Table 19)

Factors Affecting Grade: Comparatively little information is available relative to the exact importance of various factors affecting the grade of cotton grown in the United States. This is especially true in attempting to find studies which have attempted to measure the degree of influence which each of the factors or combination of factors have on the grade of cotton. However, it is generally understood that the interrelated influence of soil fertility, varieties of cotton grown, weather conditions, such as rainfall and temperature, method of harvest and handling, method and care used in ginning, and insect damages all directly affect the quality of cotton produced but in varying degrees.

The most important physical factor affecting the quality of cotton, both from the standpoint of color and grade, is the amount of rainfall during the harvesting season.

Directly and indirectly, weather conditions determine the grade of cotton produced within an area. Cotton which has been rained on will lose its luster and will appear creamy in color; or in severe weather conditions the lint may take on a yellow-tinged color. When there are severe winds accompanying rain the lint is detached from the boll and falls to the ground; and thus there it is likely that the sample of lint after the cotton has been ginned will contain a higher percentage of foreign matter. In this connection the average cotton producer of

the Western Area is at more of a disadvantage than the average cotton producer of the Eastern Area, for;

> ".....some varieties have been bred to produce large bolls that are storm resistant which prevents the cotton, after it has opened, from falling out on the ground when it is subjected to wind and rain. Half and Half, the chief variety grown in the Western Area, has not been bred for storm resistance, and when it is open and weather conditions are adverse, large amounts of the lint are blown from the burr to the ground and are damaged. The higher percentage of low grades of cotton produced in the Western Area may be caused in part by the large percentage of Half and Half cotton grown there....." 4/

The amount of rainfall during the harvesting season indirectly affects the grade of cotton produced, in that the amount of rainfall will have much effect on the care exercised in harvesting the crop.

> ".....Too much rainfall during the fall months slow down the harvesting of cotton. Frequently large quantities of the crop open in the field before it can be harvested, and the farmerswishing to gather their crop as fast as possible before weather conditions causes further damage, resort to snapping as soon as conditions permit." 5/

In the Western Area, Figure XIV, there is a close correlation between the amount of rainfall during the harvesting season and the percentage of cotton which is harvested by snapping, while in the Eastern Area only a very small percentage of cotton is harvested by this method.

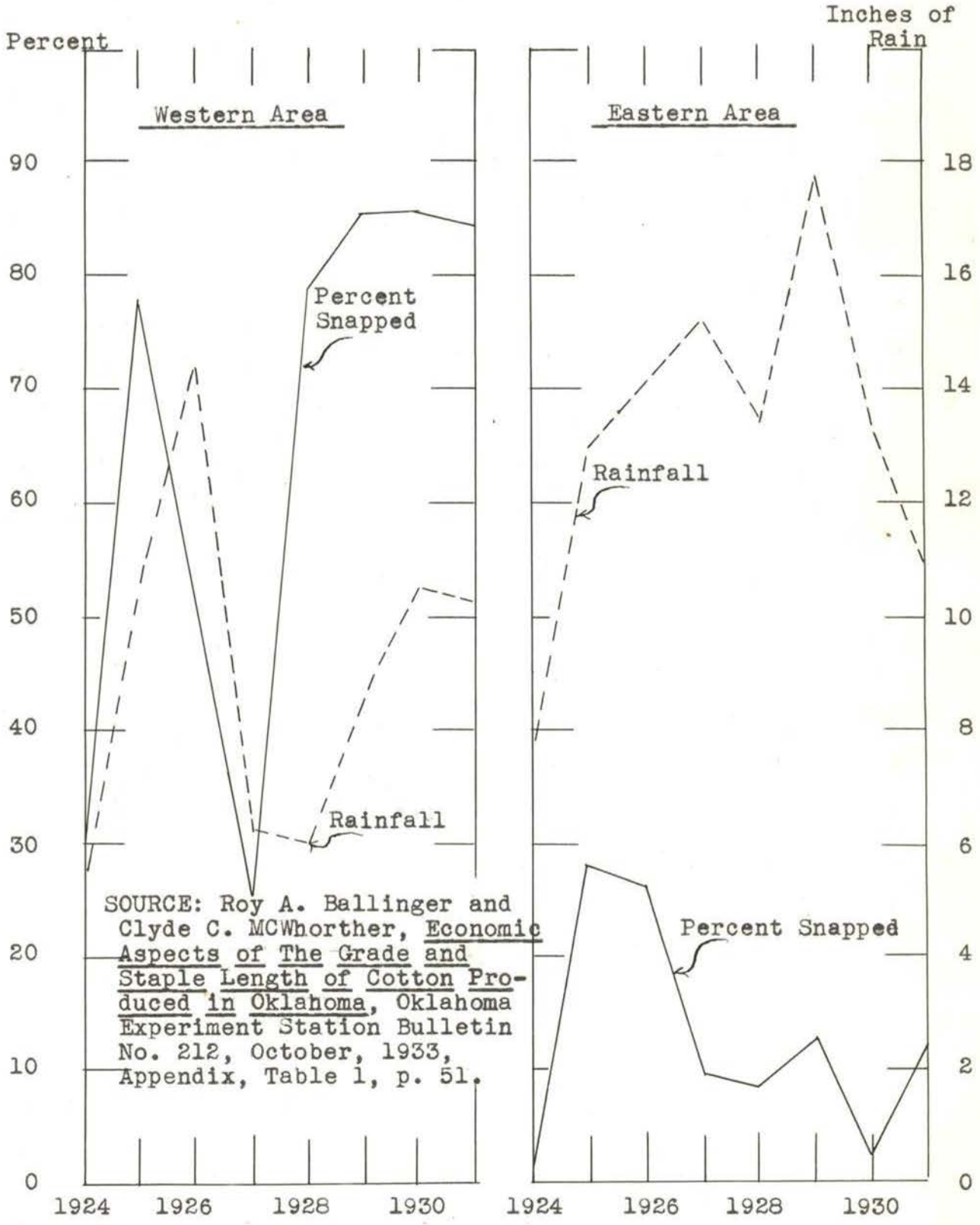
It has been previously stated in this paper that the cost of harvesting and ginning cotton by the "snapping" method is higher than the

---

4/ Roy A. Ballinger and Clyde C. McWhorter, Economic Aspects of The Grade and Staple Length of Cotton Produced in Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 212, October, 1933, p. 50.

5/ Ibid. p. 43.

Figure XIV. Percentage of Total Cotton Snapped and Amount Of Rainfall During The Harvest Season, Eastern And Western Areas of Oklahoma Studied, 1924-'31.



SOURCE: Roy A. Ballinger and Clyde C. MCWhorther, Economic Aspects of The Grade and Staple Length of Cotton Produced in Oklahoma, Oklahoma Experiment Station Bulletin No. 212, October, 1933, Appendix, Table 1, p. 51.

cost of harvesting and ginning cotton which has been picked. In this connection the average farmer of the Western Area is at a disadvantage and the disadvantage probably offsets in part advantages formerly stated as existing in the Western Area, because;

> ".....Apparently differences in the type of farming and the average acreage of cotton raised per farm are the most important reasons why a much larger proportion of the cotton crop is harvested by snapping in Western Oklahoma than in the Eastern part of the State. In Western Oklahoma, farmers customarily raise a larger acreage of cotton on their farms than they are able to harvest with the amount of labor which they have available during the planting and growing season. Consequently they hire a considerable amount of extra labor during the harvesting season. It is sometimes difficult to secure a sufficient amount of this extra labor. Snapping is a more rapid and, somewhat cheaper, method of harvesting cotton than picking. Since a man can harvest more pounds of lint cotton per day by snapping than by picking and the wages per day are about the same. This situation causes farmers in the Western Area to snap most of their cotton. In the Eastern Area, cotton is harvested largely with family labor and there is sufficient time to pick the crop because of the smaller acreage per farm....." 6/

Snapped cotton is usually lower in grade than cotton which has been harvested by picking. Thus, the larger amount of cotton snapped in the Western Area probably accounts for the larger percentage of the lower grades as compared with the Eastern Area even though the amount of rainfall is much greater during the harvesting season in the latter Area. According to McWhorter and Ballinger: 7/

> ".....It is a common practice where farmers snap all of their cotton for them to leave the first open bolls on the stalk until practically all of the bolls have opened and are ready for harvesting. This subjects the cotton weather conditions which lower the grade. More care is usually given to cotton when the crop is picked and the cotton is not so likely to be damaged by weather conditions. Also it is the general opinion

---

6/ Ibid. pp. 46-47.

7/ Ibid. p. 11.

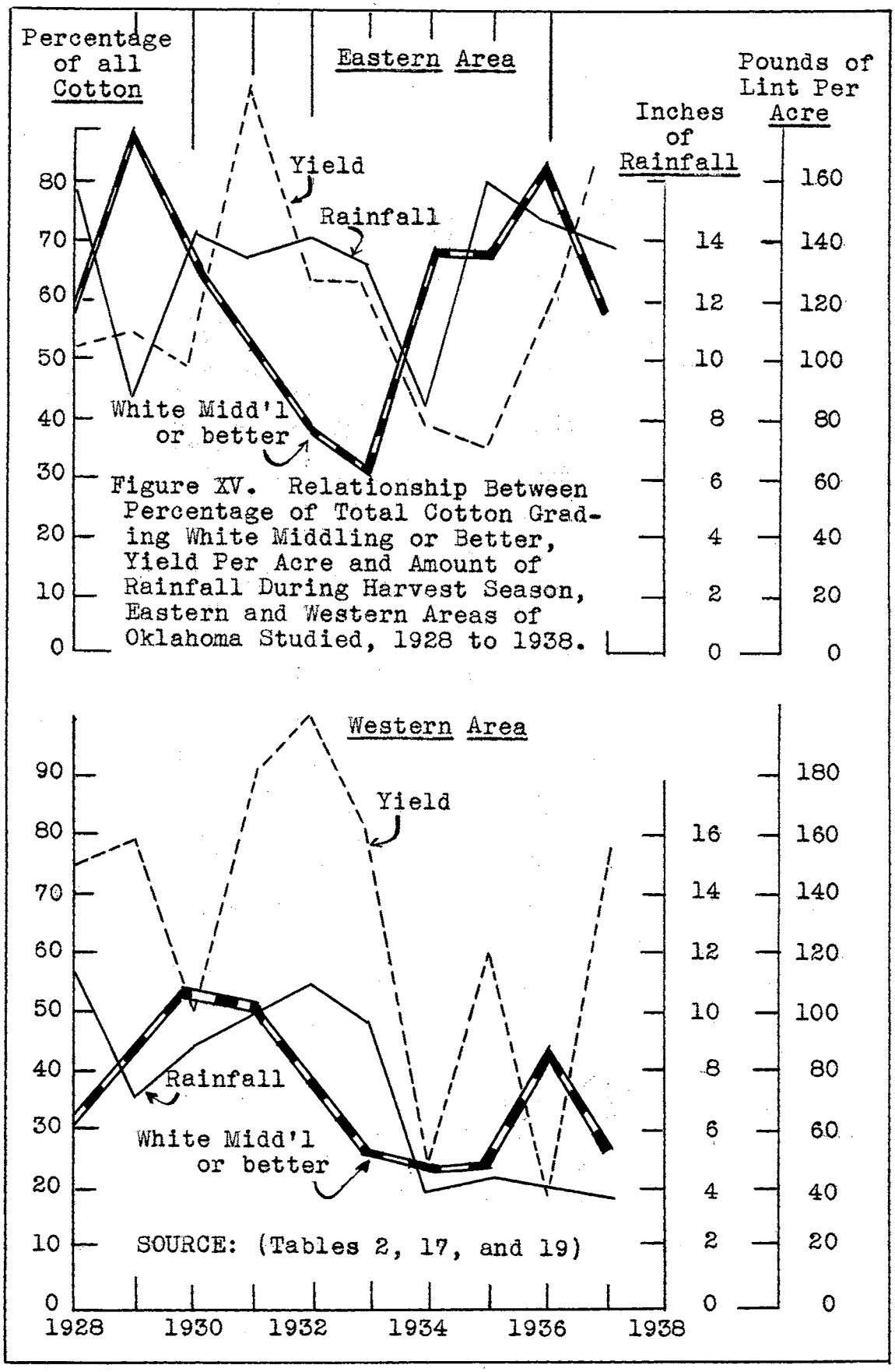


Figure XV. Relationship Between Percentage of Total Cotton Grading White Middling or Better, Yield Per Acre and Amount of Rainfall During Harvest Season, Eastern and Western Areas of Oklahoma Studied, 1928 to 1938.

> of gin operators that snapped cotton, after it is ginned, contains more trash and more foreign matter than does picked cotton. Modern cleaning machinery has helped greatly in removing the trash from snapped cotton, but apparently the cleaning process is not yet perfected to the point where snapped cotton will average as high in grade as picked cotton.

The average yield of lint cotton per acre has an inverse relationship to the grade of the cotton produced between the two Areas. In the Eastern Area (Figure XV) as the yield of lint per acre increases there is a decrease in the proportion of all cotton which is of the better grades. The degree of the correlation between yield per acre and quality of cotton is influenced by the amount of rainfall during the harvesting season.

In the Western Area as the average yield of lint per acre increased there has been an increase in the percentage of the total cotton which graded white middling or better. The inverse relationship between the two Areas can be accounted for in part by the fact that the cotton in the Western Area is harvested by outside help whereas the cotton in the Eastern Area is harvested by family labor. The amount of family labor would of course be limited or would be a fixed amount; thus, when additional work results from the higher yields per acre more time is required to pick the crop, and usually there is greater weather damage to the cotton. In the Western Area when the yields are high the problem is merely to secure more cotton pickers, a problem which is made easier during years of relatively high yields. The wages for cotton pickers are based on the amount of cotton which can be picked in a day, and since it is possible to pick more cotton per day in fields of high yield, the per day wages for cotton picking are

higher during years of high yields thus attracting more and better cotton pickers.

Indirectly the variety of cotton grown in each of the Areas has a material influence on the grade of the cotton produced. In the Western Area much of the cotton grown is of the Half and Half variety. This variety of cotton produces a short staple which commands no premium for staple, thus the farmers are not as careful in the method used in harvesting the crop as they might otherwise be. Also in the Eastern Area the varieties grown and the climatic conditions are such that the cotton stalk grows larger and the bolls are well attached to the stalk. The difference in the amount of labor required to pick or snap this cotton is much less than it is for the kind of cotton grown in the Western Area. 8/

Measures of Quality of Cotton (b) Staple: The staple length of cotton which is measured in 1/32 of an inch, also influences the quality of cotton, quoting McWhorter and Ballinger:

> ".....The staple length of cotton, in this county meanse the measurement of a selected portion of fibers in inches and fractions thereof. These portions of fibers are selected by "pulling" a typical bundle of the fibers from the sample of cotton....." 9/

Staple Length of Cotton Produced: Generally speaking, the cotton produced in the Eastern Area is longer than the staple length of cotton produced in the Western Area. This is especially true of the cotton produced in each of the Areas during the more recent years.

8/ Ballinger and McWhorter. Op. Cit. p. 40.

9/ Ballinger and McWhorter. Op. Cit. p. 10.

For the season 1937, more than 90 percent of the cotton produced in the Western Area measured less than 15/16 of an inch, while in the Eastern Area, for the same season, less than 30 percent of the cotton produced was of this short staple. (Table 20)

There have been variations in the staple length of the cotton produced in each of the Areas from one year to the other. The trend, however, has been for the production of a longer staple cotton in the Eastern Area and a shorter staple cotton in the Western Area. (Table 20)

Factors Affecting the Staple Length of Cotton: In some sections of the United States it has been shown that the more fertile soils produce a cotton of longer staple length than is produced in sections of less fertile soils.[10/]

In this study it was found that the soils of the Western Area were higher in fertility than the soils of the Eastern Area, however, a greater percentage of the cotton produced in the Western Area is of the shorter staple lengths.

The interrelated influence of soil fertility, variety grown, and rainfall are believed largely to determine the staple length of cotton produced in any area.[11/] These different factors are combined in various ways between the two Areas and this variation may account for much of the difference in the staple length of the cotton produced in one Area compared to the other Area.

10/ B. Youngblood, Relation of Soil Fertility to Quality of Product, United States Department of Agriculture, Mimeographed Release, February 6, 1929, pp. 45-46.

11/ McWhorter and Ballinger, Op. Cit. pp. 41-42.

Table 20. Staple Length of Cotton Produced, Percentage Each Staple Length is of Total Production, Eastern and Western Areas of Oklahoma Studied, For Selected Years

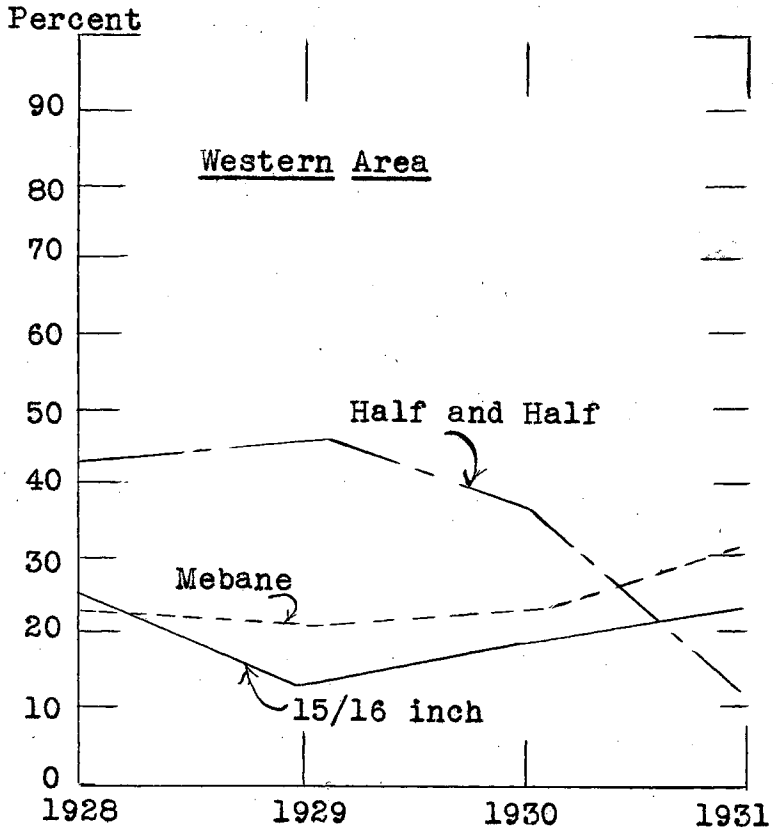
Year	Total Production 1/ 1,000 Pounds		29/32 Inch and Shorter		15/16 Inch and 31/32		1 inch and longer	
	Eastern	Western	Eastern	Western	Eastern	Western	Eastern	Western
1928	31,810	101,200	71.7 2/	67.6 2/	22.6 2/	25.8 2/	5.8 2/	5.5 2/
1929	28,260	108,805	82.8	86.0	15.9	12.5	1.3	1.5
1930	24,100	60,850	71.2	79.8	27.8	18.3	1.0	1.9
1931	43,150	92,200	51.8	73.5	41.2	23.8	8.0	2.7
1932	25,665	96,700	80.5	69.0	19.5	29.2	0.0	1.8
1933	14,745	14,950	10.5 3/	60.1 3/	39.5 3/	33.1 3/	50.0 3/	6.8 3/
1934	10,470	48,750	50.0	87.8	45.7	11.0	4.3	1.2
1935	20,195	12,680	25.9	81.9	35.2	15.4	38.9	2.7
1936	35,015	57,200	27.5	93.5	31.2	6.2	41.3	0.3

1/ See Table 17, (This Thesis).

2/ Roy A. Ballinger and Clyde C. McWhorter, Economic Aspects of The Grade and Staple Length of Cotton Produced in Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 212, pp. 21-22.

3/ J. L. McCollum, F. E. Nelson, and C. C. McWhorter, Quality of Cotton Ginned in Oklahoma, Crops 1933-36, Bureau of Agricultural Economics, United States Department of Agriculture.

Figure XVI. Percentage of Total Cotton Measuring 15/16 inch Staple and Percentage of All Cotton Grown Which Is Mebane or Half and Half Variety, Eastern and Western Areas of Oklahoma Studied, 1928-1931.



SOURCE: (Tables 20 and 21)

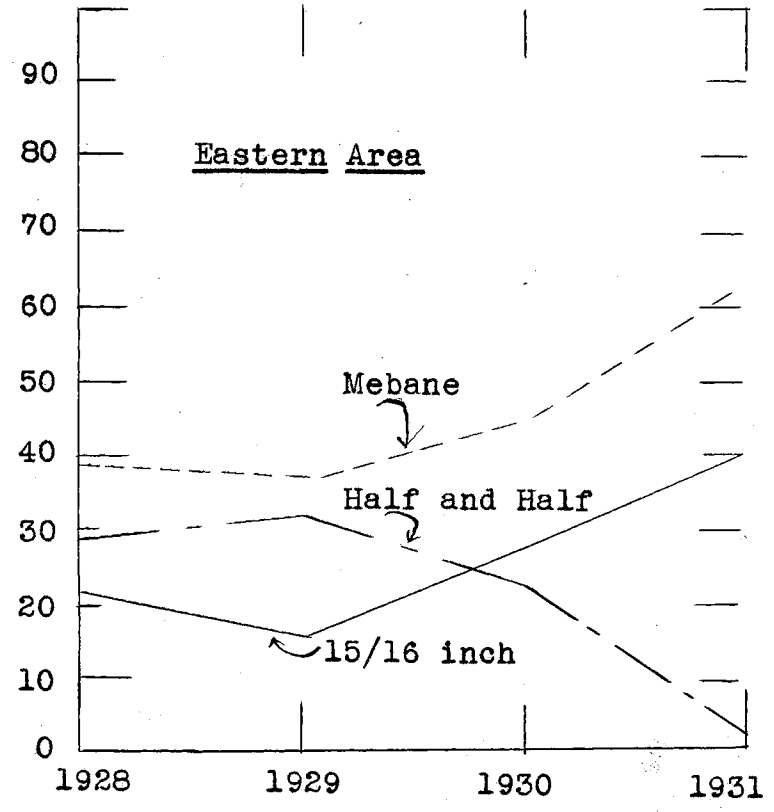


Table 21. Variety of Cotton Grown: Percentage Each Variety is of Total Crop, Eastern and Western Areas of Oklahoma Studied, For Selected Years

	1928		1929		1930		1931	
	Eastern	Western	Eastern	Western	Eastern	Western	Eastern	Western
Half and Half	29.5	44.9	32.1	45.4	22.5	38.3	2.6	11.4
Mebane	38.4	23.3	37.4	21.0	44.8	22.5	63.3	33.1
Acala	1.8	13.5	0.7	12.7	0.7	12.4	1.0	12.6
Oklahoma 44	4.3	0.8	4.4	0.9	4.5	1.8	6.2	0.9
Kasch	1.9	4.8	0.7	6.2	0.8	6.3	1.4	8.1
Delfos	0.3	0.2	0.4	0.1	0.6	0.2	0.2	0.7
Rowden	1.3	0.4	1.5	0.4	1.3	0.4	1.9	0.6
Russel	0.8	2.3	0.3	3.0	0.1	3.0	2.3	4.0
Cleitt	0.0	1.5	0.0	2.4	0.0	5.0	0.0	11.5
Qualla	1.7	0.6	1.6	0.7	2.1	1.3	5.7	4.0
All other	1.5	3.3	2.5	3.6	8.2	4.7	3.6	6.7

SOURCE: Roy A. Ballinger and Clyde C. McWhorter, Economic Aspects of The Grade and Staple Length of Cotton Produced in Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 212, Table 12, pp. 33-34.

In both Areas there is a close correlation between the proportion of cotton which is of the Mebane variety and the proportion which measures 15/16 inch or more in staple length. The Eastern Area in 1929 started planting a greater amount of this variety of cotton and from this date there has been a very noticeable increase in the percentage of the total cotton measuring 15/16 inch staple. (Table 21)

In the Western Area (Figure XVI) only a small percentage of the cotton is of the Mebane variety; however, with a decrease in the amount of Half and Half variety of cotton produced has come an increase in the percentage of cotton measuring 15/16 of an inch or longer in staple. In the Eastern Area (Figure XVI) there is very little Half and Half cotton raised. Half and Half variety of cotton produces a staple length of approximately 7/8 inch while Mebane variety usually produces a staple of 15/16 inch or longer.[12/]

Variety of Cotton Produced: There are several varieties of cotton produced in each of the Areas. Half and Half and Mebane are principal leaders in both Areas, but during recent years there has been a decrease in both Areas in the acreage planted to Half and Half cotton and an increase in the percentage of the acreage which is planted to Mebane cotton. (Table 21)

Throughout this study there have been several references, mostly of an unfavorable nature, in regard to Half and Half variety of cotton. This variety (Table 21) is one of the major varieties grown in the

---

12/ L. L. Ligon, Varieties of Cotton for Oklahoma, Oklahoma Agricultural Experiment Station Bulletin No. 175, p. 20.

Table 22. Cotton Variety Test in Selected Points of Oklahoma, 1924; Yield of Seed Cotton per Acre and Value per Acre For Varieties Studied

		Acala	Improved Mebane	Oklahoma Tri 44	Tri 406	Half and Half	New Boykin	Rowden	Bennett	Lone Star	Trice	River Crest
Eastern Oklahoma												
Idabel	(Dollars)	83.97	100.50	124.99	105.69	103.76	95.76	76.36	105.40	95.33	82.07	--
	(Pounds)	940	1020	1350	1110	1150	1040	900	1070	1050	980	--
Durant	(Dollars)	55.37	39.75	76.39	49.13	55.12	63.06	47.71	38.36	44.90	--	39.18
	(Pounds)	636.8	422.1	903.4	577.6	666.5	733.1	555.4	451.7	636.8	--	540.6
Hugo	(Dollars)	25.10	32.24	41.43	20.12	21.62	44.15	43.25	32.56	17.17	20.44	--
	(Pounds)	308	360	495	240	253	484	483	367	198	297	--
Average	(Dollars)	53.81	57.36	80.94	64.98	60.18	67.66	55.77	58.74	52.43	51.26	39.18
	(Pounds)	628.2	600	916	642	690	752	646	608	628	639	540.6
Relative Rank	(Dollars)	(8)	(6)	(1)	(3)	(4)	(2)	(7)	(5)	(9)	(10)	(11)
	(Pounds)	(7)	(10)	(1)	(5)	(3)	(2)	(4)	(9)	(8)	(6)	(11)
Western Oklahoma												
Mangum	(Dollars)	24.51	19.94	29.35	26.82	31.75	24.87	25.74	18.02	24.56	--	19.31
	(Pounds)	277.51	224.5	331.5	305.1	336.8	336.8	290.8	221.8	287.6	--	226.2

Dollars - Value per acre. Pounds - Seed cotton per acre. The price used was the average price paid for cotton in Oklahoma during the 1924 season, up to January 1, 1935. This was found to be 22 cents for middling cotton with 1 inch staple and cotton seed at $35.00 per ton.

SOURCE: Oklahoma Experiment Station Bulletin No. 154, Table III, p. 8.

Western Area. (Table 21) It is a medium early maturing variety having a high gin turn-out.[13] and in the Western Area has a relatively high yield per acre as compared to other varieties raised. Various physical and economic factors emerge in a combination which results in Half and Half cotton as the most profitable variety grown in the Area. (Table 22)

In the Eastern Area there is the combination of physical and economic factors which results in the longer staple varieties being the most profitable to raise. Besides Mebane, other long staple cottons grown in the Area are Acala, Oklahoma Tri 44, and Cleitt. (Table 22)

Because of the difference between the two Areas in the grade and staple length of the cotton produced there is a difference in the per pound value of the product.

Value of Cotton Produced: In speaking of the value or price of cotton, men of the field usually mean the value or price of 7/8 inch white middling grade. This grade and staple length of cotton is usually considered as the basis, and deviations command a premium or draw a discount. For example, (Figure XVII and Table 23), cotton middling in grade ane less than 7/8 inch staple draws a discount, while cotton middling in grade but 15/16 inch in staple receives a premium. Likewise cotton 7/8 inch in staple which is good middling in grade receives a premium, while cotton of the same staple length but strict low middling in grade receives a discount.

13/ Ligon. Op. Cit. p. 20.

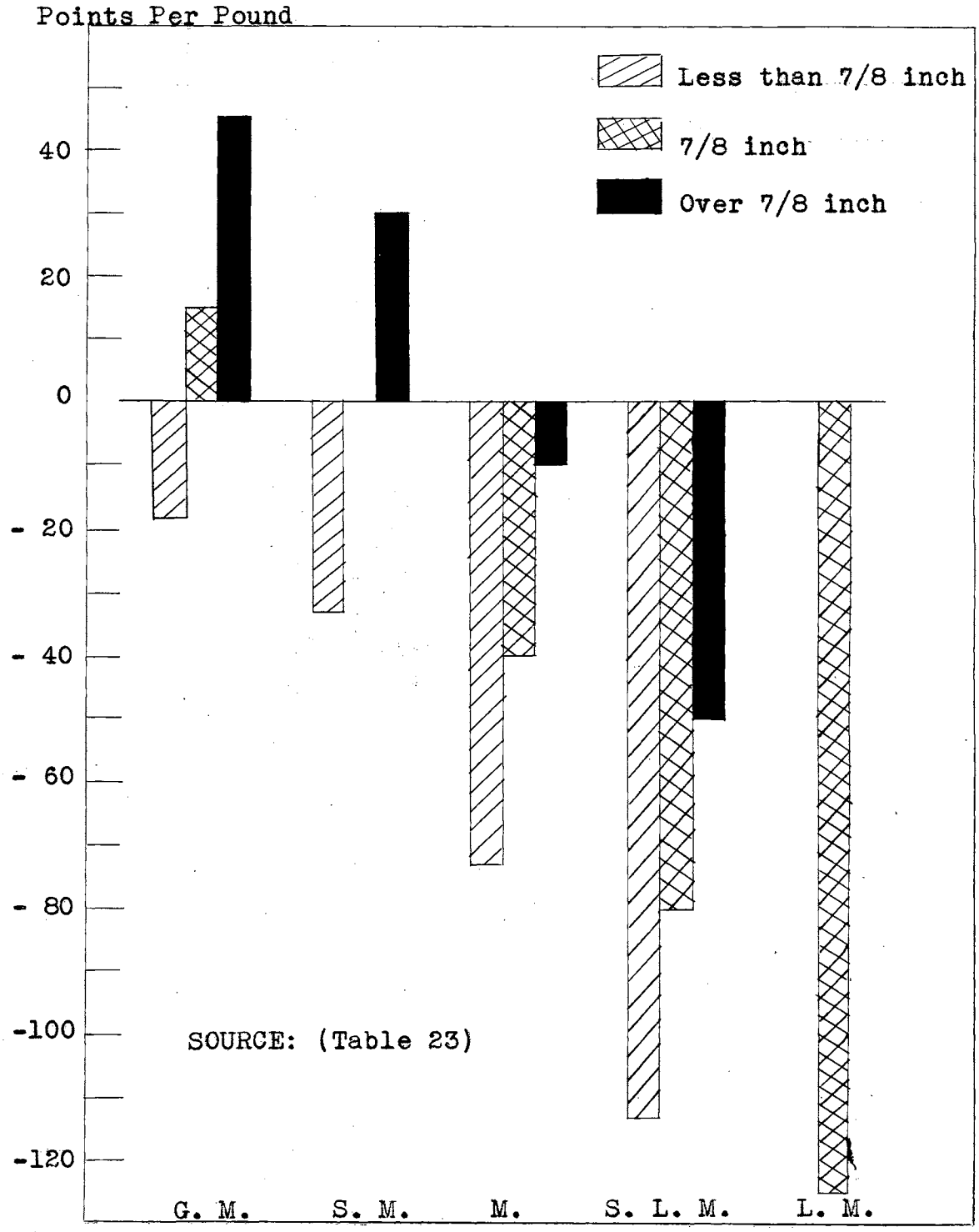
Table 23. Average Premiums and Discounts For Cotton of Specified Grades and Staple Lengths From The Average Price of Strict Middling 7/8 Inch Cotton in Houston, Texas, For Season of 1934-35

(Cents per Pound)

	Shorter Than 7/8 Inch	7/8 Inch (Basis)	15/16 Inch
White			
3. G. M.	-0.18	0.15	0.45
4. S. M. (Basis)	-0.33	--	0.30
5. M.	-0.73	-0.40	-0.10
6. S. L. M.	-1.13	-0.80	-0.50
7. L. M.	--	-1.25	--

SOURCE: Bureau of Agricultural Economics, United States Department of Agriculture, Cotton Prices in Relation to Cotton Classification Service and To Quality Improvement, 1936, Table 2, p. 7.

Figure XVII. Premiums and Discounts For White American Cotton According To Grade and Staple Length, Houston, Texas, Season 1934-35.



Because the cotton produced in the Western Area is both lower in grade and shorter in staple length, the value of the produce is much lower than the value of the cotton produced in the Eastern Area.

Summary: The cotton produced in the Eastern Area is of higher grade than the cotton produced in the Western Area. In the Western Area, during the past 10 years, there has been an increase in the amounts of the lower grades of cotton produced. Within this Area during more recent years there have been many deviations from the established pattern of cotton production as found in the Eastern Area. Since the trend has been twoard the production of lower grades of cotton during those years in which changes have occurred in the method of production one may assume that the changes were either the cause of the lowering in the grade of the product or that the lowering in the grade resulted in the changes of production.

The staple length of the cotton produced in the Western Area was lower than the staple length of the cotton produced in the Eastern Area. In more recent years the percentage of shorter staple cotton has increased in the Western Are but have decreased in the Eastern Area. The chief factor affecting the staple length of cotton is the variety of cotton grown; there is a correlation between staple length and grade of cotton produced.

Due to the shorter staple length and the lower grade of the cotton produced in the Western Area the value per pound is less than the per pound value of the cotton produced in the Eastern Area.

CHAPTER V

MARKETS AND TRANSPORTATION

In the preceding chapters those conditions affecting the quantity and quality of the cotton produced in each of the Areas has been described. It has been found that in the Western Area the production of cotton is associated with the more extensive type of farming and that the production of the lower grades and the shorter staple lengths of cotton have increased in proportions within the Area when the degree of extensive farming increased.

In the Eastern Area, it was found that cotton production was more intensive and the greater the degree of intensive cultivation the greater the percentage of the better grades and longer staple length cottons. Thus, it has been found that cotton is produced cheaper per pound in the Western Area, but that the cotton produced is of lower per pound value than the cotton which is produced in the Eastern Area.

Until recent years there was an approximate equal growth in the production of cotton in both of the Areas even though there was a great difference in the method of production and a wide difference in the type of product produced; however, during the more recent years there has been a more noticeable decrease in the production of cotton in the Western Area.

In attempting to determine the economic advantages and disadvantages in the production of cotton between these two Areas, since the economic aspect of the problem is significant, it becomes necessary to state the nature of the conditions under which an advantage or a disadvantage occurred. Also, economic studies must analyze the factors

which affect both the supply and the demand of the product. Having already pointed out the factors which affect the supply of cotton in the two Areas, this study will be concluded by studying the factors which affect the demand for the type of product produced in each of the Areas.

In studying the markets for the type of cotton produced in each of the Areas, both place and use will be considered. After the place of consumption for the cotton produced in each of the Areas has been determined, a study will be made of transportation from the standpoint of mode and distance, which results in an economic advantage because of variation in cost.

Defusion of Supply, (a) Use: The cotton that the yarn manufacturer will demand is determined by the type of the finished product he is making, but the fiber must possess a definite spinning quality. In the United States approximately one-third of the cotton goes into clothing, one-third into industry, and one-third into articles for household use.[1/]

Factors Affecting Use of Cotton: With very few exceptions, cotton is in its final usable form only after it has been woven into cloth. Cloth for different purposes had a different weave. The simplest form of weave is the "plain weave," which consists of an alternate interlacing of the warp and the filling yarns over one and under one the entire width of the fabric. This weave which is often spoken of as homespun, cotton or tabbly weave is found in muslin, gingham, crepe,

---

1/ Katharine P. Hess, Textile Fibers and Their Use; 1931, p. 177.

and taffeta. Plain weaving is especially adapted to the use of short fibers and poorly spun yarns.[2]

The quality of yarn is measured by size or count. A skein of cotton yarn, 840 yards in length, known as a hank, is the basis for determining the count of cotton yarn. The size is the number of these hanks required to weigh one pound. That is, if a hank of 840 yards of yarn weighs on pound, the yarn is a number ones, written as 1^{s} : if two hanks weigh one pound the count is a number 2^{s}.[3]

The staple length of the cotton fiber determines the count or size of cotton yarn. According to Mathews, the diameter of cotton fibers varies from 0.00046 to 0.001 inch, the longest fibers having the least diameter.[4]

The basket weave is probably the second of the various weaves of cotton cloth in importance from the standpoint of use. This weave for cloth demands a medium fine spun yarn. In this type of a weave two or more yarns in both warp and filling are treated as one interlaced as in plain weave. This type of weave is found in monks cloth, used for draperies, and in materials used for sport coats or suits.[5]

Twill weaving is the interlacing of warp and filling yarns with a progression of one at the point of interlacing. Yarns that go over several of those of the opposite set, form floats. The length of the

---

2/ Hess. Op. Cit. p. 17.

3/ Ibid. p. 18.

4/ Merritt J. Mathews, Textile Fibers, 1924, p. 415.

5/ Hess. Op. Cit. p. 19.

float, which is the yarn showing on the surface, is determined by the number of yarns that are passed over in forming the weave. This may be designated as a five shaft, seven shaft, and so on. The satin weave cloth, which is the most expensive cotton cloth, must have a count of five shaft; a less number would result in a broken twill. The higher count shaft is possible only with fine spun yarn. 6/

Because of the staple length, much of the cotton produced in the Eastern Area may be used for the manufacturing of fine cloth, while the larger percentage of the cotton produced in the Western Area can be manufactured only into coarse materials using yarns of low count.

Defusion of Supply: (b) Place. Much of the cotton consumed by domestic mills is of the higher grades and of the longer staple lengths.

In 1928 only 1.4 percent of all the cotton consumed by the mills located in the United States was less than 7/8 inch staple length, approximately 28 percent was 7/8 inch and more than 66 percent was 15/16 inch or longer in staple length. (Table 26)

Ten years later, in 1937, less than 1 percent of the cotton consumed by domestic mills was shorter than 7/8 inch staple, only 19 percent was 7/8 inch, and more than 80 percent was 15/16 inches or longer in staple. (Table 24)

The cotton consumed by a given mill does not vary much in staple length. A mill is designed usually to handle a certain range of yarn numbers and the manager whose mill is running smoothly on a certain type of cotton is disinclined to change to another.

Apparently only a small percentage of the mills located in the United States could use 13/16 inch cotton regularly with their present

---

6/ Hess. Op. Cit. p. 21.

Table 24. Staple Lenth of Cotton Spun by 11.8 Million Active Consuming Spindles in the United States Year Ending July 31, 1937

Staple Length	Percentage Each Staple is of Total Spun
Below 7/8 inch	0.08
7/8 inch	19.25
15/16 inch	34.55
1 and 1 1/32 inches	34.46
1 1/16 and 1 3/32 inches	5.99
1 1/8 inches and longer	5.69

SOURCE: Domestic Mill Consumption of American Cotton by Grade and Staple, Bureau of Agricultural Economics, February, 1938 Table 1, p. 6.

equipment. It is estimated by men who are familiar with the spinning machinery that fully 85 percent of the American mills, as they are now equipped, could not use this cotton. 7/

The grade of cotton is also an important factor affecting the demand of the cotton mamufacturer. Unlike many other fibers, cotton is not scoured before it is spun into yarn but is cleaned by mechanical processess, the most important of which is carding. 8/

The commercial value of cotton is determined by the grade, which is based upon its color and percentage of foreign matter it contains.

7/ Domestic Mill Consumption of American Cotton by Grade and Staple, Bureau of Agricultural Economics, February, 1928, Table 1, p. 6.

8/ Hess. Op. Cit. p. 198.

The higher the percentage of foreign matter the lower will be the amount of carded cotton available from a 500 pound bale. Also as the grade lowers the greater will be the expense of producing a white cloth.

The mills of the United States, for the most part, use cotton which is white. For the year 1928 (Table 26) more than 90 percent of the cotton used by domestic mills was white in color, and for this same year more than 90 percent of all the cotton consumed was better than strict low middling in grade.

Then years later, in 1937, (Table 25) 87 percent of all cotton consumed in the United States was better than strict low middling in grade.

Table 25. Grades of Cotton Spun by 11.8 Million Active Spindles of the United States, Year Ending July 31, 1937

Grade	Percentage Each Grade is of Total Cotton Spun
Strict Good Middling	1.67
Good Middling	16.18
Strict Middling	25.33
Middling	21.82
Strict Low Middling	21.72
Low Middling	7.39
Strict Good Ordinary	4.50
Good Ordinary	1.00
Below Good Ordinary	0.39

SOURCE: Domestic Consumption of American Upland Cotton by Grade and Staple Length, Bureau of Agricultural Economics, February, 1938, Table 4, p. 7.

Table 26. Consumption of Cotton by Mills Located in the United States According to Grade and Staple Length, For the Year 1928

(1,000 Bales)

Grade	Total Cotton Consumed	Staple Length (Inches)				
		13/16 and Under	7/8	15/16	1 and 1-1/32	1-1/16 and More
All Grades	6,520	94	1,878	1,783	1,855	910
White	5,968	72	1,712	1,560	1,720	904
S. G. M.	7	--	1	5	--	1
G. M.	605	--	95	147	105	258
S. M.	2,044	4	564	596	556	323
M.	2,062	56	758	527	528	193
S. L. M.	658	11	132	180	269	65
L. M.	301	--	45	32	194	30
S. G. O.	209	--	52	57	63	32
G. O.	82	--	62	15	6	--
Spotted	424	22	129	169	99	5
G. M.	38	--	16	17	--	5
S. M.	138	8	77	52	1	--
M.	194	5	23	72	94	--
S. L. M.	45	9	11	20	4	--
L. M.	7	--	1	7	--	--
Color	74	1	26	36	12	--
No Grade	54	--	11	18	25	--

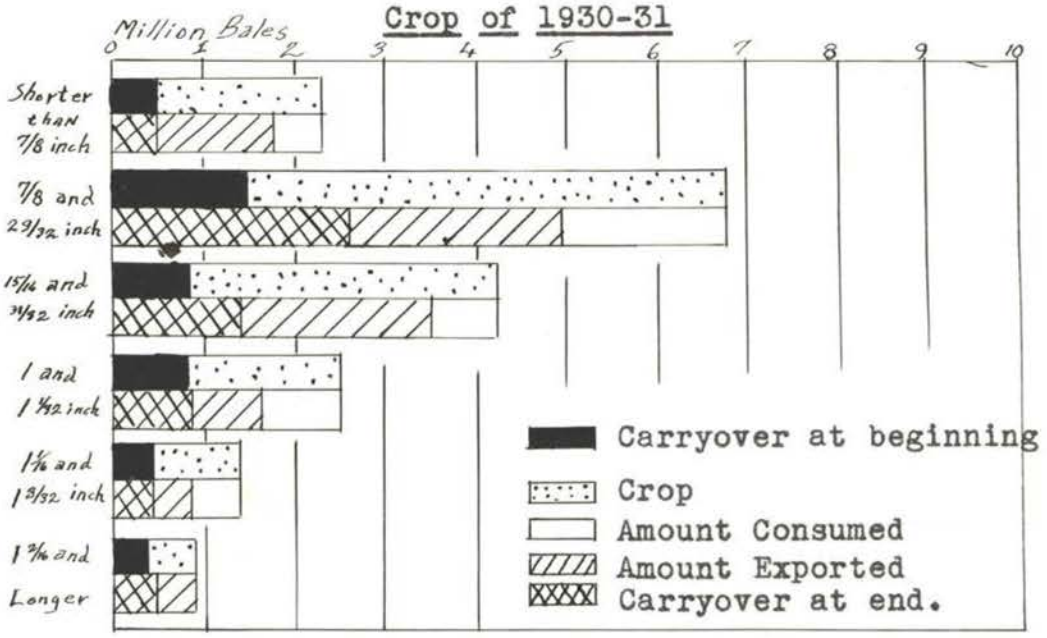
SOURCE: Bureau of Agricultural Economics, United States Department of Agriculture, Quality of Cotton Spun in the United States, 1929, Appendix A.

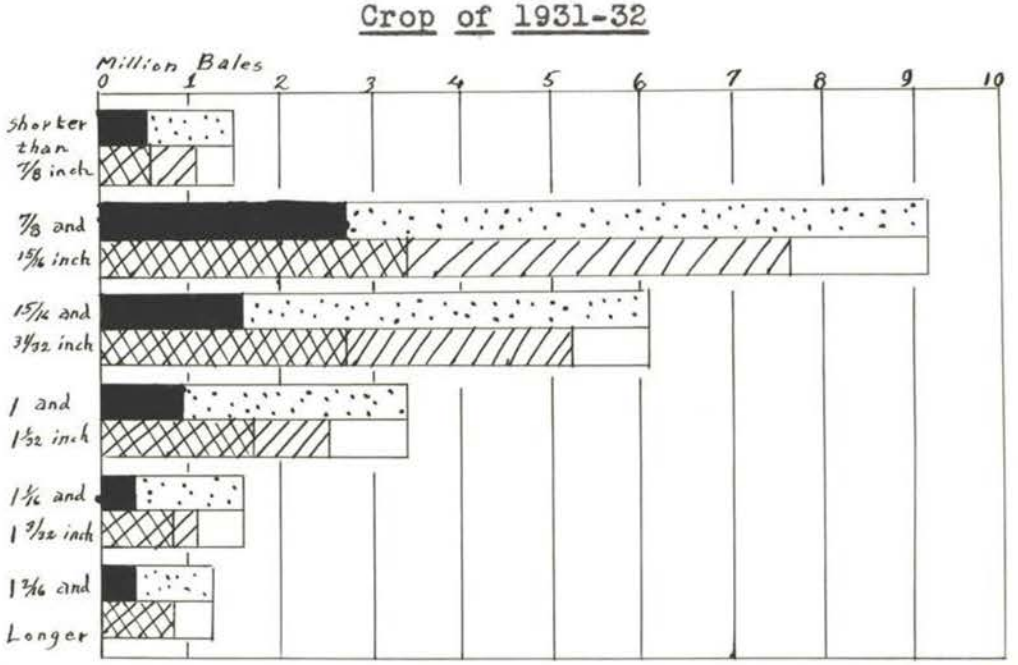
There is an interrelationship between grade and staple length of the cotton used by the domestic mills. As shown by Table 26, cotton of the lower grades is used by the mills located in the United States if the staple is relatively high. Likewise if the cotton is of relatively long staple, the mills of the United States will use the lower grades. For example, most of the cotton less than 7/8 inch staple used by the mills of the United States was white middling or better in grade. Cotton consumed by the domestic mills grading below low middling was one inch or longer in staple length. (Table 26)

A higher percentage of the lower grades of cotton produced in the United States is exported than is consumed by domestic mills. (Figure XVIII) Also a greater percentage of the shorter staple lengths of cotton produced in the United States is exported than is consumed by domestic mills. Thus, because of the shorter staple and the lower grade of the cotton produced in the Western Area, one would assume that the production was for a market outside of the United States. It is the opinion of men in the field that the chief market for cotton produced in the Western Area is Japan. It is known that much cotton is shipped from this country to Japan, and a study of the value of the cotton shipped to Japan bears out the belief that the cotton is of low quality.

In the year 1935 there was a carryover from the preceding year of 2,767,500 bales of cotton 29/32 inch or less, the United States crop of this staple length was 4,555,200 bales, and thus there was a total supply of 7,322,700 bales of this staple length cotton in the United States. Of this supply 2,829,800 bales were carried over into the next year. During this year Japan imported 1,523,500 bales, and since

Figure XVIII. Supply And Distribution By Staple Length Of American Upland Cotton, United States Total Production, 1930-31 and 1931-32.





SOURCE: United States Department of Agriculture, Bureau of Agricultural Economics, Grade and Staple Length Of Cotton Consumed by Domestic Mills, 1930-31 and 1931-32. Washington, February, 1934.

Table 27. Average Price for American Middling 7/8 Inch Cotton at Osaka, Japan, and The Value and Quantity of Cotton Exported to Japan and The Average Value Per Pound of Cotton Exported From The United States to Japan For Selected Years

Year	1,000 Pounds of Cotton Exported to Japan	Total Value of Cotton Exported to Japan (000 dollars	Per Pound Value of Cotton Exported to Japan (Cents)	Average Per Pound 7/8 Inch White Middling, at Osaka (Cents)
1934	858,049 1/	119,134 1/	13.0 1/	12.42 2/
1935	761,710	106,775	14.0	14.15
1936	784,238	108,082	13.4	13.40
1937	558,753	88,142	15.7	15.34

1/ United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Foreign Commerce Yearbook, 1938, 1939, p. 335.

2/ United States Department of Agriculture, Agricultural Statistics, 1939, 1939, Table 155, p. 118.

it has been shown that Japan takes this staple length cotton one may assume that Japan took one-third of the total supply of these staple lengths. 9/

The other chief source of cotton for the mills of Japan is that cotton produced in India.

In competing with the country of India the farmers of the Western Area have, in past years, enjoyed a great economic advantage. In India the average yield of cotton is approximately 80 pounds of lint per

9/ United States Department of Agriculture, Agricultural Statistics, 1937, p. 89.

Table 28. Cotton Imports into Japan, 1927-28 to 1936-37

Season Ending The 31st of August of Each Year	Total Number of Bales Imported	Number of Bales Imported From India	Percent Imports From India is of Total	Number of Bales Imported From America	Percent Imports From America is of Total
1927-28	2,980,603	1,322,194	44.3	978,483	32.8
1928-29	3,649,270	1,751,209	48.0	1,367,609	37.4
1929-30	3,111,949	1,412,330	45.4	1,083,879	34.8
1930-31	3,448,244	1,721,708	49.9	1,179,651	34.2
1931-32	3,895,917	913,249	23.4	2,537,612	64.1
1932-33	3,734,848	1,499,406	40.1	1,693,667	45.3
1933-34	4,180,434	1,601,780	38.3	1,994,175	47.7
1934-35	3,808,009	1,723,027	45.2	1,638,792	43.0
1935-36	4,459,769	2,075,510	46.5	1,553,464	34.8
1936-37	5,125,331	2,490,538	48.6	1,566,206	30.5

SOURCE: The Cotton Trade Journal, International Edition, 1938, The Cotton Trade Journal Inc., New Orleans, Louisiana, June 25, 1938, p. 55.

acre[10] and there are only 1.8 acres of cotton per farm worker, while in the Western Area for the year 1930, there were 85.9 acres of cotton per farm worker.[11] However, during the past nine years it must be remembered that the total acreage of cotton has declined more than 50 percent in the Western Area.

Transportation: Cotton produced in Oklahoma and exported to foreign countries leaves, for the most part, from ports located along the coast of Texas. Approximately 69 percent of all cotton produced in

10/ United States Department of Agriculture, Agricultural Statistics, 1939, p. 81.

11/ J. T. Sanders, A Long Time View of The Competitive Position of The Oklahoma Cotton Producer, Current Farm Economics, Oklahoma Agricultural Experiment Station, April, 1933, p. 30.

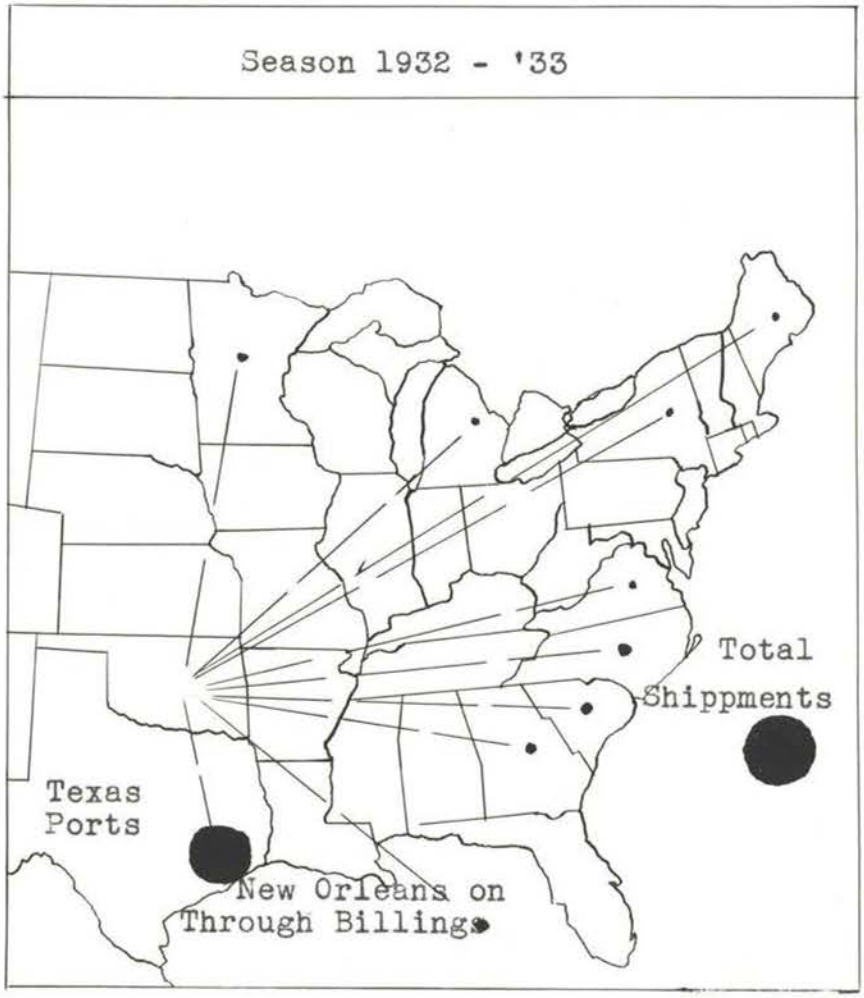
Table 29. Mode of Transportation and Destination of Oklahoma Cotton, Season of 1932-33

	Mode of Transportation		Amount Shipped	
	Number of Bales by Rail	Number of Bales by Truck	Number of Bales	Percent of Total
To Mill Points in:				
Alabama	1,697	---	1,697	0.2
Georgia	58,082	---	58,082	6.1
Illinois	1,696	---	1,696	0.2
Indiana	322	---	322	(1)
Maine	497	---	497	(1)
Massachusetts	557	---	557	.1
Michigan	84	---	84	(1)
Minnesota	24	---	24	(1)
Missouri	154	---	154	(1)
New Hampshire	600	---	600	.1
New York	669	---	669	.1
North Carolina	98,293	---	98,293	10.4
Ohio	72	---	72	(1)
South Carolina	38,206	---	38,206	4.0
Tennessee	300	---	300	(1)
Virginia	11,445	---	11,445	1.2
Ports and Interior Markets:				
New Orleans	739	---	739	.1
Memphis	10,103	---	10,103	1.1
Texas Ports	630,400	22,845	653,245	69.0
Foreign on Through Billing	69,588	334	69,922	7.4
Total	923,746	23,179	946,925	100.0

SOURCE: Bureau of Agricultural Economics, The Distribution of American Raw Cotton, Season 1932-33, 1934, p. 11.

(1) Less than 1 percent.

Figure XIX. Destination Of Oklahoma Cotton .



SOURCE: (Table 29)

Oklahoma, during the season 1932-33, traveled by way of Texas to its points of consumption. (Table 29)

Only a very small percentage of the cotton produced in Oklahoma is sent to larger central markets. The market located at Memphis is the nearest central market and during the 1932-33 season, only 1.1 percent of the total cotton produced in Oklahoma was shipped to this market.

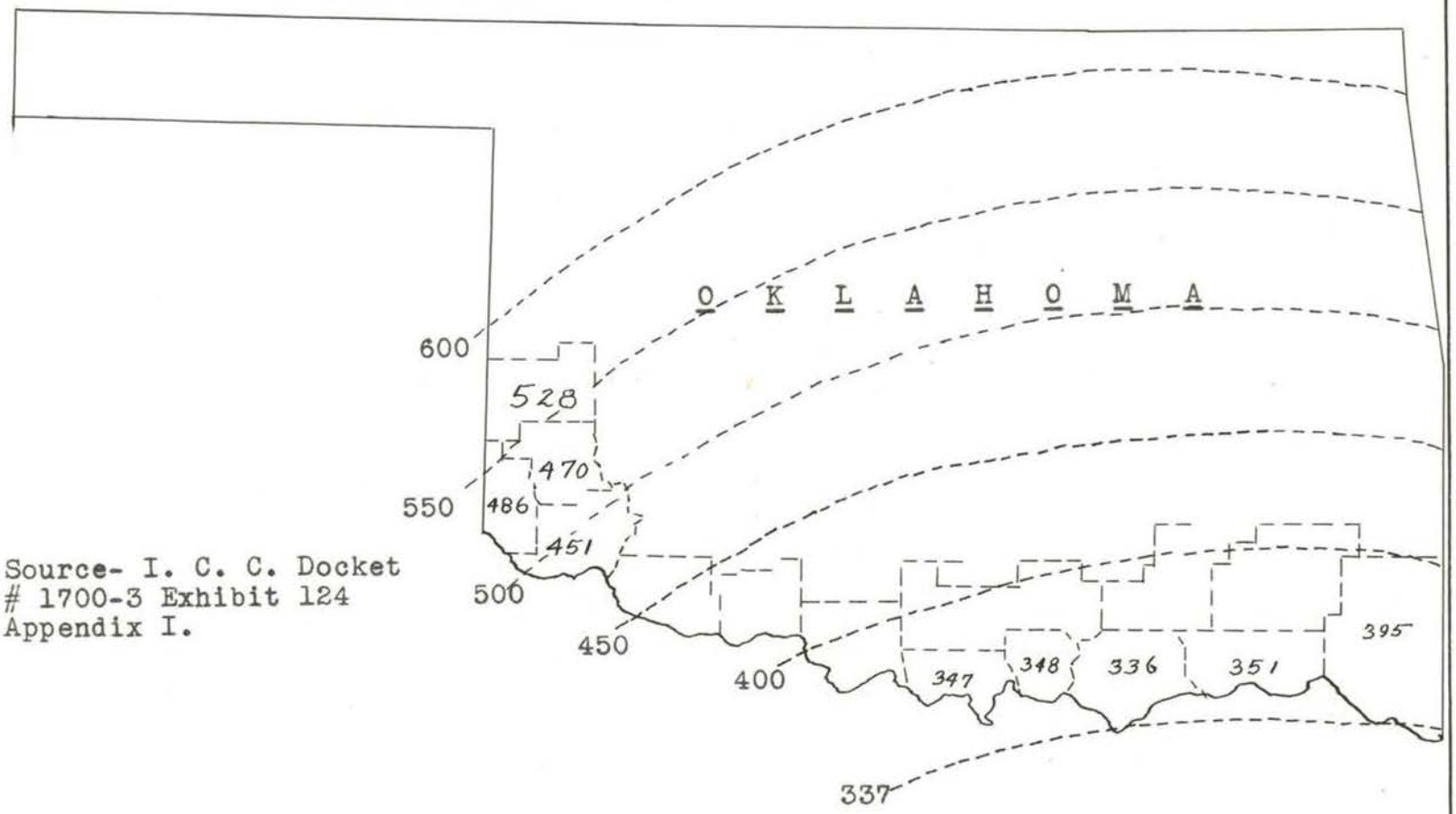
For the most part, cotton produced in Oklahoma and consumed by domestic mills is shipped direct to the mills. For the season 1932-33, 10.4 percent of the cotton produced in the State was sent to the mills of North Carolina, 6.1 percent to the mills located in the State of Georgia, a State which has no large central markets. South Carolina received 4 percent of the cotton produced in Oklahoma during the 1932-33 season. (Table 29)

The Eastern Area is approximately two hundred miles closer to the mills located in the United States; also the distance to Houston, Texas is approximately two hundred miles less for the Eastern Area than for the Western Area. (Figure XIX)

Nearly all the cotton produced in Oklahoma which is shipped to the Texas ports goes via rail; thus this study will be limited to comparing the costs of shipping cotton via rail. (Table 29)

The rates which may be charged for the hauling of cotton from any one point to another are set by the Interstate Commerce Commission. The exact rates as of 1936 are shown by Figure XX. The flat rate of $1.065 per hundred is charged for the hauling of cotton via rail from any point within the Western Area to Houston, Texas. The weighted

Figure XX. Number of Miles From County Seats To Houston, Texas.
Eastern and Western Areas of Oklahoma Studied.



Source- I. C. C. Docket
1700-3 Exhibit 124
Appendix I.

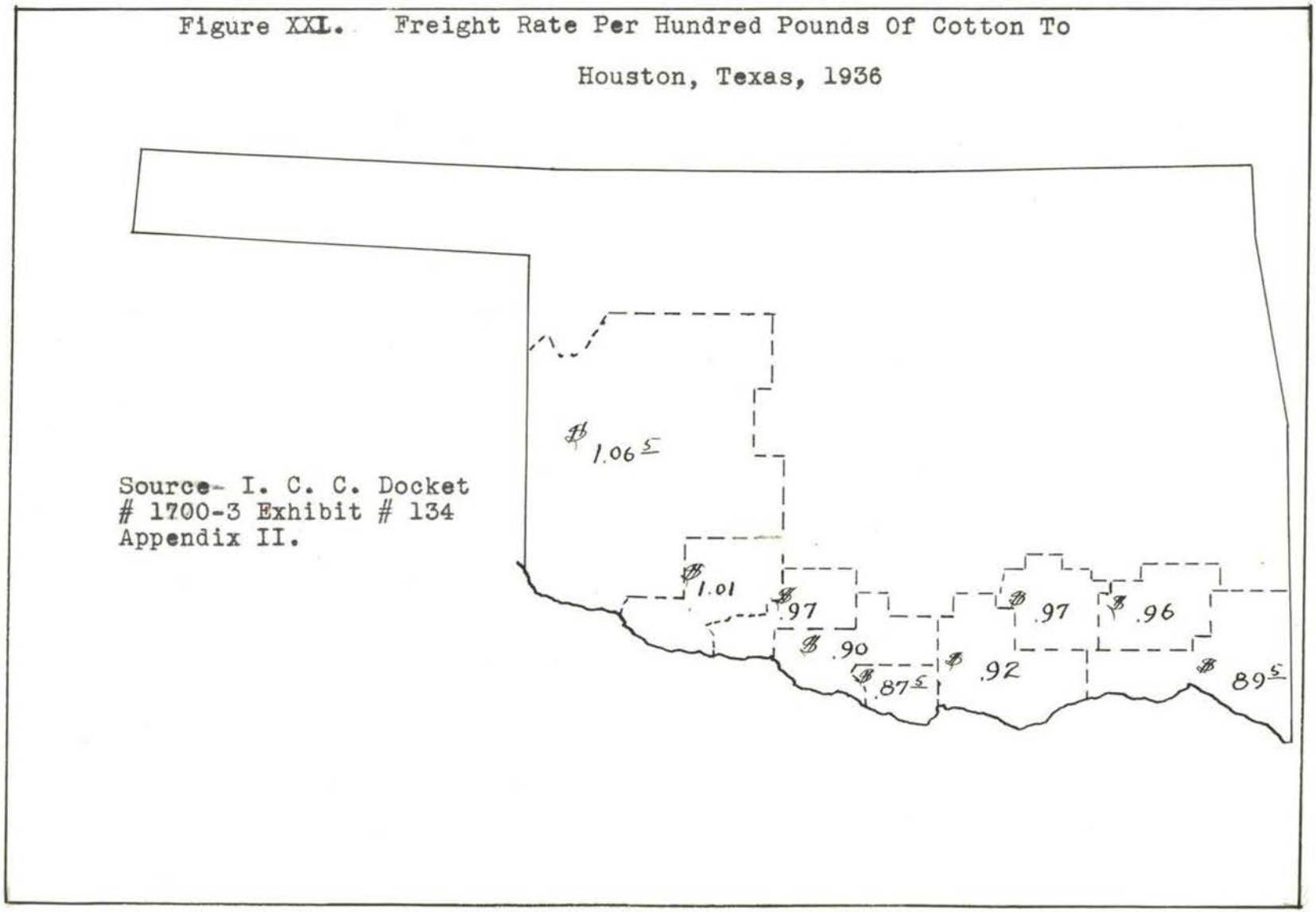
average rate (using 1928 production) for the Eastern Area is $0.90 per hundred pounds.

Using the production figures of 1928 as a basis, it was found that the transportation cost of shipping the entire amount of cotton produced in the Western Area to Houston, Texas, would have been approximately $1,076,768; the cost of shipping the entire amount produced in the Eastern Area was found to be approximately $228,237. For comparison, if the rate for shipping cotton in the Western Area was the same as for the Eastern Area, the cost of shipping the cotton produced in the former Area during the year 1928 would have been approximately $916,720, or an amount of $160,048 less than the actual cost. This saving in the transportation of cotton produced in the Western Area would have moved more than one-half of the entire amount of cotton produced in the Eastern Area during the year 1928 to Houston, Texas.

The degree of advantage occupied by the Eastern Area as compared to the Western Area in connection with transportation costs varies as the price for cotton varies. For example, under present rates for shipping cotton, when the price of cotton paid the farmers is only five cents a pound, the advantage held by the Eastern Area over the Western Area would be twice as great as when the price of cotton was ten cents a pound.

Assuming that most of the cotton produced in the Western Area is exported and that most of the cotton produced in the Eastern Area is used by mills located in the United States, the average cotton farmer of the Western Area has an additional transportation cost which the average cotton producer of the Eastern Area does not have.

Figure XXI. Freight Rate Per Hundred Pounds Of Cotton To Houston, Texas, 1936



Source- I. C. C. Docket
1700-3 Exhibit # 134
Appendix II.

Data are not available as to the cost of shipping cotton to Japan, the country receiving the largest amount of cotton produced in the Western Area. However, a list of the various charges are as follows:

Commission of landed price, 6 percent
Compressing H. D., 15 cents and two cents for loading and unloading
Commission to Broker for hedging
Ocean freight
Allowance for probable claims for grade and staple
Marine insurance
Exchange rate
Interest on money invested in cotton
Discount for sale of paper, foreign exchange rate
Ninety day draft
Weight discount
Cost of patches.

The foregoing are a list of charges which are relatively small or are not even considered when determining the value of cotton consumed by domestic mills.

Summary: In this chapter it has been shown that the longer the staple and the higher the grade, the greater was the use of cotton for weaving of higher price cloth. A small percentage of the shorter staple lengths and cottons of the lower grades was consumed by domestic mills; thus we would assume that only the better grades of cloth are woven in this country. The country of Japan imports a large percentage of the shorter staple lengths and lower grades of cotton which are produced in this country. The other great source of cotton for the mills of Japan is India, and during the more recent years cotton exports from India to Japan have been increasing, while the exports of cotton by the United States to Japan have been decreasing.

In comparing the grade and staple length of cotton produced in each Area with the grade and staple length of the cotton which is used

by domestic mills and the exported cotton we would assume that a very large percentage of the cotton produced in the Western Area is exported, while the bulk of the cotton produced in the Eastern Area is of the grade and staple length of cotton which is used by the domestic mills. Also, the grade and staple length of the cotton produced in the Western Area is of the grade and staple length as that cotton which is exported by this country to Japan.

Thus in producing cotton for the mills of Japan, the Western Area and other areas of the United States producing this short staple cotton are in competition with India. During former years the average cotton producer of the Western Area has occupied an advantage over the cotton producer of India, in that the average yield per acre is greater and the number of acres of cotton per farm worker is greater in the Western Area. However, in recent years there has been a great reduction in the acreage planted to cotton in the Area.

CHAPTER VI

CONCLUSIONS

Through the preceding attempt to determine and contrast the advantages and disadvantages of producing cotton in southeastern and southwestern Oklahoma, it has been found that there were many differences in the production of cotton between these two areas. However, advantages or disadvantages can be recognized only under certain conditions and limitations. It is hoped that from attention to these conditions and limitations there has been shown a need for considering cotton as two or more commodities, and also for dividing the cotton section of the United States into two areas before attempting to study the problem of the individual cotton producer.

The soils of the Western Area at the present time need no fertilizer for the production of cotton, but the soils of the Eastern Area are low in the plant food needed for the production of cotton. The higher amount of rainfall in the Eastern Area has reduced the fertility of the soil, while in the Western Area the amount of rainfall has not been great enough to cause leaching of plant food from the soil. From such evidence it might seem that the Western Area enjoys an advantage. However, it is possible that these same conditions may change the advantage to the Eastern Area. For example, the relatively larger amount of rainfall in the Eastern Area allows for the addition of plant food to the soil in inorganic form, while under moisture conditions as found in the Western Area it is possible to add plant food to the soil only in organic form.

The annual amount of rainfall has an influence on the yield of cotton per acre. In contrasing the two Areas it was found that the Eastern Area has a much larger amount of rainfall than the Western Area

At first hand it might seem that as the result of the greater amount of rainfall there is an advantage in the production of cotton in the Eastern Area. Further study shows, however, that there was much damage to cotton production from boll weevil infestation which was greatest during years of high rainfall. Because of the drought conditions in the Western Area there was no damage to cotton production from the boll weevil; but damage from grasshoppers, insects which are not found in areas of relatively high moisture, often accompanies drought conditions. In contrasting the damage resulting from insects between the two Areas, it can be said that usually the greatest damaging effect of insects in the Eastern Area occurs during years when the weather conditions have been favorable for the production of cotton, and as the result in most cases it would be profitable to practice control measures. In the Western Area, however, the greatest damaging effect to cotton as the result of insects usually occurs during the years when the weather conditions have already rendered the crop invaluable, and thus there is little to be gained by attempting to control the invasion of the insect.

An analysis of the agricultural pattern of the two Areas reveals that in the Western Area cotton production has developed into a large scale type of farming while in the Eastern Area the production of cotton has remained on a family size scale. It was found that cotton was produced under a large scale type of farming at a cheaper cost per pound in the Western Area.

The cotton produced in the Eastern Area, however, is of higher value than the cotton of the Western Area, because of its higher grades and longer staple lengths. In the Western Area a new method of

harvesting has been developed in order to take care of the harvesting problem resulting from the growth of large scale farming. But in most cases when this new method, snapping, was practiced the quality of the cotton was lower. Thus cotton can be produced cheaper per pound in the Western Area, but the cheaper method of production results in a cheaper product.

The method of harvesting is not the only factor which causes the difference in the quality of cotton between these two Areas. The variety of cotton grown has a great influence on the staple length of the cotton produced. In Eastern Oklahoma the variety which produced the longer staple was the most profitable to grow, but in Western Oklahoma the varieties which produced the shorter staple lengths were most profitable.

Thus, having found that conditions exist in the Eastern Area which combine to result in a higher valued product, and since in most cases the greater value offsets the greater cost of production, a conclusion might be reached that there is a greater advantage in the production of cotton in the Eastern Area than in the Western Area; but since expansion in cotton production has been more rapid in the Western Area data on production do not substantiate this conclusion. Factors which affect the demand for the type of cotton as produced in each of the Areas were analyzed in the hope of endorsing the conclusion reached.

The grade and staple length of cotton influence the quality of cloth that can be manufactured, the higher the grade and the longer the staple the more valuable the cloth. Only the more valuable cloths are woven in the United States. Most of the cotton produced in the Western Area is exported and Japan imports a large amount of cotton from the

United States which is similar in grade and staple to the cotton produced in the Western Area. Besides the United States, India is an important source of cotton imported by Japan. The average cotton yield in India is approximately 80 pounds of lint per acre and there are only 1.8 acres of cotton per farm worker. Thus, when it is considered that the Western Area has an average yield of more than 120 pounds of lint cotton per acre and that there are more than 80 acres of cotton per farm worker, the reason for the greater growth in cotton production in the Western Area is found. The Western Area is not in competition with the Eastern Area in the production of cotton. Thus, before attempting to find a solution to the problems of cotton farmers of the United States it is necessary first to divide the cotton belt into separate Areas. It is necessary further to think of cotton as being several commodities, rather than one single commodity, since variations in grade and staple virtually result in different products.

BIBLIOGRAPHY

Articles

1. Nelson, Peter, "Geographical Variability in Types of Farming in Oklahoma," Current Farm Economics, Volume 9, No. 1, February, 1936, Oklahoma Experiment Station, Stillwater, Oklahoma.

2. Sanders, J. T., "A Long-Time View of the Competitive Position of Oklahoma Cotton Producers." Current Farm Economics, Volume 6, No. 2, April, 1933, Oklahoma Experiment Station, Stillwater, Oklahoma.

3. Stephens, P. H., "Farm Production Costs." Current Farm Economics, Volume 4, No. 6, December, 1931, Oklahoma Experiment Station, Stillwater, Oklahoma.

4. "The Service Man." "Number of Farm Tractors in Certain Counties of Oklahoma During the Year 1939," A published answer to a letter written by the writer of this thesis requesting the number of farm tractors. Oklahoma City Times, October 1, 1940, Oklahoma Publishing Company, Oklahoma City, Oklahoma.

Books

1. Hess, Katharine, P., Textile Fibers and Their Use. The J. B. Lippincott Company, Chicago, Illinois, 1931.

2. Mattews, J. Merritt, Textile Fibers. The John Wiley and Sons, Inc. New York City, New York, 1924.

3. Waters, Henry Jackson, Essentials of the New Agriculture. The Ginn and Company, Boston, 1924.

4. Watkins, James L., King Cotton. The James L. Watkins and Sons, Inc. New York City, New York, 1924.

Bulletins

1. Ballinger, Roy A., and McWhorter, Clyde C., Economic Aspects of the Grade and Staple Length of Cotton Produced In Oklahoma. Oklahoma Experiment Station Bulletin No. 212, October, 1933, Stillwater, Oklahoma.

2. Bennett, H. H., Soils of The United States. Bureau of Soils, United States Department of Agriculture, 1936, United States Printing Office, Washington, D. C., 1936.

3. Carter, William T., Jr., and Patrick, A. L., Soils Survey of Bryan County, Oklahoma. United States Department of Agriculture, Bureau of Soils, Washington, D. C., November, 1915.

4. Goke, A. W., and Penn, R. E., Soil Survey of Greer County, Oklahoma, Bureau of Chemistry and Soils, United States Department of Agriculture, 1936, United States Government Printing Office, Washington, D. C., 1935.

5. Harper, Horace J., Easily Soluble Phosphorus In Oklahoma Soils. Oklahoma Experiment Station Bulletin No. 205, September, 1932, Stillwater, Oklahoma.

6. Howell, L. D., and Hembree, Joel F., Cotton Prices in Relation To Cotton Classification Service and to Quality Improvement. United States Department of Agriculture, Bureau of Agricultural Economics, January, 1937, Washington, D. C.

7. Ligon, L. L., Varieties of Cotton for Oklahoma. Oklahoma Experiment Station Bulletin No. 175, April, 1928, Stillwater, Oklahoma.

8. Moorehouse, L. A., and Nicholson, J. F., Cotton Culture. Oklahoma Experiment Station Bulletin No. 77, 1908, Stillwater, Oklahoma.

9. McCollum, J. L., Nelson, F. E., and McWhorter, Clyde C., Quality of Cotton Ginned In Oklahoma, Crops of 1933-36. United States Department of Agriculture, Bureau of Agricultural Economics, United States Government Printing Office, June, 1938, Washington, D. C.

10. McWhorter, Clyde C., and Ballinger, Roy A., Relative Economic Advantages of Harvesting Cotton By Picking and Snapping In Western Oklahoma, Oklahoma Experiment Station Bulletin No. 227, October, 1935, Stillwater, Oklahoma

11. Osborn, W. M., Cotton Experiments at the Lawton (Oklahoma) Field Station, 1916-1931. Oklahoma Experiment Station Bulletin No. 209, March, 1933, Stillwater, Oklahoma.

12. Palmer, A. W., Commercial Classification of American Cotton. United States Department of Agriculture, Bureau of Agricultural Economics, Circular No. 278, October, 1934, Washington, D. C.

13. Ruggles, A. G., and Aamodt, T. L., Grasshopper Control. Agricultural Extension Division Circular No. 17, July, 1936, University of Minnesota, St. Paul, Minnesota.

14. Youngblood, B., Relation of Soil Fertility to Quality of Product, United States Department of Agriculture, Mimeographed Release, February 6, 1929, Washington, D. C.

15. United States Department of Agriculture, Bureau of Agricultural Economics. A Graphic Summary of American Cotton Production Consumption and Prices. August, 1933, Washington, D. C.

16. United States Department of Agriculture, Bureau of Agricultural Economics. Domestic Mill Consumption of American Cotton By Grade and Staple. February, 1938, Washington, D. C.

17. United States Department of Agriculture, Bureau of Agricultural Economics. Grade and Staple Length of Cotton Consumed By Domestic Mills, 1930-31, 1931-32. July, 1934, Washington, D. C.

18. United States Department of Agriculture, Bureau of Agricultural Economics, Grade, Staple Length, and Tenderability of Cotton in the United States, 1928-29 to 1936-37, July, 1937, Washington, D. C.

19. United States Department of Agriculture, Bureau of Agricultural Economics, Handbook For Licensed Classifiers (United States Cotton Standards Act). Revised August, 1931, Washington, D. C.

20. United States Department of Agriculture, Bureau of Agricultural Economics, The World Cotton Situation, April, 1936 Washington, D. C.

Source Material

1. United States Department of Agriculture, Agricultural Marketing Service, Oklahoma Cotton, Estimated Acreage, Yield and Production, 1928-1937 by Counties, August, 1939 Washington, D. C.

2. Oklahoma State Board of Agriculture, Third Biennial Report (1907-08), 1907, Oklahoma City, Oklahoma.

3. Oklahoma State Board of Agriculture, Third Biennial Report (1910-11), 1910, Oklahoma City, Oklahoma.

4. Oklahoma State Board of Agriculture, Annual Report for 1916 (1915-16) 1915, Oklahoma City, Oklahoma.

5. Oklahoma State Board of Agriculture, Yearbook 1918 (1917-18), 1917, Oklahoma City, Oklahoma.

6. Oklahoma Territorial Board of Agriculture, Second Biennial Report, Part VII, 1905-1908, 1908, Oklahoma City, Oklahoma.

7. United States Department of Agriculture, Agricultural Statistics, 1935; 1936; 1937; and 1938. Washington, D. C.

8. United States Department of Agriculture, Bureau of Agricultural Economics, Agricultural Marketing Service, Oklahoma City, Oklahoma. Unpublished Data, furnished on request by K. D. Blood, Agricultural Statistician.

9. United States Department of Agriculture, Bureau of Weather, Climatological Data. Reports for Years: 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, and 1938. Washington, D. C.

10. United States Department of Agriculture, Bureau of Census, Agriculture, Thirteenth, Fourteenth, Fifteenth, and Sixteenth Census Reports, Washington, D. C.

11. United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Foreign Commerce Yearbook, 1938, 1939, Washington, D. C.

Tyana Marshall