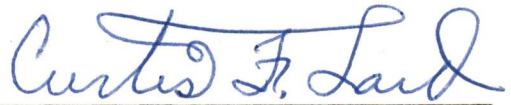


July 14, 1967

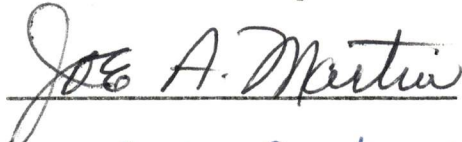
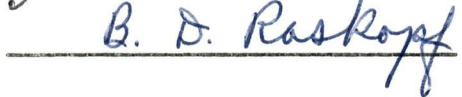
To the Graduate Council:

I am submitting herewith a thesis written by Robert Mack Jones entitled "An Economic Evaluation of Cotton Stripping Harvesting In Tennessee." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.



Major Professor

We have read this thesis and
recommend its acceptance:

Accepted for the Council:


Vice President for
Graduate Studies and Research

AN ECONOMIC EVALUATION OF COTTON STRIPPING
HARVESTING IN TENNESSEE

A Thesis
Presented to
the Graduate Council of
The University of Tennessee

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
Robert Mack Jones

August 1967

ACKNOWLEDGMENT

The writer wishes to express his sincere appreciation to those who have given their time to make this manuscript possible. Failure to recognize some individual does not indicate lack of gratitude.

Special gratitude is expressed to Dr. Curtis Lard for the guidance, competent advice, and constructive criticism which guided the writer throughout his program of study.

Special appreciation is also expressed to Dr. Joe A. Martin and Professor B. D. Raskopf for their guidance and assistance during the preparation of this manuscript.

The writer wishes to express his appreciation to Dr. T. J. Whatley for the funds that have made my continued education possible.

My sincere appreciation goes to Mr. Glenn H. Glover for his assistance and information. Also, appreciation is expressed to Mr. Tom McCutchen, manager of The Milan Field Station, and Mr. R. J. Goddard, Ames Plantation, for supervision of the experiments on which this thesis was based.

Gratitude is also expressed to Donna and Tracy for their patience, understanding, and scarifices during this effort.

TABLE OF CONTENTS

CHAPTER	PAGE
I. NATURE OF THE STUDY	1
Introduction.	1
Need for Study.	4
Objectives.	7
Source of Data.	8
Review of Related Literature.	9
Organization of Study	11
II. CHARACTERISTICS OF COTTON STRIPPERS	13
Introduction.	13
History of Development.	13
Types of Mechanical Cotton Strippers.	15
Factors Affecting the Performance of Cotton Strippers	16
Plant Characteristics	17
Plant Population.	18
Cultural Characteristics.	18
Design of Stripping Unit.	19
Conveying System.	21
General Considerations.	22
III. FACTORS AFFECTING GRADE LOSS, MICRONAIRE, AND FIELD WASTE	
OF COTTON MECHANICAL STRIPPED AND PICKED.	23
Introduction.	23

CHAPTER

PAGE

III. (CONTINUED)

Plot Descriptions	24
Producer For Grade Comparison	28
Effect of Various Factors on Grade.	29
Method of harvest	29
Varietal Differences.	30
Vegetative growth of weeds and grass.	33
Time of Harvest	34
Micronaire.	36
Field Waste Comparison.	36
Plot size and selection	36
Procedure for estimating field waste.	37
Varietal difference	37
IV. COST OF MECHANICALLY HARVESTED COTTON IN TENNESSEE.	40
Introduction.	40
Budgets	40
Data sources.	40
Revenues.	42
Expenses.	42
Returns above specified costs	43
Cost per pound of lint.	46
Budget qualifications	47

CHAPTER	PAGE
IV. (CONTINUED)	
Additional Charges for Mechanical Stripping.	47
Grade loss	48
Field waste.	48
Ginning charges.	49
Field loss	50
Harvesting Cost and Acreage Requirements Per Machine . . .	50
V. SUMMARY AND CONCLUSIONS.	56
Implication for the Study.	58
BIBLIOGRAPHY.	60
APPENDIX.	64

LIST OF TABLES

TABLE	PAGE
I. Average Price Per Cwt. of Lint and Tons of Seed, Combined Average Value Per Acre, and Total Farm Value of Cotton in Tennessee, 1956-1966	3
II. Harvested Acreage, Total Number of Bales, Total Tons of Seed, and Average Pounds of Lint Per Acre of Cotton Produced In Tennessee, 1956-1966	5
III. Field Operations and Dates of Operations Performed on the Cotton Enterprise, Field N-15, Milan Field Station, West Tennessee, 1965 and 1966.	25
IV. Field Operations and Dates of Operations Performed on the Cotton Enterprise, Field S-2, Milan Field Station, West Tennessee 1965-1966.	26
V. Varieties, Materials, and Rates of Application on Cotton Enterprise, Fields N-15 and S-2, Milan Field Station, West Tennessee, 1965-66	27
VI. Grade Comparison and Average Prices, Ames Plantation Farm Management Units, West Tennessee, Farmers I, II, and III, 1965-66	31
VII. Grade, Staple, and Micronaire Reading of Cotton Harvested, Milan Field Station, West Tennessee, 1965-66.	32

TABLE

PAGE

VIII.	Field Waste Comparisons Per Acre Before Harvest, After Harvest, and Percentage of Cotton Crop Lost, Milan Field Station, West Tennessee, 1965-66.	38
IX.	Gross Income, Total Expenses, Net Revenue, and Cost Per Pound of Lint, Per Acre of Cotton Mechanically Stripped, Field N-15 and S-2, Milan Field Station, West Tennessee, 1965.	44
X.	Gross Income, Total Expenses, Net Revenue, and Cost Per Pound of Lint, Per Acre of Cotton Mechanically Stripped, Field N-15 and S-2, Milan Field Station, West Tennessee, 1966.	45
XI.	Costs Per Acre of Harvesting Using a 2-Row Mechanical Stripper, 1-Row Mounted Picker, 2-Row Mounted Picker, and 2-Row Self Propelled Picker, 50 Acre Cotton Allotment, 7-Year Depreciation Schedule, Yield Per Acre, and Harvest Cost Per Bale	52
XII.	Costs Per Acre of Harvesting Cotton Using a 2-Row Mechanical Stripper, 1-Row Mounted Picker, 2-Row Mounted Picker, 2-Row Self Propelled Picker, 100 Acre Cotton Allotment, 7-Year Depreciation Schedule, Yield Per Acre, and Harvest Cost Per Bale	53
XIII.	Costs Per Acre of Harvesting Cotton Using a 2-Row Mechanical Stripper, 1-Row Mounted Picker, 2-Row Mounted Picker, 2-Row Self Propelled Picker, 150 Acre Cotton Allotment, 7-Year Depreciation Schedule, Yield Per Acre, and Harvest Cost Per Bale.	54

TABLE

PAGE

XIV.	Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field N-15, Rex Smoothleaf and Lockett 4789, 150 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1965	65
XV.	Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field N-15, Rex Smoothleaf and Lockett 4789, 50 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1965	67
XVI.	Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field S-2, Rex Smoothleaf and Lockett 4789, 150 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1965	69
XVII.	Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field S-2, Rex Smoothleaf and Lockett 4789, 50 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1965	71
XVIII.	Average Gross Income, Specified Costs and Returns for Producing One Cotton, Field N-15, Rex Smoothleaf and Lockett 4789, 150 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1966	73
XIX.	Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field N-15, Rex Smoothleaf and Lockett 4789, 50 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1966	75

TABLE

PAGE

XX. Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field S-2, Rex Smoothleaf and Lockett 4789, 150 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1966	77
--	----

XXI. Average Gross Income, Specified Costs and Returns for Producing One Acre Cotton, Field S-2, Rex Smoothleaf and Lockett 4789, 50 Acre Cotton Allotment, Milan Field Station, Milan, Tennessee, 1966	79
--	----

CHAPTER I

NATURE OF THE STUDY

I. INTRODUCTION

The time when cotton fiber was first utilized by man is not definitely known. It may possibly antecede written history by several centuries. Before the invention of the cotton gin in 1793, cotton was grown and converted into cloth without leaving the farm.¹ Seeds were pulled from the lint, the fibers were carded and spun into thread, and slow hand methods were used in making cloth. Originally all crops were produced and prepared by the power of animal and human muscle. However, the coming of the cotton gin and then the spinning mills allowed cotton producers to expand their cotton production. Now, in the latter part of the twentieth century, the United States cotton industry has progressed to a highly mechanized system of production and processing.

With the increase in cotton production the United States farmers began to search for easier, faster, and more efficient ways to harvest their cotton crop. The first patent on a cotton harvesting machine of the picker type, in the United States, was issued in 1850.² Several patents for stripper type cotton harvesting equipment were granted

¹V. R. Cardozier, Growing Cotton (New York: McGraw-Hill Book Company, Inc., 1957), p. 310.

²Basil G. Christidis and George J. Harrison, Cotton Growing Problems (New York: McGraw-Hill Book Company, Inc.), p. 589.

as early as 1871, but the method did not come into practice until about 1914.³ Since 1850, almost nine hundred patents have been granted to inventors of various cotton harvesting devices.⁴ Various types of almost every conceivable machine for cotton harvesting have been patented; however, the cotton picker and cotton stripper are the only machines that have been widely accepted by farmers in the United States. There were approximately 2,575 cotton pickers operated in Tennessee in 1965.⁵ Of these, 2,500 were in the 21 counties of West Tennessee. In a survey conducted by the author, it was determined that only seven cotton strippers were operated in Tennessee in 1965. There were three stripping machines located in Gibson County and one machine each in Decatur, Giles, McNairy, and Hardeman counties.

Through 1965 cotton continued to yield the greatest cash receipts of any crop in Tennessee. The acreage harvested in Tennessee has fluctuated in the last 10 years primarily due to government programs and has continued to decline since 1963 (Table I). Tennessee Crop Reporting Service reports that the 1966 cotton crop was the smallest in Tennessee since 1935. The average pounds of lint per acre have increased slightly but have varied due to growing conditions of the particular season. The average yield in pounds per acre rose from

³Ibid., p. 590.

⁴Ibid., p. 589.

⁵James A. Mullins, Assistant Agricultural Engineer, University of Tennessee Agricultural Extension Service, in a letter to the author, dated July 11, 1966.

TABLE I

AVERAGE PRICE PER CWT. OF LINT AND TON OF SEED, COMBINED AVERAGE
VALUE PER ACRE, AND TOTAL FARM VALUE OF COTTON
IN TENNESSEE, 1956-1966

Year	Average price per cwt. of lint	Average price per ton of seed	Combined average value per acre	Total farm value
1956 ^a	\$33.15	\$46.90	\$185	\$100,453,000
1957	31.72	48.10	160	74,209,000
1958	35.41	45.30	206	82,257,000
1959	33.78	38.10	239	121,717,000
1960 ^b	31.40	41.70	198	101,437,000
1961	34.18	49.10	197	106,129,000
1962	32.78	46.50	189	101,524,000
1963	33.38	51.00	243	122,526,000
1964	30.10	48.30	228	114,129,000
1965 ^c	29.00	46.00	221	110,122,000
1966	22.20	67.10	194	70,850,000 ^{d,e}

^aTennessee Department of Agriculture, Agriculture Trends in Tennessee 1866-1960. (Fourth edition; Nashville: Crop and Livestock Statistics, September, 1964), p. 21.

^bTennessee Agricultural Statistics Annual Summary 1965, Bulletin T-2 (Nashville: Tennessee Crop Reporting Service, Tennessee Department of Agriculture, September, 1965), p. 8.

^cTennessee Agricultural Statistics Annual Bulletin 1966, Bulletin T-3 (Nashville: Tennessee Crop Reporting Service, Tennessee Department of Agriculture, September, 1966), p. 9.

^dTotal farm value including government price support and diversion payments.

^eTennessee Crop Reporting Service, "Smallest Tennessee Cotton Crop Since 1935," (May 10, 1967), p. 1.

488 pounds per acre in 1956 to a high of 640 in 1964, and then declined to 475 in 1966 (Table II).

II. NEED FOR STUDY

The domestic and foreign consumption of United States cotton has been declining because of increased competition from synthetic fibers and cotton produced by foreign countries. For the ten year period, 1954-1963, the average mill consumption per capita of cotton in the United States dropped from 25.5 pounds to 21.2 pounds; synthetics increased from 10.5 to 15.7 pounds and other fibers declined from 2.6 to 2.1 pounds.⁶ World cotton production has been on the increase. The average annual production for the period 1955-1959 was 43,888,000 bales grown on 80,978,000 acres; in 1964 production was 51,857,000 grown on 82,107,000 acres. The yield per acre for world cotton production was 260 pounds during the 1955-1959 period, 305 pounds in 1964, and 306 pounds in 1965.⁷ The acreage harvested in the United States declined from an average of 14,613,000 in 1955-1959 to 13,621,000 in 1965. Over this same period of time, production increased from 13,013,000 bales to 15,059,000 bales.⁸ The increased population, both in the world and United States, has caused conditions that forced the American farmers to lower production costs to gain a better advantage

⁶B. D. Raskopf, "Cotton Spinning Mill Capacity and Cotton Utilization," Tennessee Farm and Home Science, 53:10, January-March, 1965.

⁷United States Department of Agriculture, Agriculture Statistics: 1966 (Washington: Government Printing Office, 1966), p. 64.

⁸Ibid., p. 64.

TABLE II

HARVESTED ACREAGE, TOTAL NUMBER OF BALES, TOTAL TONS OF SEED,
AND AVERAGE POUNDS OF LINT PER ACRE OF COTTON PRODUCED IN
TENNESSEE, 1956-66

Year	Total Acreage Harvested	Total number of 500 lb. bales	Total tons of seed	Average lbs. of lint per harvested acre
1956 ^a	543,000	552,000	211,000	488
1957	465,000	415,000	176,000	427
1958	400,000	419,000	178,000	501
1959	510,000	660,000	269,000	620
1960 ^b	512,000	583,000	238,000	545
1961	538,000	554,000	231,000	493
1962	538,000	555,000	228,000	494
1963	504,000	654,000	263,000	621
1964	502,000	671,000	272,000	640
1965 ^c	499,000	637,000	255,000	611
1966 ^d	365,000	363,000	150,000	475

^aTennessee Department of Agriculture, Agriculture Trends in Tennessee 1866-1960. (Fourth edition; Nashville: Crop and Livestock Statistics, September, 1964), p. 19.

^bTennessee Agricultural Statistics Annual Summary 1965; Bulletin T-2 (Nashville: Tennessee Crop Reporting Service, Tennessee Department of Agriculture, September, 1965), p. 8.

^cTennessee Agricultural Statistics Annual Bulletin 1966; Bulletin T-3 (Nashville: Tennessee Department of Agriculture, September, 1966), p. 9.

^dTennessee Crop Reporting Service, "Smallest Tennessee Cotton Crop Since 1935," (May 10, 1967), p. 1.

in cotton production. The decreased per capita consumption of cotton, along with increased production of cotton in foreign countries, and synthetic fibers gaining a greater portion of the fiber market, have all combined to affect the cotton industry in a substantial way.

The determination of the cost of producing cotton under different methods necessitates an economic evaluation of the alternative methods of land preparation, fertilization and seeding, weed control, insect control, harvesting and the overall management of these techniques as to timing, costs, elimination of certain machines, combining field operation and other relevant aspects of cotton production.⁹

Harvesting affords the producer one of the major opportunities for cost reduction. A shortage of available labor has forced many Tennessee farmers to resort to mechanical methods of harvesting cotton. The farmer is faced with several basic alternatives in harvesting his cotton crop. These are:

1. Have cotton picked by hand.
2. Hire a machine (either a picker or a stripper) on a custom basis.
3. Purchase a machine for his own use and or custom work for others.
4. Purchase a machine cooperatively with neighbors or an organization.

In 1966 the Tennessee cotton allotment was 533,283 acres. There were 44,590 farms that had a cotton allotment in 1966.¹⁰ This would be

⁹Statement by Glenn Glover, from study "An Economic Appraisal of the Emerging Technology on the Costs of Producing Upland Cotton," The University of Tennessee, 1966.

¹⁰"Late Tally Shows Acreage Diverted in All 20 States," Cotton Growing, 10:45, April, 1966.

an average allotment of 11.9 acres per cotton farm. This illustrates the point that in many cases cotton acreage is inadequate to justify the high investment required to purchase a cotton picker. The increasing cost of equipment, along with the reduction of cotton acreage and declining cotton lint prices, are forcing the farmer to lower his costs in order to retain or increase his net revenue.

III. OBJECTIVES

The general objective of this study was to obtain data that could be used to aid Tennessee farmers in choosing the harvesting method that would most nearly fit their specific needs and result in the greatest net returns to their cotton enterprise. This would involve supplying additional information about the alternative harvesting practices in Tennessee. More specifically the objectives of this study were:

1. To estimate the difference between the quality and per acre value of cotton harvested by a stripper versus a picker.
2. To estimate the difference between the amount and value of field waste of cotton harvested by a stripper, compared with a picker.
3. To estimate the minimum acreage or yield necessary to justify the ownership of a mechanical stripper and a mechanical picker.
4. To determine the ginners acceptance and the extra cost associated with ginning cotton harvested by a mechanical stripper.

IV. SOURCE OF DATA

The primary source of data for this study was obtained from test plots located at the Milan Field Station in West Tennessee. These test plots were located on Collins and Loring soil types with Rex Smoothleaf and Lockett 4789 cotton varieties replicated on each soil type. The 1966 data included the Hybee 300 variety. Efficiency data, grade comparisons, yield, and price data were obtained from these plots along with input-output data used in constructing budgets for this study.

Additional information was secured by a survey conducted during the month of August, 1966. The author attempted to obtain a complete population of farmers owning and operating cotton strippers in 1965 and 1966. These machines were located by visiting each County Agricultural Agent, the Agricultural Stabilization and Conservation Service and some of the farm equipment dealers in each county seat town. Twenty-one counties in West Tennessee were visited plus Lawrence, Lincoln and Giles counties in Middle Tennessee. Four gins were visited to obtain the opinions and observations of the ginners concerning stripped cotton.

Data from Ames Plantation Farm Management Units in West Tennessee were also used. These data were utilized in the comparison of grade and value of stripped cotton compared with cotton harvested by a mechanical picker. This information was for the 1965 and 1966 crop years.

V. REVIEW OF RELATED LITERATURE

Very little literature has been published on cotton stripping in Tennessee. The cotton stripper has been used in Arkansas where a considerable amount of research work has been done in recent years by the Arkansas Agricultural Experiment Station. The cotton stripper originated in Texas and extensive research work has been done in the Texas and Oklahoma area where almost all of the cotton is harvested by mechanical strippers. The work done in Texas and Oklahoma is not very applicable to Tennessee because of differences in climate, growing seasons, plant characteristics, and other factors that would substantially influence the cost of stripping and the quality of the harvested product.

A study was conducted in 1964 by the University of Tennessee to determine the effect of stripping and mechanical picking of four different cotton varieties. The varieties included were; Deltapine Smoothleaf, Dixie King II, A. K. S. Stormproof 61-30, and Paymaster 101 A. The first two varieties are open-boll varieties and the last two are stormproof varieties. In this study the cotton stripped gave the highest gross returns per acre but a lower quality product, especially in grade.

The open-bolled varieties were better suited for spindle picking than the stormproof varieties. Under these conditions the best open-bolled varieties when stripped gave returns per acre equal to the stormproof variety. The stormproof varieties had a short staple length

and grades were reduced by stripping.¹¹

The University of Arkansas Agricultural Experiment Station conducted a study under the directions of D. G. Lafferty and G. R. Tupper investigating the field loss due to stripping. Losses incurred during harvest and up to harvest time constitute a substantial item in the cost of producing cotton. This study revealed that a 1 per cent decrease in the amount of plant and/or machine loss would increase the producers' gross revenue \$3.20 per acre for open-bolled cotton that was spindle picked two times; \$3.73 per acre for open-bolled cotton that was stripped; and \$3.21 for stormproof cotton that was stripped.¹²

The University of Arkansas published a report in 1965 concerning the effect of harvest methods on the returns from the cotton crop. Rex and Rex Smoothleaf varieties were used in the study. The methods of harvest were: (1) spindle pick the first and second harvest, (2) spindle pick the first harvest and strip the second harvest, (3) spindle pick once over, and (4) strip once over. This report concluded that after all costs were subtracted from the value of the lint and seed that the returns did not differ significantly for the various methods of harvest during either year studied.¹³ A similar study conducted in 1963 by the Arkansas

¹¹C. R. Graves, J. R. Overton, and R. J. Goddard, "Stripping and Spindle Picking of Four Cotton Varieties," Tennessee Farm and Home Science, 54:11, April-June, 1965.

¹²D. G. Lafferty and G. R. Tupper, "Losses During Cotton Harvest," Arkansas Farm Research, Arkansas Agricultural Experiment Station, 15(1): 11, 1966.

¹³D. G. Lafferty, G. R. Tupper, and Fred Hale, "Effect on Harvest Method on Returns to Cotton Producers," Arkansas Farm Research, Arkansas Agriculture Experiment Station, 14(4):11, 1965.

Agricultural Experiment Station compared a stripper and spindle picker in once over harvest. It was found there was more seed cotton harvested by the stripper from a given field of cotton. Although government loan prices for stripped cotton was 1.3 cents per pound lower, the gross value of the stripped cotton was about \$20.27 (18 per cent) more than the picked cotton.¹⁴

VI. ORGANIZATION OF STUDY

Chapter I is a general introduction to the study, giving its importance, its objectives, the sources of data used and a review of related studies.

Chapter II deals with the history and development, the types, and the basic operations of the stripper. Plant characteristics, cultural practices, operator skill, and other factors affecting stripper performance are also reviewed.

Chapter III considers the factors affecting the grade of cotton and the field waste from the stripper. The factors discussed that may affect the value of the cotton are varietal differences, method of harvest, vegetative growth, time of harvest, and minconaire.

Chapter IV contains costs of cotton producing and harvesting. Complete budgets were constructed and the per acre costs and returns

¹⁴D. G. Lafferty, G. R. Tupper, and B. A. Waddle, "Once-Over Harvest of Cotton with Strippers and Spindle Pickers," Arkansas Farm Research, Arkansas Agricultural Experiment Station, 12(1):11, 1963.

were determined for a cotton stripper. Extra charges that must be assigned to the stripper were briefly discussed. Ginning was considered as to location, acceptance of stripped cotton, and the method of handling the stripped cotton. The minimum number of harvested bales required to justify the ownership of the stripping machine was determined.

Chapter V contains a summary and presents conclusions drawn from the study along with suggestions for additional research.

CHAPTER II

CHARACTERISTICS OF COTTON STRIPPER

I. INTRODUCTION

A general knowledge of the development and basic operation of the cotton stripper will be presented in this chapter to aid in understanding and interpreting the results of this study. To date, most of the research information on the cotton stripper has come from the Texas and Oklahoma area. The conditions under which cotton stripping is done in these areas is not always applicable to Tennessee, however, this work can be used as an indication of the capabilities of the mechanical stripper.

II. HISTORY AND DEVELOPMENT

The cotton stripping machines were first known as cotton sleds. These were very simply constructed machines that removed the entire boll from the plant by extended teeth on each side of the plant or by pulling the cotton plant through a slot that removed the boll. The first patent to be issued on a cotton stripping machine was granted to John Hughes of New Berne, North Carolina in 1871.¹

¹James H. Street, New Revolution in the Cotton Economy (Chapel Hill: The University of North Carolina Press, 1957), p. 112.

The cotton stripper or a similar device was first used to any great extent in 1914 when Texas had an extremely large crop and prices were very low.² Some farmers harvested their crop with a picket fence pulled behind a mule team. This cotton contained so much trash that the gins refused to gin the cotton. The farmers then reverted to threshing their cotton and this helped break up some of the bolls so the gins could handle the cotton.

In 1927 implement manufacturers became interested in the cotton stripper.³ Deere and Company began to produce and promote a machine during this year. Between the time the first patent had been issued in 1871, there had been several improvements made on the first, rather simply constructed machine. The machines now had revolving rolls that extracted the cotton from the plant with much less damage to the seed cotton and also the plant.

At the start of the depression the interest in the cotton stripper subsided. This was due to plentiful labor that could be hired for very low wages. However, during this period the Texas Agricultural Experiment Station continued its work and testing of the stripper, and in 1935 developed a field bur extractor which helped clean the cotton as it was harvested.⁴

With the coming of World War II a labor shortage developed and the farmer had to depend on machines to harvest much of his cotton crop.

²Ibid., p. 112.

³Ibid., p. 113.

⁴Ibid., p. 114.

During this period many strippers were produced and sold. It was estimated there were 18,587 strippers sold in the United States from 1946 through 1953.⁵ Practically all of these machines were located in the Texas and Oklahoma area. In 1960, 86 per cent of the cotton in the Blackland area of Texas was harvested with a mechanical stripper.⁶ This figure indicates the extent strippers have and are being utilized in the Texas and Oklahoma area. The cotton stripper has begun to be used in other areas of the United States. This is due to improved stripping machines, cultural practices, cotton varieties, and other factors that have better adapted the stripper to conditions in other areas. Ginners have installed better cleaning and extracting equipment capable of doing a more efficient job of ginning and resulting in a higher quality product. Varieties are being tested and other related work done that increase the adaptability and utilization of the cotton stripper.

III. TYPES OF MECHANICAL COTTON STRIPPERS

The cotton strippers differ primarily by method of mounting and types of stripper rolls. Cotton strippers are classified largely according to the type of stripping devices which are:

⁵Ibid., p. 115.

⁶Ralph H. Rogers and C. E. Bonnen, Economics of Mechanical Cotton Stripping on Blackland Farms, Texas Agricultural Experiment Station, Bulletin No. 949, 1960, p. 3.

1. The single steel roller.
2. The double stell roller.
3. The double nylon-brush roller.
4. The double rubber-strip or paddle roller.
5. The multiple-finger or comb types.⁷

Cotton strippers are manufactured in a two-row tractor mounted model; and a two-row, self-propelled model. The stripper rolls are made of many different materials and combination of materials. In Oklahoma an experiment was conducted on stripper rolls using steel, nylon bristle, a vegetable fiber bristle known as tampacio-palmetto, and rubber.⁸ All of these materials were judged satisfactory for stripper roll use. Nylon bristle rolls are the most prevalent type used in Tennessee. The Oklahoma experiment determined that the straight-mounted material was superior to the spiral-mounted.

IV. FACTORS AFFECTING THE PERFORMANCE OF COTTON STRIPPERS

There are many factors embracing both plant characteristics and mechanical factors that affect the performance of the mechanical cotton stripper. Characteristics that will be discussed here include plant characteristics, plant population, cultural characteristics, mechanical

⁷H. P. Smith, Farm Machinery and Equipment (Fourth Edition; New York: McGraw-Hill Book Company, Inc., 1955), p. 389.

⁸D. G. Batchelder, W. E. Taylor and Jay G. Porterfield, Stripper Rolls For Cotton Harvesters, Oklahoma Experiment Station, Bulletin No. B-589, 1961, pp. 6-10.

factors such as design of the stripping unit, and conveyor system of the machine.

Plant Characteristics

According to B. G. Christidis and G. J. Harrison in their book, Cotton Growing Problems, the most suitable cotton plant characteristics should be as follows:

1. The plants should be rather short or semi-dwarf. Tall plants will not pass through the stripping rolls before they reach the rear end of the rolls, and other tall plants passing against them form a mass of vegetative material.
2. Short to medium but numerous fruiting branches (eight to ten inches long) are desirable, with short nodes. They must start well off the ground (about three to four inches off the ground) to allow the lifters of the machine to slip under the lowest branches and engage the cotton without picking up trash and dirt. Wide spreading, numerous, and long vegetative branches are not suitable because they reduce the efficiency of the stripper and cause excessive field losses.
3. Bolls should be large, strong, and borne singly (not in clusters) on a peduncle which will snap easily under tension, but will stand considerable agitation. The locks need not be fluffy.
4. Storm resistance is essential since all or most of the bolls on the plant must be mature before the stripper enters the field.
5. A dense foliage which shades the bolls and delays their opening is undesirable. However, this point may be without much practical importance where successful defoliation is practiced, or leaf shedding occurs naturally as a result of weather conditions or of the genetic constitution of the plant. Hairy foliage is also objectionable.
6. Maturity should take place early and in a comparatively short time.⁹

⁹B. G. Christidis and G. J. Harrison, Cotton Growing Problems (New York: McGraw-Hill Book Company, Inc., 1955), pp. 592-593.

Developments in the engineering aspects of the cotton stripper have helped make the machines more efficient. Through the development of longer stripper rolls, improved green boll extractors, and other improvements, the strippers have become more adapted to use in areas other than Texas and Oklahoma.

Plant Population

The cotton plant population is an important factor affecting the performance of the stripper. Plants that are closely spaced in the row are smaller in diameter, have shorter limbs borne higher off the ground, and are not as tall as plants that are thinly spaced in the rows. A plant population of 30,000 to 40,000 per acre retards growth sufficiently and allows the stripper to do its most efficient job.¹⁰

Cultural Characteristics

To obtain the highest efficiency with mechanical strippers, it is necessary to adopt cultural methods that will improve the performance of the machine. The last cultivation should be made so the soil is two to three inches higher around the base of the plant than in the middle of the rows. This allows the leaves and trash to drift into the middle of the rows. Every effort should be made to keep the field free of weeds, grass, and vines.

¹⁰Smith, op. cit., pp. 389-390.

Chemicals of two types are used to prepare the cotton for harvest, defoliants and dessicants. Defoliants are generally used in Tennessee and dessicants are applied depending on the time of frost. If the frost is severe enough to cause the plant to become "brittle" then generally the dessicant is not applied.

Defoliants cause the plants to shed their leaves, but do not kill the plants. The defoliant should be applied when 33 to 50 per cent of the bolls are open and most unopened bolls are at least thirty days old.¹¹ A slightly higher percentage of bolls should be open before defoliation when cotton is to be stripped.

Dessicants kill the leaves and small stems and usually stop the growth of the plant. Dessicants are not recommended until all the bolls are mature and at least 80 to 90 per cent of the bolls are open.

Most farmers in Tennessee follow the practice of defoliating, wait five to seven days and apply dessicant, then wait five to seven days and start harvesting operations.

Design of Stripping Unit

"The design and type of stripping unit are the most important mechanical factor influencing the performance of a cotton stripper."¹²

When a single roll is used on one side of the plant and a stationary bar on the opposite side, the cotton must be transferred to a single

¹¹J. R. Overton, "Cotton Defoliation," Tennessee Farm and Home Science, 34:5, April, 1960.

¹²Smith, op. cit., p. 389.

conveyor adjacent to the roll. The bar can be adjusted to provide the proper spacing between the roll and bar for the size of plant being harvested.

When double steel rollers are used, a conveyor is located on each side of the plant. One of the stripping rolls is usually not stationary and can be adjusted to operate with a space between the rollers ranging from about $\frac{3}{8}$ to $\frac{3}{4}$ inch, can be adjusted to give a maximum space of more than one inch.¹³

The stripping rolls that are constructed of rows of bristles or strips of rubber are generally held rigid. There are, however, adjustments on the machine to alter the space between the rollers.

Generally, cotton-stripper rollers are mounted at an angle of approximately thirty degrees.¹⁴ The roller should be long enough so the rear end is at least thirty to thirty-six inches above the ground. Today, most stripper rolls are approximately forty inches long on the tractor-mounted machines and approximately fifty-six inches long on the self-propelled models. This aids in preventing the taller plants from bunching up around the top of the stripping unit. The surface speed of the steel roller should be 20 to 50 per cent faster than the ground speed of the tractor. The brush and rubber paddle stripper rolls are generally

¹³Ibid., p. 395.

¹⁴Ibid., p. 396.

operated faster than the steel roll type and their speed may range from 400 to 800 revolutions per minute.¹⁵

Conveying System

"There are three methods of conveying the cotton away from the stripping unit. These are: (1) finger-beater rolls, (2) augers, and (3) air flow."¹⁶

The finger-beater rolls are used with the single roll, the double roll, and the finger-type stripper. They are not suitable for use with the brush and rubber-paddle rolls because the beater throws the cotton against the outside of the roller and the locks are thrown onto the ground. The finger-beaters, beat a high percentage of the dirt and trash out of the cotton.¹⁷

The auger type of conveyor is used on roller-type strippers. A tapered auger ranging from a diameter of about four inches at the front to about eight inches at the rear is used on some machines, while on others the conveyor auger is of uniform size from front to rear.¹⁸

Air flow is a fast method of getting the cotton away from the stripping rolls, but it also carries a lot of dirt and trash with the cotton. The air may be beneficial in eliminating some of the green bolls because they will drop onto the ground or in the front of the cotton trailer.

¹⁵Ibid., p. 396.

¹⁷Ibid., p. 396.

¹⁶Ibid., p. 396.

¹⁸Ibid., p. 397.

V. GENERAL CONSIDERATIONS

The operators skill will have some effect on the performance of the cotton stripper. The stripper may be operated at a faster speed than a picker, and the picker requires more care and maintenance than a stripper.

Extreme care should be taken to keep the fields free of weeds, grass, and vines, and other materials that will hamper the performance of the stripper. It is very important that the stripper rolls be adjusted to the proper width in order that the cotton can be harvested but not so tight that the limbs and even stalks will be incorporated into the cotton.

CHAPTER III

FACTORS AFFECTING GRADE LOSS, MICRONAIRE, AND FIELD WASTE OF COTTON MECHANICAL STRIPPED AND PICKED

I. INTRODUCTION

"The grade of cotton, as the term is most widely understood, is composed of three factors: color, leaf or foreign matter, and ginning preparation."¹ There are several factors that have a considerable effect on the efficiency of cotton-harvesting machinery. Some of the factors depend on the machine and the operator; others are concerned with the variety of cotton harvested, while a number of other factors are determined by cultural practices.² The field waste includes both the plant loss of cotton before harvest and loss during the harvesting process. These factors must be considered along with the cost and returns from the cotton enterprise to determine the most profitable method of harvest. With this information, the farmer or cotton producer should be able to properly evaluate his alternatives and choose the method of harvest that could best fit his particular need and return the greatest net revenue.

¹Harry Bates Brown and Jacob Osborn Ware, Cotton (New York: McGraw-Hill Book Company, Inc., 1958), p. 422.

²B. G. Christidis and G. J. Harrison, Cotton Growing Problems (New York: McGraw-Hill Book Company, Inc., 1955), p. 590.

II. PLOT DESCRIPTIONS

The experimental plots for this study were located on the Milan Field Station in the Brown Soil Area of West Tennessee. The plots were located on Loring and Collins soil types. Field N-15 was located on Loring soil type which occupies loessial uplands in association with Memphis, Grenada and Henry types. These soils were formed from wind-blow loess material that was deposited in West Tennessee. Field N-15 contained an area of five acres.

Field S-2 contained Collins soil type which consist of moderately well drained alluvial soils that were derived from sediment washed primarily from the Memphis, Loring, Grenada, and Henry association. The Collins series is found in association with Vicksburg, Falaya, and Waverly type. These soils occupy the bottom areas of West Tennessee. This plot contained four acres.³

Soil tests were taken from both plots on January 1, 1965. The plots on Loring soil type (Field N-15) tested very low in phosphorus and medium in potassium with a pH of 5.0. Two tons of lime per acre were applied April 16, 1965. The plots located on Collins soil type (Field S-2) tested low in phosphorus and low in potassium with a pH of 6.2.

Field operations, dates of operation, cultural practices, materials used, and rate of input application on the plots are summarized in Tables III, IV, and V.

³The description of Loring and Collins soil types were taken from, Soils of Tennessee, Description. Soil Surveys, Bureau of Plant Industry, United States Department of Agriculture.

TABLE III

FIELD OPERATIONS AND DATES OF OPERATIONS PERFORMED ON
THE COTTON ENTERPRISE, FIELD N-15, MILAN FIELD
STATION, WEST TENNESSEE, 1965-66

1965		1966	
Date of Operation	Operation	Date of Operation	Operation
Fall of 1964	Cutting stalks	Fall of 1965	Cutting stalks
April 13-14	Discing	March 23	Discing
April 14-16	Turning	March 23	Turning
April 16	Harrowing	March 23	Harrowing
April 16-17	Liming	March 29	Discing and
April 23	Applying		Harrowing
	Fertilizer	March 29	Pre-emerging
April 23	Discing	March 31	Applying
May 6	"Do-all" ^a		Fertilizer
May 6	Rolling	March 31	Discing and
			Harrowing
May 6	Planting	May 11	Discing and
May 6	Pre-emerging		Harrowing
June 7	Chopping	May 11	Planting
June 8	Spraying	June 1	Cultivating
June 22	Cultivating	June 3	Spot Chopping
June 25	Chopping	June 9	Post-emerging
June 28	Cultivating	June 15	Chopping
July 26	Chopping	July 13	Cultivating
August 24	Spraying	September 14	Spot Chopping
October 5	Defoliating	September 20	Spraying
November 5-6	Stripping	November 23	Stripping ^b

^aA "Do-all" is an apparatus that has disk harrow, a spike tooth harrow and a drag in one machine.

^bStripping was late due to rain during fall of 1966.

TABLE IV

FIELD OPERATIONS AND DATES OF OPERATIONS PERFORMED ON
THE COTTON ENTERPRISE, FIELD S-2, MILAN FIELD
STATION, WEST TENNESSEE, 1965-66

1965		1966	
Date of Operation	Operation	Date of Operation	Operation
Fall of 1964	Cutting stalks	Fall of 1965	Cutting stalks
March 23	Discing	Fall of 1965	Bedding
March 24	Turning	April 4	Applying Ferti- lizer
April 16	Fertilizing	April 4	Rebedding
April 17	Discing	May 7	"Do-all"
April 17	Harrowing	May 7	Planting
April 19	Bedding	May 7	Pre-emerging
May 3	"Do-all"	June 2	Spot Chopping
May 3	Planting	July 6	Spot Chopping
May 3	Rolling	September 6	Spot Chopping
May 3	Pre-emerging	September 14	Spraying
May 26	Cultivating	October 26	Defoliating
June 7	Spot Chopping	November 18	Stripping
June 19	Cultivating		
June 30	Post-emerging		
July 7	Chopping		
October 13	Defoliating		
November 3	Stripping		
November 15	Cutting Stalks		

TABLE V

VARIETIES, MATERIALS, AND RATE OF APPLICATION ON COTTON
 ENTERPRISE, FIELDS N-15 AND S-2, MILAN FIELD STATION,
 WEST TENNESSEE, 1965-1966

Item	Unit	1965 Crop Year			
		Field N-15		Field S-2	
		Variety and Material	Amt. per Acre	Variety and Material	Amt. per Acre
Seed	lb.	Rex Smoothleaf	25	Rex Smoothleaf	20
		Lockett 4789	25	Lockett 4789	20
Fertilizer	lb.	10-20-20	400	10-20-20	500
	lb.	30% Uran	60		
Pre-emergence	oz.	Promytrene	2		
	lb.			Karmex	1
Post-emergence	oz.	Bidrin	2		
	qt.			MSMA-Caperol	1
Insect and disease control	lb.	Captan PCNB	2.5	Captan PCNB	2
	lb.	Thimet	4	Di-Syston	4
	pt.	Thimet	.666		
Defoliation	pt.			Defoliation	1.5

Item	Unit	1966 Crop Year			
		Field N-15		Field S-2	
		Variety and Material	Amt. per Acre	Variety and Material	Amt. per Acre
Seed	lb.	Rex Smoothleaf	25	Rex Smoothleaf	30
		Lockett 4789	25	Lockett 4789	30
Fertilizer	lb.	10-20-20	400	10-20-20	400
	lb.	30% Uran	60		
Pre-emergence	lb.	Treflan	.75	Catoran	2
Post-emergence	qt.	MSMA	1		
Insect and disease control	lb.	Captan PCNB	2.5	Captan PCNB	3
	lb.	Thimet	4	Di-Syston	4
	pt.	Thimet	.666		
Defoliation	pt.			Defoliation	1.5

III. PROCEDURE FOR GRADE COMPARISON

There were three major sources of data utilized in this study for the comparison of the grades of cotton harvested by mechanical picking and stripping. The sources of data show the grade comparisons at different locations in the State and under different levels of management. Data from the Milan Field Station were collected from controlled plots that received closer attention and management than the average farmer would give their cotton crop. Data from the Ames Plantation Farm Management Units represent field conditions that more nearly typify conditions that could be achieved by the individual farmer. The units on Ames Plantation also received above average management. Grades of cotton were obtained from three farmers for the 1966 crop. These data were taken from field conditions, "Farmers I" and "Farmer II" represented average farm managers while "Farmer III" would be considered a below average manager. Farm samples were included to show what the "average" farmer could expect and also the consequence of poor management.

The grade values for this study were converted to an index which is designed to reflect differences in market value and provide a way of averaging the grade. Middling grade white is used as the base value and higher or lower index numbers indicate higher and lower values as shown below:⁴

⁴United States Department of Agriculture. Annual Cotton Quality Survey. (Washington: Government Printing Office, April, 1967), Bulletin 318, p. 104.

Grade Name	Grade Index for		
	White	Light Spotted	Spotted
Strict middling	104	102	99
Middling	100	97	93
Strict low middling plus	97		
Strict low middling	94	89	83
Low middling plus	90		
Low middling	85	80	75
Strict good ordinary	76		
Good ordinary	70		
Below grade	60		

The grade index and prices of stripped cotton were then compared with grades and prices of cotton harvested with a mechanical picker.

Hand-picking as a method of harvest was not included in this study, information of this method of harvest can be obtained from the unpublished Master's thesis of James T. Long entitled "An Economic Evaluation of Harvesting Cotton Mechanically in West Tennessee."⁵

IV. EFFECT OF VARIOUS FACTORS ON GRADE

Method of Harvest

Data from the Ames Plantation afforded the only direct comparison of the picker and stripper. In 1965, at the Ames Plantation, there was a difference of .85 index points in favor of the picker.⁶ This was not a significant difference. In 1966, there was 8.18 index points difference in favor of the picker which did constitute a significant difference.⁷

⁵James T. Long, "An Economic Evaluation of Harvesting Cotton Mechanically in West Tennessee," (unpublished Master's thesis, The University of Tennessee, Knoxville, Tennessee, 1961).

⁶The "t" value for the relationship between the grades of cotton from a mechanical picker and stripper for 1965 was calculated at .208.

⁷The "t" value for the relationship between the grade of cotton from a mechanical picker and stripper for 1966 was calculated at 8.19.

This difference would account for a \$.50 per 100 pounds or \$2.50 for a 500 pound bale in 1965. In 1966, the difference amounted to \$2.43 per 100 pounds or \$12.15 per 500 pound bale. See Table VI.

The grades of stripped cotton obtained at the Milan Field Station, Table VII, were lower in both 1965 and 1966 than at the Ames Plantation. Grades taken from "Farmer I" and "Farmer II" in 1966, located in the same county as Milan Field Station, were substantially higher than either the grades at Ames Plantation or Milan Field Station.

Varietal Differences

There were two varieties used at Milan Field Station in 1965, Rex Smoothleaf and Lockett 4789. The two varieties were replicated four to ten times depending on the width of the field with four, forty inch rows in each replication. Rex Smoothleaf is an open-bolled variety that has been recommended and grown in Tennessee for some time. Rex Smoothleaf is an early large-boll variety with a lint percentage of about 35 to 37. It is medium in yield, staple length and fair in strength and fineness. It is also resistant to fusarium wilt and one strain of bacterial wilt.⁸ Lockett 4789 is a stormproof variety of cotton that originated in Texas. The stormproof varieties have the characteristics of holding the locks of cotton moderately firm and the locks cling well together. The burs are also still and do not open completely as in the case of the open-bolled varieties. The burs assume a cuplike form and hang down which helps

⁸Charles R. Graves, 1965 Performance Trials of Field Crop Varieties, Bulletin 396, Knoxville, Tennessee: Tennessee Agricultural Experiment Station, December, 1965.

TABLE VI

GRADE COMPARISON AND AVERAGE PRICES, AMES PLANTATION
FARM MANAGEMENT UNITS, WEST TENNESSEE,
FARMERS I, II, AND III, 1965-1966

Location	Bales		Average Grade		Average Price	
	Mechan- ical	Mechan- ical	Mechan- ical	Mechan- ical	Mechan- ical	Mechan- ical
	Picked	Stripped	Picked	Stripped	Picked	Stripped
	(number)		(grade index)*		(cents per pound)	
<u>Ames Plantation 1965</u>						
Unit 1	28	--	99.11	-----	30.47	-----
Unit 4	--	61	-----	92.92	-----	28.24
Unit 5	13	33	93.69	94.09	28.62	28.61
Unit 6	42	---	93.26	-----	28.64	-----
Unit 7	29	16	95.34	94.13	28.90	28.62
Unit 8	29	39	97.72	98.46	29.82	29.70
Plot G ^a	<u>16</u>	<u>--</u>	<u>93.81</u>	<u>-----</u>	<u>28.80</u>	<u>-----</u>
Total	157	149	95.61	94.76	29.25	28.74
<u>Ames Plantation 1966</u>						
Unit 1	--	25	-----	94.04	-----	21.34
Unit 4	--	51	-----	87.24	-----	18.71
Unit 5	--	44	-----	87.43	-----	19.34
Unit 6	29	5	97.83	72.80	22.55	15.55
Unit 7	34	--	92.62	-----	21.13	-----
Unit 8	--	54	-----	78.59	-----	16.88
Plot G	<u>17</u>	<u>--</u>	<u>87.41</u>	<u>-----</u>	<u>18.19</u>	<u>-----</u>
Total	80	179	93.40	85.22	21.02	18.59
Farmer I	--	10	-----	92.70	-----	20.72
Farmer II	--	12	-----	90.50	-----	20.12
Farmer III	--	54	-----	80.65	-----	16.83

*Refer to grade index description on previous page.

^aPlot G was a field of cotton that was not included in the Farm Management Units.

TABLE VII

GRADE, STAPLE, AND MICRONAIRE READING OF COTTON HARVESTED, MILAN FIELD
STATION, WEST TENNESSEE, 1965-66

Item	1965			1966		
	Grade (designation)	Staple (in.)	Micro- naire ^a (reading)	Grade (designation)	Staple (in.)	Micro- naire (reading)
<u>Field N-15</u>						
Rex Smoothleaf	SLM Lt. Sp. Grassy	1	-	SLM	1-1/32	3.6
	LM Grassy	1	-	LM	1-1/32	3.3
	SLM Lt. Sp.	1-1/32	-	SLM	1-1/16	3.5
	Grassy					
	SLM Lt. Sp.	1-1/32	-	LM	1-1/16	3.1
	Grassy					
Lockett 4789	LM	1	-	LM	1-1/16	3.8
	SLM Lt. Sp.	1	-	LM	1-1/16	3.3
	SLM	1-1/32	-	SLM Lt. Sp.	1-1/16	3.5
	SLM	1-1/32	-	SGO Bark	1-1/16	3.6
	---	---	-	LM	1-1/32	3.7
Hybee 300						
<u>Field S-2</u>						
Rex Smoothleaf	SLM Grassy	1-1/16	-	LM Grassy	1-1/16	3.3
	LM Grassy	1	-	LM Lt. Sp.	1-1/16	3.3
				Grassy		
Lockett 4789	LM Grassy	1-1/16	-	LM Lt. Sp.	1-1/16	3.5
				Grassy		
	SLM	1-1/32	-	LM Lt. Sp.	1-1/32	3.8

32

^aMicronaire readings were not reported by Milan Field Station in 1965.

protect the locks against wind and rain damage.⁹ During 1966, Hybee 300 variety was added to the experiment. Hybee 300 is another stormproof variety that originated in Texas.

A direct comparison was made between Rex Smoothleaf and Lockett 4789 at Milan Field Station. In 1965, the grade index was 1.66 points higher for Lockett 4789. In 1966, Rex Smoothleaf graded 4.67 index points better than Lockett 4789 and 2.17 index points better than Hybee 300.

Varieties used in the Ames Plantation tests consisted of Auburn M and Rex Smoothleaf in 1965 and Lockett 4789, Rex Smoothleaf, and a small amount of Stardel in 1966. Auburn M and Rex Smoothleaf are both open-bolled varieties that have approximately the same characteristics and results when stripped. In 1966, Lockett 4789 variety was stripped and Rex Smoothleaf variety was picked on units VI, VII and Plot G and was stripped on unit IV. The Rex Smoothleaf variety graded 1.86 index points superior to Lockett 4789 for 1966. The Stardel variety which was machine picked graded 9.19 index points below the Rex Smoothleaf harvested by the by the same method and during the same time period.

Vegetative Growth of Weeds and Grass

The cotton stripper will "harvest" any weeds or grass that occur in the drill row. Cotton that contain grass was docked one grade. At the Milan Field Station 1965, 58.3 per cent of the bales contained grass

⁹Basil G. Christidis and George J. Harrison, Cotton Growing Problems (New York: McGraw-Hill Book Company, Inc., 1955), p. 63.

and in 1966, 30.7 per cent of the bales contained grass.

At the Ames Plantation in 1965 there was only one bale out of 149 bales stripped that was downgraded because of grass; however, seven bales out of 157 or 4.5 per cent of the cotton that was machine-picked in 1965 contained some grass. The proportion of grass in the 1966 crop at Ames Plantation was much greater. Of the cotton stripped, 47 per cent contained grass and another 18 per cent contained bark. The bark was not due to vegetative growth but to minute pieces of leaves, stems, and bark from the cotton plants. In 1966, 14 per cent of the cotton harvested by a mechanical picker at the Ames Plantation contained grass. The large percentage of the bales that contained grass and bark helps explain the lower average grade of the 1966 cotton crop.

Farmers II and III experienced the same problems with grass infestation. Farmer II and Farmer III had 100 per cent of their cotton grading "grassy." Farmer II harvested twelve bales and Farmer III harvested fifty-four bales. Farmer I had no bales where the grade was reduced because of grass out of ten bales harvested.

From the data indicated above, grass poses a serious problem to cotton producers. There is no practical way, at the present time, to completely exclude the grass either in the stripping or ginning process.

V. TIME OF HARVEST

In 1965, 33 per cent of the cotton at the Milan Field Station graded light spotted and 30.7 per cent in 1966 graded light spotted.

In 1965 at the Ames Plantation, 3.2 per cent of the cotton stripped and 4.5 per cent of the cotton machine-picked graded light spotted. In 1966, 33 per cent of the cotton stripped and 4 per cent of the cotton machine-picked graded light spotted.

The grade and value of cotton are affected by the length of time the cotton remains in the field. After the bolls open, the cotton fiber tends to lose its luster and natural whiteness if it is exposed to weather. The cotton at the Milan Field Station was harvested November 3rd and November 6th in 1965, and November 18th and November 23rd in 1966. The cotton at Ames Plantation was stripped between October 21st and November 29th, 1966; however, in 1965 stripping began October 12th and continued through October 30th. Machine picking usually begins around the second week of September in Tennessee.

In a study published by the Oklahoma Experiment Station in 1958, the staple length and grade did not differ significantly by method of harvest; however, there was a significant difference in grade of lint and the time of harvesting. Each 15 day delay in harvest resulted in a 20 per cent decrease in the proportion of cotton grading white. The decline in the value of the lint from September to the latter part of November amounted to three cents per pound in 1956.¹⁰

¹⁰ W. E. Cathcart and W. B. Black, Harvesting Method as Related to Yields, Quality, and Net Returns of Cotton, Oklahoma Agricultural Experiment Station, Bulletin No. B-529, 1958.

VI. MICRONAIRE

Micronaire is a measure of the fineness or coarseness of the cotton fiber. Its importance has been increasing and in 1966 the micronaire data were included with the cotton grades and staple lengths. At Milan in 1966, Rex Smoothleaf micronaired 3.35; Lockett 4789, 3.58; and Hybee 300, 3.7. The desirable range on micronaire is 3.5 to 4.9. The lower value denotes fibers of increasing fineness while 4.9 denotes the coarser fibers.

The government loan agency did not penalize the price of cotton with a micronaire value of 3.35 in 1965 or 1966; however, the Memphis market discounted the cotton of this micronaire reading fifty points to even. The other varieties (Lockett 4789 and Hybee 300) fell in the 3.5 to 4.9 range, but were on the lower or finer end of the scale. This could be explained in two ways. The Rex Smoothleaf variety has next to the lowest micronaire value of any cotton variety grown in Tennessee in 1965 with an average value of 4.15,¹¹ and the micronaire value goes down as the season progresses because more immature fibers are harvested.

VII. FIELD WASTE COMPARISON

Plot Size and Selection

The amount of cotton that is not harvested either because of plant or machine loss constitutes an important consideration in selecting a

¹¹B. D. Raskopf, Micronaire Tests for Cotton and Cotton Quality Relationships, The University of Tennessee Agricultural Experiment Station, Bulletin 410, 1966, p. 42.

harvesting method. Plots were selected from Field S-2 and N-15 and comparisons were made between the Rex Smoothleaf and Lockett 4789 varieties. Both varieties were mechanically stripped the same day. Three samples were taken from each variety on Field S-2 for pre-harvest and post-harvest loss and samples from Field N-15 were taken on pre-harvest loss. Random numbers were utilized to select plot locations in each replication.

The plots from which the samples were taken were ten feet long and two rows or 6.66 feet wide. This area was converted to an acre basis by determining the number of plots in an acre (654.054), and multiplying this number times the amount of cotton lost on the plot.

Procedure for Estimating Field Waste

Before the cotton was harvested the plots were selected as described above. The cotton was picked from the ground that had fallen from two rows. This cotton was weighed and the field loss before harvest was calculated. After stripping was completed, the cotton was again removed from the same plots so as to get only cotton that was lost by the stripping machine. This cotton was also weighed and field loss after harvest was calculated. The amount of cotton left on the plant was not measurable.

Varietal Difference

There was a difference of 85.72 pounds of seed cotton loss per acre between the Rex Smoothleaf and Lockett 4789 varieties (Table VIII).

TABLE VIII

FIELD WASTE COMPARISONS PER ACRE BEFORE HARVEST, AFTER
HARVEST AND PERCENTAGE OF COTTON CROP LOST, MILAN
FIELD STATION, WEST TENNESSEE, 1965-66^a

Variety ^b	Seed cotton average loss before harvest		Seed cotton average loss after harvest	
	Lbs.	Per cent	Lbs.	Per cent
Rex Smoothleaf	119.57	3.09	51.86	1.34
Lockett 4789	33.85	.89	44.66	1.17

^aMeasured in pounds of seed cotton.

^bThe seed cotton base used in computing per cent losses was :
3859.76 pounds of seed cotton per acre for Rex Smoothleaf and 3791.19
pounds of seed cotton per acre for Lockett 4789.

The differences in loss after harvest was only 7.2 pounds per acre.

In both cases, Rex Smoothleaf variety had the greatest loss.

The open-bolled variety, Rex Smoothleaf, lost more cotton before and during harvest than did the Stormproof variety and Lockett 4789. The pre-harvest loss was due to flaring, loosely attached characteristics of the open-bolled variety. Long found that the field waste of a mechanical picker was approximately 10 per cent.¹²

¹²James T. Long, D. G. Paris, and R. J. Goddard, "Grade Loss and Field Waste of Machine-Harvested Cotton at Ames Plantation," Tennessee Farm and Home Science, 39:7, July-September, 1961.

CHAPTER IV

COST OF MECHANICALLY HARVESTED COTTON IN TENNESSEE

I. INTRODUCTION

In this study enterprise budgeting was the technique chosen to compare the cost and returns of cotton when harvested by a stripper versus a cotton picker. With the use of budgets, relevant input costs and returns can be assembled to aid the farm manager in selecting the most profitable alternatives for his farm organization.

II. BUDGETS

Budgets on the cost and returns of cotton were computed on the basis of per planted acre. The test plots at the Milan Field Station were located on two different soil types and field operations were different for each field (Field N-15 and S-2), then input-output budgets were computed for both fields. Budgets were also computed for Rex Smoothleaf and Lockett 4789 varieties on each soil type. Equipment charges were computed using 50 acre and 150 acre cotton allotments.

Data Sources

Yield data were taken from plots located at the Milan Field Station. Rates of application of material inputs and field operations were taken from actual treatment of the plots. The prices for cotton-seed for 1965 and 1966 and the prices of lint for 1966 were taken from

the Spot Cotton Quotation Report.¹ The price of inputs and equipment costs that went into cotton production were taken from data obtained from the study "An Economic Appraisal of the Effects of Emerging Technology on the Cost of Producing Upland Cotton," conducted by Glenn H. Glover.²

The hourly labor requirements for given field operations were obtained from "Farm Planning Manuals, A Guide for Increased Income,"³ and other supplementary data from "Production Requirements, Estimated Costs and Returns from Selected Crop and Livestock Enterprises in Tennessee."⁴

The costs of field operations were influenced by the number of operations performed on the test plots. In many cases field conditions would not require as many operations. In calculating a budget for a specific producer, the farmer should use only field operations performed on his cotton crop.

¹Consumer and Marketing Service, Spot Cotton Quotation Report (November, 1965 and 1966), The United States Department of Agriculture, Washington, D. C.

²Glenn H. Glover, Agricultural Economics, United States Department of Agriculture, Unpublished Budgets of Fixed and Operating Costs for Equipment Items Used in Cotton Production, The University of Tennessee, Knoxville, Tennessee, 1965.

³Estel H. Hudson and Robert M. Ray, "Farm Planning Manual, A Guide for Increased Income," Knoxville, Tennessee: The University of Tennessee Agricultural Extension Service, June, 1966.

⁴Luther H. Keller and Curtis F. Lard, "Production Requirements Estimated Costs and Returns from Selected Crops and Livestock Enterprises in Tennessee," Knoxville, Tennessee: The University of Tennessee Department of Agricultural Economics and Rural Sociology, November, 1965 (Mimeographed).

Revenues

The average yield of a variety for a specified plot was used in computing the returns from lint and cottonseed. The prices for lint in 1965 were reported by the local gin at Milan, Tennessee. The price of lint in 1966 was determined from the Memphis market prices. The value of cottonseed was \$45.00 per ton in 1965 and \$65.00 per ton in 1966 for the period when cotton stripping was conducted. Subsidy payments for 1966 were determined by assuming a 600 pound projected yield and multiplying this figure times 9.42 cents per pound.⁵

Expenses

The expenses per acre were determined by adding materials used, machinery, and labor costs. The amounts of inputs used on the test plots at the Milan Field Station were used in computing input costs per acre.

Equipment costs were determined by adding the depreciation, repairs, interest, insurance, taxes, housing, fuel, and lubrication costs for each type of machinery used in preparing and harvesting the cotton crop. The straight line method of computing depreciation was used. The depreciation was determined by subtracting the salvage value from the

⁵Earl A. Stennis, "An Economic Evaluation of Alternative Planting Patterns for Cotton in Tennessee," (unpublished Master's thesis, The University of Tennessee, Knoxville, Tennessee, 1967).

new cost of the item and dividing this figure by the expected life of each kind of machinery. Repairs were computed as a per cent of the new costs. The interest charge was determined by multiplying the average cost of the machinery times 6 per cent. Insurance was computed by multiplying average cost times \$3.80 per \$1,000 and taxes by multiplying \$3.25 per \$1,000 times average cost. Housing charges were determined by assigning a square foot requirement for each machine, and a charge of ten cents per square foot was levied. Fuel and lubrication charges were computed from estimated requirements for the size of machine being considered. Proper allowances were made in the costs for the 50 acre and 150 acre cotton allotments. Labor charges were computed at \$1.25 per hour.

Returns Above Specified Costs

The returns above specified costs are the returns to capital, management, and land. In this study no breakdown was made for the three factors; however, certain portions of the net income could be allocated to each factor.

The net revenue per acre for cotton that was mechanically stripped at the Milan Field Station in 1965 ranged from a low of \$135.16 per acre to a high of \$158.77 (Table IX). The average net revenue for the Rex Smoothleaf variety was \$152.62 and \$141.16 for Lockett 4789 variety. In 1966, the net revenue ranged from \$134.74 per acre for Rex Smoothleaf to \$165.78 for Lockett 4789 (Table X). The net revenues from Rex Smoothleaf and Lockett 4789 in 1966 were \$157.66 and \$145.09 per acre,

TABLE IX

GROSS INCOME, TOTAL EXPENSES, NET REVENUE, AND COST PER POUND
OF LINT, PER ACRE OF COTTON MECHANICALLY STRIPPED, FIELD
N-15 AND S-2, MILAN FIELD STATION, WEST
TENNESSEE, 1965^a

Item	Field N-15			
	Rex Smoothleaf		Lockett 4789	
	50 Acre	150 Acre	50 Acre	150 Acre
Lint yield ^b	945	945	866	866
Gross income	\$281.27	\$281.27	\$268.41	\$268.41
Total expenses	133.25	122.50	133.25	122.50
Net revenue	148.02	158.77	135.16	145.91
Cost per pound of lint	.1410	.1269	.1538	.1414

	Field S-2			
	Rex Smoothleaf		Lockett 4789	
	50 Acre	150 Acre	50 Acre	150 Acre
Lint yield	928	928	853	853
Gross income	\$282.64	\$282.64	\$272.58	\$272.58
Total expenses	133.34	128.25	133.34	128.25
Net revenue	149.30	154.39	139.24	144.33
Cost per pound of lint	.1436	.1382	.1563	.1503

^aGross income includes Government price support and diversion payments.

^bPounds of lint per acre.

TABLE X

GROSS INCOME, TOTAL EXPENSES, AND COST PER POUND OF LINT,
 PER ACRE OF COTTON MECHANICALLY STRIPPED, FIELDS N-15
 AND S-2, MILAN FIELD STATION, WEST TENNESSEE, 1966

Item	Field N-15			
	Rex Smoothleaf		Lockett 4789	
	50 Acre	150 Acre	50 Acre	150 Acre
Lint yield ^a	899	899	907	907
Gross income	\$284.90	\$284.90	\$265.37	\$265.37
Total expenses	130.63	119.12	130.63	119.12
Net revenue	154.27	165.78	134.74	146.25
Cost per pound of lint	.1453	.1312	.1440	.1313

Item	Field S-2			
	Rex Smoothleaf		Lockett 4789	
	50 Acre	150 Acre	50 Acre	150 Acre
Lint yield	896	896	891	891
Gross income	\$267.30	\$267.30	\$261.69	\$261.69
Total expenses	120.79	103.23	120.79	103.23
Net revenue	146.51	164.07	140.90	158.46
Cost per pound of lint	.1348	.1152	.1355	.1158

^aPounds of lint per acre.

Smoothleaf and Lockett 4789 in 1966 were \$157.66 and \$145.09 per acre, respectively. There was no significant difference ("t" value 1.10) in the net revenue from Fields N-15 and S-2. The soil types of both fields were very similar and expected to yield approximately the same amount of seed cotton. In 1966, the U. S. support payment for upland cotton was paid directly to the farmer and was computed in this study at \$56.52 per acre. A complete itemized account of expenses and revenues is included in Appendix A.

Cost Per Pound of Lint

The cost per unit of lint was computed by obtaining the total cost of all inputs and dividing this figure by the pounds of lint produced per acre. The cost per unit varies with changes in the equipment costs as affected by the size of allotment, number and type of field operations, material inputs used, and the lint yield. Reduced equipment costs as affected by the size cotton allotment appears to be the factor having the greatest bearing on the production cost per unit of lint in this study (Tables IX and X, pages 44, 45). The average production cost per pound of lint in 1965 at the Milan Field Station for the 50 acre cotton allotment was \$.1487 per pound of lint and \$.1392 per pound of lint for the 150 acre cotton allotment. In 1966, the cost per pound of lint was \$.1399 for the 50 acre allotment and \$.1237 per pound for the 150 acre allotment.

Budget Qualifications

A tractor of at least 60 horsepower is required to operate a two-row stripping unit. This increased the tractor charges for the small (50 acre) cotton allotment because operating and fixed costs were increased. The inventory of equipment used in this study was greater than that carried on most small farms; however, the total cost was only slightly affected by this factor. The amount of weeding on the test plots at the Milan Field Station was high in relation to most commercial cotton farms. Weeding would probably not affect the yield to any great degree. Mechanically delinted seed were planted at the Milan Field Station. The gins in most areas of West Tennessee furnish cotton trailers to haul the cotton. On this basis the hauling charge was assessed at \$1.00 per bale. Ginning charges were \$15.00 per bale in 1965 and \$20.00 per bale in 1966 for mechanically picked cotton. An additional ginning charge of \$2.00 per bale was assumed for the stripped cotton.

III. ADDITIONAL CHARGES FOR MECHANICAL STRIPPING

There are some factors that appear to lower the value of cotton harvested by a stripping machine. Some of these factors are in the process of being eliminated by better equipment and cultural practices. While others, due to Tennessee climatic conditions, will continue to be a hindrance to stripper harvesting.

Grade Loss

The grade of cotton is usually reduced when cotton is harvested with a stripper. The loss in grade can often be traced to factors other than the stripping machine. For example, a large number of the bales contained grass which lowers the cotton of one grade. In this instance, if the field was free of grass, this grade reduction could have been avoided. Other factors have similar effects. When the stripper is to be used, the cotton crop should be planned and produced to allow maximum efficiency of the stripping machine.

Field Waste

The field waste from hand picked and mechanically picked cotton both averaged about 10 per cent.⁶ The stripper field waste is much less, 3.09 per cent before harvest and 1.34 per cent at harvest time for Rex Smoothleaf; .89 per cent before harvest and 1.17 per cent at harvest time for Lockett 4789, as shown and discussed in Chapter III. The combined loss of 171.43 pounds of Rex Smoothleaf and 78.51 pounds of Lockett represent a small loss compared to the mechanical picker. This lower loss will increase gross returns to the cotton harvested by a stripper. The field loss differences in stormproof and open-bolled varieties also influence gross returns and must be considered.

⁶James T. Long, op. cit.

Ginning Charges

Four gin operators were interviewed to ascertain their opinions and views concerning the cotton stripper. Farmer III in this study had difficulty in getting cotton ginned. One gin refused to gin his cotton because of improper harvest, and another gin ginned the stripped cotton only because Farmer III also owns and operates a cotton picker. The gin had to gin the cotton from both harvest methods or not gin either. In all other cases studied the ginners gave no particular objections to stripped cotton except that it required longer to gin a bale because more seed cotton was required. In 1966, none of the ginners were charging more than the "standard" rate to gin stripped cotton. All ginners indicated that the cost of ginning to the farmer would probably have to be increased if large volumes of cotton were stripped. Only in the case of Farmer III was stripped cotton held back and ginned following other methods of harvested cotton. In this case, the cotton was the last ginned during the day. This could have involved a considerable period of time before the cotton was ginned which could cause some spotting of the cotton in the field because of adverse weather conditions. This would depend primarily on the amount of green and foreign matter in the cotton. Of the six farmers that had done some stripping in the past, all except one farmer sold his cotton to the ginner. One farmer's cotton was placed directly in the Government loan. In general, the gins that ginned stripped cotton were somewhat better equipped with newer equipment and some had stick and green leaf machines. Of the farmers

interviewed, the distance that the stripped cotton was hauled to the gin was greater than would otherwise be necessary. The number and nature of the observations were such that a meaningful difference could not be determined between the picker and stripper. There has not been enough cotton harvested by stripping in Tennessee as of this date (less than 0.5%) to cause any measureable interest or impact on the ginning industry of the State. Further study and analysis in this area is needed before definite conclusions may be made.

Field Loss

The loss in cotton grade and low micronaire caused by late harvest dates constitutes the most objectionable features of cotton stripping in Tennessee. The effect upon grade and micronaire of the cotton on Ames Plantation in 1966 illustrates the effect of late harvest and adverse weather conditions. Farmers are aware of climatic conditions in Tennessee. Therefore, they are unwilling to risk a complete failure or major quality reduction in their cotton crop because of postponing harvest which would be necessary if they used the stripper harvesting method.

IV. HARVESTING COST AND ACREAGE REQUIREMENTS PER MACHINE

The cost of harvesting a bale of cotton and the minimum acreage needed to economically justify the ownership of a mechanical cotton harvester help determine the cotton producer's method of harvest. The normal custom charge for mechanical cotton picking in Tennessee in 1966

was \$2.20 per 100 pounds of seed cotton. Cotton in Tennessee in 1966 was harvested by hand-picking, hand-snapping, machine-picking, and machine-stripping. In 1966 72 per cent of the cotton in Tennessee was harvested by a mechanical picker.

The cost of harvesting cotton were computed for a 50 acre, 100 acre, and 150 acre cotton allotments and yield levels of 500 pounds, 750 pounds, and 1000 pounds of lint per acre (Tables XI, XII, and XIII). Costs were computed for a one-row tractor-mounted picker, a two-row tractor-mounted picker, a two-row self-propelled picker, and a two-row tractor-mounted stripper. The costs per bale ranged from a high of \$73.43 for a two-row self-propelled picker on a 50 acre allotment to a low of \$6.18 per bale for the two-row tractor-mounted stripper on the 150 acre cotton allotment at the 1000 pound lint yield per acre.

To determine the minimum number of acres necessary to economically justify the ownership of a mechanical harvester, it was assumed that a cotton producer would own a machine when his costs per 100 pounds of seed cotton harvested less than the custom charges. Under this assumption the custom charge of harvesting a 500 pound bale of lint cotton would be \$31.82. At the 500 pound lint yield level, this would necessitate harvesting 50.18 bales of cotton to justify the ownership of a one-row tractor-mounted picker, 73.48 bales for a two-row tractor-mounted picker, 123.68 bales for a two-row self-propelled picker, and only 17.36 bales for a two-row tractor-mounted stripper. In order to determine the minimum acreage required to own a particular machine, the required

TABLE XI

COSTS PER ACRE OF HARVESTING COTTON USING A 2-ROW MECHANICAL
STRIPPER, 1-ROW MOUNTED PICKER, 2-ROW MOUNTED PICKER,
2-ROW SELF PROPELLED PICKER, 50 ACRE COTTON
ALLOTMENT, 7-YEAR DEPRECIATION SCHEDULE,
YIELD PER ACRE, AND HARVEST COST
PER BALE

Acreage	500 Pounds of lint per acre			
	Stripper	1-Row mounted picker	2-Row mounted picker	2-Row Self propelled picker
<u>Costs based on 50 acre allotment</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.00	2.50	1.25	1.25
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.20	8.82	14.00	25.20
(6) Depreciation	7.50	14.40	22.86	41.14
Total harvest cost	\$16.99	\$31.90	\$43.95	\$73.43
(7) Harvest cost per bale	\$16.99	\$31.90	\$43.95	\$73.43
<u>750 Pounds of lint per acre</u>				
(1) Pre harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.30	2.80	1.55	1.55
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.20	8.82	14.00	25.20
(6) Depreciation	7.50	14.40	22.86	41.14
Total harvest cost	\$17.29	\$32.20	\$44.25	\$73.73
(7) Harvest cost per bale	\$11.53	\$21.47	\$29.50	\$49.15
<u>1000 Pounds of lint per acre</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.50	3.00	1.75	1.75
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.20	8.82	14.00	25.20
(6) Depreciation	7.50	14.40	22.86	41.14
Total harvest cost	\$17.49	\$32.40	\$44.45	\$73.93
(7) Harvest cost per bale	\$ 8.75	\$16.20	\$22.23	\$36.97

TABLE XII

COST PER ACRE OF HARVESTING COTTON USING A 2-ROW MECHANICAL STRIPPER,
1-ROW MOUNTED PICKER, 2-ROW MOUNTED PICKER, 2-ROW SELF PROPELLED
PICKER, 100 ACRE COTTON ALLOTMENT, 7-YEAR DEPRECIATION
SCHEDULE, YIELD PER ACRE, AND HARVEST COST PER BALE

Acreage	500 Pounds of lint per acre			
	Stripper	1-Row mounted picker	2-Row mounted picker	2-Row Self propelled picker
<u>Costs based on 100 acre allotment</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.00	2.50	1.25	1.25
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.10	4.41	7.00	12.60
(6) Depreciation	3.75	7.34	11.43	20.57
Total harvest cost	\$13.14	\$20.43	\$25.52	\$40.26
(7) Harvest cost per bale	\$13.14	\$20.43	\$25.52	\$40.26
<u>750 Pounds of lint per acre</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.30	2.80	1.55	1.55
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.10	4.41	7.00	12.60
(6) Depreciation	3.75	7.34	11.43	20.57
Total harvest cost	\$13.44	\$20.73	\$25.82	\$40.56
(7) Harvest cost per bale	\$ 8.96	\$13.82	\$17.21	\$27.04
<u>1000 Pounds of lint per acre</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.50	3.00	1.75	1.75
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.10	4.41	7.00	12.66
(6) Depreciation	3.75	7.34	11.43	20.57
Total harvest cost	\$13.64	\$20.93	\$26.02	\$40.76
(7) Harvest cost per bale	\$ 6.82	\$10.47	\$13.01	\$20.38

TABLE XIII

COSTS PER ACRE OF HARVESTING COTTON USING A 2-ROW MECHANICAL STRIPPER,
1-ROW MOUNTED PICKER, 2-ROW MOUNTED PICKER, 2-ROW SELF PROPELLED
PICKER, 150 ACRE COTTON ALLOTMENT, 7-YEAR DEPRECIATION
SCHEDULE, YIELD PER ACRE, AND HARVEST COST PER BALE

Acreage	500 Pounds of lint per acre			
	Stripper	1-Row mounted picker	2-Row mounted picker	2-Row Self propelled picker
<u>Cost based on 150 acre allotment</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.00	2.50	1.25	1.25
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.07	2.94	4.67	8.40
(6) Depreciation	<u>2.50</u>	<u>4.80</u>	<u>7.62</u>	<u>13.71</u>
Total harvest cost	\$11.86	\$16.42	\$19.38	\$29.20
(7) Harvest cost per bale	\$11.86	\$16.42	\$19.38	\$29.20
<u>750 Pounds of lint per acre</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.30	2.80	1.55	1.55
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.07	2.94	4.67	8.40
(6) Depreciation	<u>2.50</u>	<u>14.80</u>	<u>7.62</u>	<u>13.71</u>
Total harvest cost	\$12.16	\$16.72	\$19.68	\$29.50
(7) Harvest cost per bale	\$ 8.11	\$11.14	\$13.12	\$19.67
<u>1000 Pounds of lint per acre</u>				
(1) Pre-harvest chemicals	\$ 3.55	\$ 1.80	\$ 1.80	\$ 1.80
(2) Application of chemicals	4.40	3.56	3.56	3.56
(3) Labor	1.50	3.00	1.75	1.75
(4) Fuel and oil	.34	.82	.48	.48
(5) Repairs	.07	2.94	4.67	8.40
(6) Depreciation	<u>2.50</u>	<u>4.80</u>	<u>7.62</u>	<u>13.71</u>
Total harvest cost	\$12.36	\$16.92	\$19.88	\$29.70
(7) Harvest cost per bale	\$ 6.18	\$ 8.47	\$ 9.94	\$14.85

number of bales should be divided by the lint yield per acre. For example, the two-row tractor-mounted picker would require 73.48 acres at the 500 pound lint level, 48.99 acre at the 750 pound lint yield, and only 36.74 at the 1000 pound lint level.

CHAPTER V

SUMMARY AND CONCLUSIONS

There were 2575 mechanical cotton pickers and 7 mechanical cotton strippers in Tennessee in 1966. These machines harvested a total of 365,000 acres of cotton. Mechanical pickers harvested 72 per cent of the 1966 crop and mechanical strippers harvested less than 0.5 per cent of the crop.

The cost of harvesting, per 500 pound bale, by a two-row, self-propelled, mechanical picker was \$73.43 when based upon a 50 acre allotment and a 500 pound lint yield per acre. This cost decreased with the tractor-mounted, two-row and one-row pickers. The lowest cost was \$6.18 per bale with a two-row tractor-mounted stripper on the 150 acre cotton allotment and a 1000 lint yield level. The minimum number of harvested bales needed to economically justify the ownership of mechanical harvesters were as follows: (1) 50.18 bales for a one-row tractor-mounted picker, (2) 73.48 bales for a two-row tractor-mounted picker, (3) 123.68 for a two-row self-propelled picker, and (4) 17.36 bales for a two-row tractor-mounted stripper. This can be converted to an acre basis by dividing the yield per acre into the number of bales.

The grade of cotton is the major factor that determines the price of the lint. Color, leaf, and ginning preparation are the major factors on which grade is based. At the Ames Plantation in 1965 the grade

difference for harvested was only .85 index points greater for the picker than for the stripper which did not constitute a significant difference. However, in 1966 the grade difference was 8.18 index points higher in favor of the picker. This was due primarily to the adverse weather conditions that delayed both planting and harvesting. In 1965, the increased net revenue for picked over stripped cotton was \$2.50 per bale. These differences are offset by the greater amount of cotton loss before and during harvest by the picker and the greater harvesting cost per bale of the mechanically picked cotton.

The field waste of a mechanical picker ranges from 8 to 10 per cent while the loss from a stripper is about 1 to 3 per cent. This would constitute a difference of about 7 per cent more seed cotton harvested by the stripper. In 1966, based on the results from the Milan Field Station, the stripper would harvest \$11.55 per acre more lint. This does not include a subsidy payment.

The amount of field loss was determined for Rex Smoothleaf and Lockett 4789 varieties in 1966. There were 85.72 pounds more seed cotton loss from Rex Smoothleaf before harvest and 7.20 pounds greater loss at harvest time than for Lockett. This would involve a total loss of 20.89 pounds of lint or \$3.82 per acre greater loss for Rex Smoothleaf.

Of the ginners interviewed, no one was charging a greater rate for ginning stripped cotton over picked cotton. More seed cotton is required to make a 500 pound bale of stripped cotton, and this causes the total cost of ginning a bale of stripped cotton to be more. All

ginners indicated that a greater rate would be charged if substantially more stripped cotton were harvested in the state. At the Ames Plantation in 1965 and 1966 an additional charge of \$2.00 per bale was levied on cotton harvested by the stripper. As of this date, there has not been enough cotton mechanically stripped in Tennessee to cause any impact on the ginning industry.

In this study the costs per acre for producing cotton up to harvest was the same for the stripper and the picker. The cotton picked received a defoliation, but the cotton stripped received both a defoliation and a dessication. The cost per bale of harvesting on the 50 acre allotment and at the 750 pound lint yield per farm was \$11.53 for the two-row tractor mounted stripper, \$21.47 for the one-row tractor-mounted picker, \$29.50 for the two-row tractor-mounted picker, and \$49.15 for the two-row self-propelled picker. The cost per bale was lowered by the increased yields per acre, and the harvest costs were reduced by the number of acres harvested.

II. IMPLICATIONS FOR THE STUDY

The results of this study should be of value to the cotton producer in the selection of his harvesting method. The area of harvesting affords the farmer of Tennessee one of his greatest opportunities for lowering costs of cotton production.

There are several areas in cotton production that need further research and study. Up to the present time, very little work has been

on a cotton variety suitable for cotton stripping. or a variety that will return a yield equivalent to varieties. This variety should possess the stormproof and mature in a short period of time. The availability would probably increase the utilization of the in Tennessee.

ssary to control grass and other vegetation in the timum grades are to be obtained. When harvesting is cal stripper, foreign matter will lower the quality cotton and often cause spotting if allowed to remain periods of time before ginning.

ll likely oppose stripped cotton more vigorously than any other cotton related industry from the farmers standpoint. Extra time is required to gin a bale of stripped cotton because of the additional foreign matter that must be removed. Stick and green leaf machines, bur machines, and other equipment would need to be installed in most gins to secure better ginning preparation.

Management is a very important factor in cotton growing and cotton stripper harvesting. As indicated in this study, below average management causes serious reductions in returns to the cotton enterprise. With above average management, proper preparation of crop for stripping, and a good job of harvesting, the farmer can receive returns and quality very near or comparable to mechanically picked cotton. More research could be done on varieties, plant characteristics, vegetative growth, and the ginning process.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Batchelder, D. G., W. E. Taylor, and Jay G. Porterfield. Stripper Rolls for Cotton Harvesters, Oklahoma Experiment Bulletin B-589, 1961.
- Brown, Harry Bates and Jacob Osborne Ware. Cotton. New York: McGraw-Hill Book Company, Incorporated, 1958.
- Cardozier, V. R. Growing Cotton. New York: McGraw-Hill Book Company, Incorporated, 1957.
- Cathcart, W. E. and W. B. Black. Harvesting Method as Related to Yields, Quality, and Net Returns of Cotton. Oklahoma Experiment Bulletin B-529, 1958.
- Christidis, Basil G. and George J. Harrison. Cotton Growing Problems. New York: McGraw Hill Book Company, Incorporated, 1955.
- Consumer and Marketing Service. Spot Cotton Quotation Report. November 1965 and 1966.
- Graves, C. R., J. R. Overton, and R. J. Goddard. "Stripping and Spindle Picking of Four Cotton Varieties," Tennessee Farm and Home Science. 54:11, April-June, 1965.
- Hudson, Estel H. and Robert M. Ray. "Farm Planning Manual, A Guide for Increased Income," Knoxville: University of Tennessee Agricultural Extension Service, 1966.
- Keller, Luther H. and Curtis F. Lard. "Production Requirements, Estimated Costs and Returns from Selected Crops and Livestock Enterprises in Tennessee," Knoxville, Tennessee: The University of Tennessee, Department of Agricultural Economics, 1965.
- Lafferty, D. G., G. R. Tupper, and Fred Hale. "Effect on Harvest Method on Returns to Cotton Producers," Arkansas Farm Research, 14(4):11, 1965.
- Lafferty, D. G. and G. R. Tupper. "Losses During Cotton Harvest," Arkansas Farm Research. 15(1):11, 1966.
- Lafferty, D. G., G. R. Tupper, and B. A. Waddle. "Once-over Harvest of Cotton with Strippers and Spindle Pickers," Arkansas Farm Research. 12(1):11, 1963.

- _____. "Late Tally Shows Acreage Diverted in All 20 States," Cotton Growing, 10:45, April, 1966.
- Long, James T. "An Economic Evaluation of Harvesting Cotton Mechanically in West Tennessee." Unpublished Master's thesis, The University of Tennessee, Knoxville, Tennessee, 1961.
- Long, James T., D. G. Paris, and R. J. Goddard. "Grade Loss and Field Waste of Machine-Harvesting Cotton at Ames Plantation," Tennessee Farm and Home Science, 39:7, July-September, 1966.
- Overton, J. R. "Cotton Defoliation," Tennessee Farm and Home Science, 34:5, April, 1960.
- Raskopf, B. D. "Cotton Spinning Mill Capacity and Cotton Utilization," Tennessee Farm and Home Science, 53:10, January-March, 1965.
- _____. Micronaire Tests for Cotton and Cotton Quality Relationships. The University of Tennessee Experiment Bulletin 410, 1966.
- Rogers, Ralph H., and C. E. Bonnen. Economics of Mechanical Cotton Stripping on Blackland Farms. Texas Agricultural Experiment Bulletin 949, 1960.
- Smith, H. P. Farm Machinery and Equipment. Fourth Edition. New York: McGraw-Hill Book Company, Incorporated, 1955.
- _____. Soils of Tennessee, Description. Division of Soil Surveys, Bureau of Plant Industry, United States Department of Agriculture.
- Stennis, Earl A. "An Economic Evaluation of Alternative Planting Patterns for Cotton in Tennessee." Unpublished Master's thesis, The University of Tennessee, Knoxville, Tennessee, 1967.
- Street, James H. The New Revolution in the Cotton Economy. Chapel Hill: The University of North Carolina Press, 1957.
- _____. Tennessee Agricultural Statistics Annual Summary 1965. Nashville, Tennessee: Tennessee Crop Reporting Service, 1965.
- _____. Tennessee Agricultural Statistics Annual Summary 1966. Bulletin T-3. Nashville, Tennessee: Tennessee Crop Reporting Service, 1966.
- Tennessee Department of Agriculture. Agricultural Trends in Tennessee 1866-1960. Fourth Edition. Nashville, Tennessee: Crop and Livestock Statistics, 1964.

Tennessee Crop Reporting Service. "Smallest Tennessee Cotton Crop Since 1935," May, 1967.

United States Department of Agriculture, Agriculture Statistics 1966.
Washington, D. C.: Government Printing Office, 1966.

United States Department of Agriculture, Annual Quality Survey.
Washington, D. C.: Government Printing Office, 1966.

APPENDIX

TABLE XIV

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD N-15,
 REX SMOOTHLEAF AND LOCKETT 4789, 150 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1965

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Income							
Cotton Lint	Cwt.	9.45	8.66	\$25.94	\$27.17	\$245.13	\$235.29
Cotton Seed	Cwt.	16.06	14.72	2.25	2.25	36.14	33.12
Total						\$281.27	\$268.41
Expenses							
Field Machinery	Acre	1		13.83		13.83	
Seed	Lb.	25		.075		1.88	
Fertilizer							
10-20-20	Lb.	400		.037		14.80	
Uran 30 %	Lb.	60		.0345		2.07	
Weed Control							
Pre-emerge	Oz.	2		.22		.44	
Post-emerge	Oz.	2		3.40		6.80	
Weeding	Hr.	25		1.25		31.25	
Insect Control							
Captan PCNB	Lb.	.1		.73		1.83	
Thimet	Lb.	4.666		.50		1.17	
Harvesting							
Defoliation	--	--		--		--	
Stripping	Acre	1		3.93		3.93	
Ginning and							
Hauling	Bale	2		18.00		36.00	

TABLE XIV (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		6.8	1.25		<u>8.50</u>	
Total						\$122.50	
Returns above specified costs ^a						\$158.77	\$145.91
Cost per pound of lint						.1296	.1414

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XV

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD N-15,
 REX SMOOTHLEAF AND LOCKETT 4789, 50 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1965

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Income							
Cotton Lint	Cwt.	9.45	8.66	\$25.94	\$27.17	\$245.13	\$235.29
Cotton Seed	Cwt.	16.06	14.72	2.25	2.25	36.14	33.12
Total						\$281.27	\$268.41
Expenses							
Field Machinery	Acre	1		17.76		17.76	
Seed	Lb.	25		.075		1.88	
Fertilizer							
10-20-20	Lb.	400		.037		14.80	
Uran 30 %	Lb.	60		.0345		2.07	
Weed Control							
Pre-emerge	Oz.	2		.22		.44	
Post-emerge	Oz.	2		3.40		6.80	
Weeding	Hr.	25		1.25		31.25	
Insect Control							
Captan PCNB	Lb.	.1		.73		1.83	
Thimet	Lb.	4.666		.50		1.17	
Harvesting	--	--		--		--	
Defoliation							
Stripping	Acre	1		10.75		10.75	
Ginning and Hauling							
Hauling	Bale	2		18.00		36.00	

TABLE XV (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		6.8	1.25		8.50	
Total						\$133.25	
Returns above specified costs ^a						\$148.02	\$135.16
Cost per pound of lint						.1410	.1538

A = quantity, price, and total value of Rex Smoothleaf.

B = quantity, price, and total value of Lockett 4789.

^aReturns to land, capital and management.

TABLE XVI

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD S-2,
 REX SMOOTHLEAF AND LOCKETT 4789, 150 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE 1965

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
<u>Income</u>							
Cotton Lint	Cwt.	9.28	8.53	\$26.63	\$28.13	\$247.13	\$239.95
Cotton Seed	Cwt.	15.78	14.50	2.25	2.25	35.51	32.63
Total						\$282.64	\$272.58
<u>Expenses</u>							
Field Machinery	Acre	1		16.64		16.64	
Seed	Lb.	25		.075		1.88	
Fertilizer							
10-20-20	Lb.	400		.037		14.80	
Uran 30 %	Lb.	60		.0345		2.07	
Lime	Ton	2		5.50		11.00	
Weed Control							
Pre-emerge	Oz.	2		.22		.44	
Post-emerge	Oz.	2		3.40		6.80	
Weeding	Hr.	10		1.25		12.50	
Insect Control							
Captan PCNB	Lb.	2.5		.73		1.83	
Thimet	Lb.	4.666		.50		1.17	
Harvesting							
Defoliation	Pt.	1.5		1.20		1.80	
Stripping	Acre	1		11.82		11.82	
Ginning and Hauling	Bale	2		18.00		36.00	

TABLE XVI (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		7.6		1.25		9.50
Total						\$128.50	
Returns above specified costs ^a						\$154.39	\$144.33
Cost per pound of lint						.1382	.1503

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XVII

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD S-2,
 REX SMOOTHLEAF AND LOCKETT 4789, 50 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1965

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
<u>Income</u>							
Cotton Lint	Cwt.	9.28	8.53	\$26.63	\$28.13	\$247.13	\$239.95
Cotton Seed	Cwt.	15.78	14.50	2.25	2.25	35.51	32.63
Total						\$282.64	\$272.58
<u>Expenses</u>							
Field Machinery	Acre	1		22.73		22.73	
Seed	Lb.	25		.075		1.88	
Fertilizer							
10-20-20	Lb.	400		.037		14.80	
Uran 30 %	Lb.	60		.0345		2.07	
Lime	Ton	2		5.50		11.00	
Weed Control							
Pre-emerge	Oz.	2		.22		.44	
Post-emerge	Oz.	2		3.40		6.80	
Weeding	Hr.	10		1.25		12.50	
Insect Control							
Captan PCNB	Lb.	2.5		.73		1.83	
Thimet	Lb.	4.666		.50		1.17	
Harvesting							
Defoliation	Pt.	1.5		1.20		1.80	
Stripping	Acre	1		10.82		10.82	
Ginning and Hauling	Bale	2		18.00		36.00	

TABLE XVII (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		7.6	1.25			9.50
Total						\$133.34	
Returns above specified costs ^a						\$149.30	\$139.24
Cost per pound of lint						.1436	.1563

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XVIII

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD N-15,
 REX SMOOTHLEAF AND LOCKETT 4789, 150 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1966

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Receipts							
Cotton Lint	Cwt.	8.99	9.07	\$19.88	\$17.50	\$178.72	\$158.73
Cotton Seed	Cwt.	15.28	15.42	3.25	3.25	49.66	50.12
Subsidy Payment	600 lb. at 9.42 per pound					56.52	56.52
Total						\$284.90	\$265.37
Expenses							
Field Machinery	Acre	1		14.25		14.25	
Seed	Lb.	25		.09		2.25	
Fertilizer							
10-20-20	Lb.	400		.037		14.80	
Uran 30 %	Lb.	60		.0345		2.07	
Weed Control							
Pre-emerge	Lb.	.75		4.25		3.19	
Post-emerge	Qt.	1		1.59		1.59	
Weeding	Hr.	16		1.25		20.00	
Insect Control							
Captan PCNB	Lb.	2.5		.73		1.83	
Thimet	Lb.	4		.23		.92	
Harvesting	--	--		--		--	
Defoliation							
Stripping	Acre	1		3.94		3.94	
Ginning and							
Hauling	Bale	2		23.00		46.00	

TABLE XVIII (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		6.5		1.25		8.13
Total						\$119.12	
Returns above specified costs ^a						\$165.78	\$146.25
Cost per pound of lint						.1325	.1313

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XIX

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD N-15,
 REX SMOOTHLEAF AND LOCKETT 4789, 50 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1966

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Receipts							
Cotton Lint	Cwt.	8.99	9.07	\$19.88	\$17.50	\$178.72	\$158.73
Cotton Seed	Cwt.	15.28	15.42	3.25	3.25	49.66	50.12
Subsidy Payment	600 lb. at 9.42 per pound					56.52	56.52
Total						\$284.90	\$265.37
Expenses							
Field Machinery	Acre		1		18.87		18.87
Seed	Lb.		25		.09		2.25
Fertilizer							
10-20-20	Lb.		400		.037		14.80
Uran 30 %	Lb.		60		.0345		2.07
Weed Control							
Pre-emerge	Lb.		.75		4.25		3.19
Post-emerge	Qt.		1		1.59		1.59
Weeding	Hr.		16		1.25		20.00
Insect Control							
Captan PCNB	Lb.		2.5		.73		1.83
Thimet	Lb.		4.666		.46		1.07
Harvesting	--		--		--		--
Defoliation							
Stripping	Acre		1		10.83		10.83
Ginning and Hauling							
Hauling	Bale		2		23.00		46.00

TABLE XIX (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		6.5		1.25		8.13
Total							<u>\$130.63</u>
Returns above specified costs ^a						\$154.27	\$134.74
Cost per pound of lint						.1453	.1440

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XX

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD S-2,
 REX SMOOTHLEAF AND LOCKETT 4789, 150 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1966

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
<u>Receipts</u>							
Cotton Lint	Cwt.	8.96	8.91	\$18.00	\$17.50	\$161.28	\$155.93
Cotton Seed	Cwt.	15.23	15.15	3.25	3.25	49.50	49.24
Subsidy Payment	600 lb. at 9.42 per pound					51.52	51.52
Total						\$267.30	\$261.69
<u>Expenses</u>							
Field Machinery	Acre		1	7.96		7.96	
Seed	Lb.		30	.075		2.25	
Fertilizer							
10-20-20	Lb.		400	.037		14.80	
Weed Control							
Pre-emerge	Lb.		2	3.50		7.00	
Weeding	Hr.		9	1.25		11.25	
Insect Control							
Captan PCNB	Lb.		3	.73		2.19	
Disyston	Lb.		4	.23		.92	
Harvesting							
Defoliation	Pt.		1.5	1.20		1.80	
Stripping	Acre		1	4.18		4.18	
Ginning and Hauling	Bale		2	23.00		46.00	

TABLE XX (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		3.9		1.25		4.88
Total						\$103.23	
Returns above specified costs ^a						\$164.07	\$158.46
Cost per pound of lint						.1152	.1158

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.

TABLE XXI

AVERAGE GROSS INCOME, SPECIFIED COSTS AND RETURNS FOR PRODUCING ONE ACRE COTTON, FIELD S-2,
 REX SMOOTHLEAF AND LOCKETT 4789, 50 ACRE COTTON ALLOTMENT, MILAN FIELD STATION,
 MILAN, TENNESSEE, 1966

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
<u>Receipts</u>							
Cotton Lint	Cwt.	8.96	8.91	\$18.00	\$17.50	\$161.28	\$155.93
Cotton Seed	Cwt.	15.23	15.15	3.25	3.25	49.50	49.24
Subsidy Payment	600 lb. at 9.42 per pound					56.52	56.52
Total						\$267.30	\$261.69
<u>Expenses</u>							
Field Machinery	Acre	1		18.87		18.87	
Seed	Lb.	30		.075		2.25	
Fertilizer	Lb.	400		.037		14.80	
10-20-20							
Weed Control	Lb.	2		3.50		7.00	
Pre-emerge	Hr.	9		1.25		11.25	
Weeding							
Insect Control	Lb.	3		.73		2.19	
Captan PCNB	Lb.	4		.23		.92	
Disyston							
Harvesting	Pt.	1.5		1.20		1.80	
Defoliant	Acre	1		10.83		10.83	
Stripping							
Ginning and	Bale	2		23.00		46.00	
Hauling							

TABLE XXI (continued)

Item	Unit	Quantity		Price		Total Value	
		A	B	A	B	A	B
Labor	Hr.		3.9		1.25		4.88
Total						\$120.79	
Returns above specified costs ^a						\$146.51	\$140.90
Cost per pound of lint						.1348	.1355

A = quantity, price, and total value for Rex Smoothleaf.

B = quantity, price, and total value for Lockett 4789.

^aReturns to land, capital, and management.