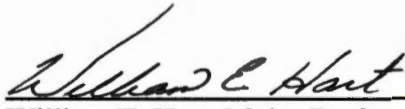
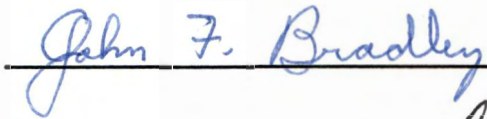


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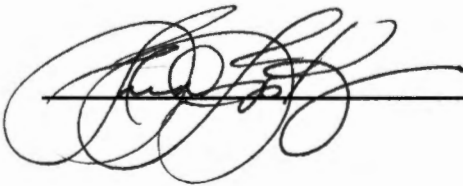
I am submitting herewith a thesis written by Tommy Everett Morgan entitled "No-Tillage and Conventional Tillage Cotton Production in 30-Inch and 40-Inch Rows: A Three-Year Study." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Engineering Technology.


William E. Hart, Major Professor

We have read this thesis
and recommend its acceptance:







Accepted for the Council:


Associate Vice Chancellor
and Dean of The Graduate School

No-Tillage and Conventional Tillage Cotton Production in 30-Inch and 40-Inch Rows:

A Three-Year Study

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Tommy Everett Morgan

August 1995

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To:

My parents

Everett and Christene Morgan

for their encouragement and ardent support.

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Abstract

Effects of tillage practices, row spacings, and application of the growth regulator PIX[®] (mepiquat chloride) on cotton lint yields were evaluated in a three year study conducted in West Tennessee. Average yield difference between no-tillage and conventionally tilled plots was 73 pounds per acre for the 1992 through 1994 season. This significant yield difference was to the advantage of no-tillage production system. Although no-tillage consistently produced higher yield, there was no recognizable year interaction. No yield advantage was found for either 30- or 40-inch row spacings. Average yield difference over the study between row spacings was 3 pounds of lint per acre. However, in any given year, effectiveness of a particular row spacing appeared to be dependent upon the nature of the growing season. Application of PIX[®] significantly resulted in positive lint yields, the average advantage of using PIX[®] was 93 pounds of lint per acre. This positive effect of PIX[®] was influenced by growing season. Further, the positive effect of PIX[®] application was more pronounced in 40-inch rows than 30-inch row spacing.

Maturity of plots was not significantly affected by row spacing on average for the three year study. Tillage, however, did have a significant effect on earliness, with no-tillage plots exhibiting greater maturity. PIX[®] treated plots also displayed a maturity advantage over untreated plots for the experiment, the magnitude of this advantage of

applying the growth regulator PIX® was dependent upon the nature of the growing season.

Plants in 30-inch row spacing measured two inches shorter than plots planted in 40-inch row spacing. Application of the growth regulator PIX® resulted in plants averaging six-inches shorter than plants not treated. Other treatments did not show significant effect on plant height.

Canopy closure was significantly affected by row spacing and application of growth regulator PIX® in the 1994 production season. Thirty-inch rows closed canopy 9.3 days earlier than 40-inch row spacing. Average time for closure in PIX® -treated plots was 81.5 days after planting, compared to 78.8 days after planting for untreated plots. No significant effect was found from tillage.

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CHAPTER 1

Introduction

Gossypium Hirsutum, better known as cotton, can be traced back to around 3500 B.C. in Mexico. Cotton fruit is a fibrous substance that is a very important part of the agriculture and textile industry of the United States (Martin et al, 1976).

Cotton is a major cash crop in West Tennessee. *Tennessee Agriculture Statistics* (1994) reports \$174.2 million dollars of cotton and cotton seed sold in 1993. Five percent of the 12,600,000 cropland acres in Tennessee is used in cotton production. Cotton producers utilize both no-tillage or conventional tillage production systems. In each of these systems, a strategy of narrow or wide row spacing is used. The producer also has the opportunity to incorporate a specific chemical application program to match the production system.

Environmental impact is among the principle concerns in cotton production. Many West Tennessee soils are considered highly erodible. Erodibility is determined by the Natural Resource Conservation Service (NRCS), which considers a field highly erodible if one-third of the field or an area totaling more than 50 acres is labeled as such. The Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA) was created to prevent continuous row cropping on highly erodible land unless the land is under some type of erosion reduction conservation system. Conservation plans for highly erodible cropland had to be fully implemented by December 31, 1994.

No-tillage production systems were developed to reduce soil erosion and increase field efficiency in cotton production. Bradley (1992) reported on a 10-year tillage study conducted on the Milan Experiment Station in West Tennessee. In the study, no

significant difference in cotton yield was found between no-tillage and conventional tillage production systems. Elimination of seed bed preparation was listed as the major advantage of no-till cotton (Bradley 1992). By eliminating primary tillage operations associated with conventional seedbed preparation, a producer reduces soil erosion which increases total land meeting NRCS approval for crop production. This increase would come from erodible land with slope limitations. Bradley (1992) also cited higher moisture holding capacity as another advantage of no-till production over conventional seedbeds.

Conventional tillage cotton production continues to be the most commonly used cropping system. Hoskinson and Howard (1993) reported on cotton grown in conventional and no-tillage systems in two West Tennessee locations. They reported that cotton produced using conventional tillage production practices had 10.6 percent higher yields than cotton grown in no-tillage. It was further noted that conventional tillage cotton also matured 11 percent earlier than cotton grown in the no-tillage production system. Advantages of conventional tillage over no-tillage were discussed by Bradley (1992) in an overview of conservation tillage. He indicated that conventional tillage producers could obtain higher plant populations, compared to no-tillage producers with the same amount of seed. Moreover, he noted fewer seedling disease problems due to the warmer ground temperature which exists in tilled soils.

McCarty et al. (1993) attributed increased acres of 30-inch cotton to the introduction of narrow-row spindle pickers. In a one-year study conducted in the Mississippi Delta, McCarty et al. (1993) showed that 30-inch rows tended to have more fruit on the lower part of the plant. Hake et al. (1992) studied square retention and

fruiting positions. They found that lower branches (three to eight) accounted for 75 percent of cotton yield. Narrow-row cotton was examined in the Texas High Plains under normal and irrigated conditions by Krieg (1992). Krieg concluded in his six-year study that narrow rows outproduced conventional rows by an average of 15 percent. In a similar five-year study conducted in South Texas by Heilman and Namken (1990), cotton grown in 30-inch row spacing yielded 14 percent higher than plants grown in 40-inch row spacings. Williford (1993) in a similar six-year test reported 30-inch cotton outyielded 40-inch cotton in three different soil types. In a Louisiana project, Boquet and Cocoet (1993) reported on the effects of row spacing with PIX® (mepiquat chloride). They found that cotton planted in 30-inch rows outyielded cotton planted in 40-inch rows by 130 lbs of lint per acre.

Conventional row spacing of 40-inches continues to be the predominant planting strategy used in cotton production. Welch et al. (1993) did a three-year feasibility study on narrow row cotton production in the Mississippi Delta. They concluded from plant mapping that there was no statistical difference in first branch fruit development between 30- and 40-inch row spacing. Moreover, boll counts were higher for cotton grown in 40-inch rows. Similar row spacing research was concluded in Arkansas by Vories et al. (1994). They reported that a higher percentage of open bolls was counted on 40-inch than 30-inch row spacing at harvest, with no significant difference found between row spacings. Heitholt et al. (1990) reported that the only yield increase for narrow row cotton was in Okra leafy type varieties, which are not commercially grown.

Cotton is an herbaceous plant. With ample moisture, cotton will allocate energy into vegetative growth rather than fruiting. Such rank vegetative growth cuts potential yield and hampers mechanical picking. A plant growth regulator by the trade name of PIX® has a tremendous effect on slowing plant growth. PIX® is one of the oldest growth regulating products on the market (Anonymous, 1992). PIX® response correlates with the vigor of the plant (Hake et al, 1990). The product consistently lessened plant leaf area, main stem growth, and plant height. This shortens the distance between fruiting sites, making a more manageable plant (Mouney and Stewart, 1986). A high area of concentration in cotton production is smaller plants with lowered fruiting branches and higher fruit retention. There is a negative correlation between the retention of the bottom five fruiting positions and plant height (Munier et al, 1993). A lower plant height results in a higher boll retention. Hoskinson and Hayes (1988), reported that the growth regulator PIX® had a significant effect on cotton yield. Weir and Kerby (1988) conducted a three-year study on row spacing with the growth regulator PIX®. They concluded in the California study that cotton grown in 30-inch rows with PIX® treatment tended to outyield conventional rows with PIX® application. Similar results were determined by Williford and Meredith (1993) in variety tests. In a Tennessee study by Gwathmey et al (1994), PIX® again tended to increase cotton yield.

Fruiting branch, plant size, earliness, and yield were monitored in a 10-state study conducted by Hickey and Dillon (1993). No significant difference between plots treated with PIX® and untreated controlled plots was determined.

Given the mixed results accrued from the several studies cited above, a three-year field experiment was initiated in 1992 to evaluate the effects of row spacing, tillage, and application of the growth regulator PIX® on the performance of cotton grown in West Tennessee. Yield performance for the various cropping years with summary results of the three-year study are reported here.

Objectives

The objective of this research was to investigate the effects of tillage practices, row spacings and growth regulator PIX® on cotton production in West Tennessee. Specific objectives were to:

1. Compare the effects of tillage practices (no-tillage and conventionally tilled seedbed preparation) on plant growth and harvest data over the three-year period.
2. Compare the effects of row spacing (30- and 40-inch) on plant growth and harvest data over the three-year period.
3. Compare the effects of growth regulator (PIX®) on plant growth and harvest data over the three-year period.

Chapter 2

Literature Review

Tillage, Row Spacing, and PIX®

Bradley (1992) reported the progress of conservational cotton production practices across the cotton belt. In a ten-year study, there were no significant differences in yield. Bradley listed several advantages of no-till cotton: (1) elimination of seedbed preparation, (2) less slope limitation, (3) reduced soil erosion, (4) broadcast application of nutrients, (5) soil is firmer at harvest, (6) moisture holding capacity is higher, and (7) less labor. The disadvantages of no-till included: (1) low stand count, (2) more intense management, (3) increased seed at planting, (4) seedling disease problems, and (5) cooler soil temperature at planting.

Matocha and Bennett (1984) studied tillage effects on cotton production in Corpus Christi, Texas. In the experiment, moldboard, chisel plow, and bedder sweeps were compared as primary tillage equipment used in seedbed preparation. Conventionally tilled plots were cultivated three to four times to control weed pressure. No-till plots received one cultivation during the growing season. Yield variations due to tillage techniques were highly variable within production year. A trend was found when yields were reduced according to the amount of soil disturbance. There was no significant difference between fiber quality and tillage.

Hart et al. (1993) conducted research on row spacing, growth regulator, and tillage effects on cotton production in West Tennessee. Tillage effects studied were on no-tillage and conventional tillage systems. There was no difference in yield between

production systems for the first year. Forty-inch rows yielded more than 30-inch row spacing by an average of 92 pounds per acre. Application of the growth regulator PIX® also had a significant effect on lint yield. Specifically plots treated with PIX® produced a 90 pound of lint per acre yield advantage. No-tillage and 40-inch row plots matured earlier than conventional tillage and 30-inch row plots. PIX® had no maturity effects on plots, although PIX® did control plant height in treatments.

Vories et al. (1994) researched the effects of row spacing on earliness and yield of cotton grown in Arkansas. In the study, cotton was planted in 30- and 38-inch row spacings. Plots were planted in a Sharky-Clay soil type and received treatments of irrigation and nonirrigation. Using the method of percentage bolls open at harvest, there was no significant difference in plant earliness between row spacings. Higher yields were recorded in treatments with 38-inch row spacing and irrigation. This study supports other research findings that there is no significant difference in 30- and 38-inch row spacings.

Anderson et al. (1994) conducted a short season study on five varieties of cotton grown in Texas. These varieties were tested in 20-inch and 38-inch row spacings. In four out of the five varieties tested, conventional row spacings produced higher yields than narrow rows. Narrow rows matured substantially earlier than conventional rows. However, the author noted that unusual amounts of rain at the end of the season could have affected yields and reversed the outcome of the data. Due to the narrow rows being ready to harvest when rains occurred, data could be tainted.

Vories et al. (1993) conducted five studies in Arkansas on 30- and 38-inch row spacing. These studies concluded that cotton grown in, 30-inch rows out yielded 38-inch rows numerically but this difference was not significant.

Williford (1993) reported on a six-year study of row spacing. In this study, cotton planted in 30-inch rows yielded more than cotton planted in 40-inch rows in three different soil types. No certain cotton variety showed a greater increase in yield, although Delta Pine Land Company varieties appeared to have higher yields than others tested in 30-inch rows. Application of a growth regulator at pin head square consistently produced higher yields compared to untreated plots. The major difference between 30-inch rows compared to 40-inch rows was the intense management with shorter critical times.

Heilman and Namken (1990) conducted research in the Lower Rio Grande Valley on cotton grown in 30- and 40-inch row spacings. Results of the six-year study indicated that narrow rows produced 15 percent higher yield averaged over six years. Thirty and 40-inch rows average 939 and 816 pounds of lint per acre, respectively. Cotton baled from 30-inch rows tended to grade higher than 40-inch rows, due to smaller amounts of trash collected during harvest. Canopy closure was 30 days earlier in the narrow rows. This allowed 30-inch spacing to receive two less cultivations than the conventional spacing. A general trend was observed in fiber length that narrow rows tended to produce longer fibers than 40-inch rows.

Valco et al. (1985) conducted row spacing field studies in the Lower Rio Grande Valley. In these studies, cultural practices, pest management, and production economics were evaluated for 30- and 40-inch rows. Their studies found that 30-inch rows had

increased yields, 12 percent higher, than 40-inch rows. In an economic evaluation, 30-inch rows had increased production costs compared to conventional row spacing. This increase was not enough to compensate for the difference in harvest. Cotton planted in narrow rows was visually estimated to mature five to seven days earlier than cotton in conventional row spacings. Quality grade was noted to be higher in 30-inch rows as well.

Williford (1984) researched the 30-inch row cropping system's effects on cotton varieties in two Mississippi soils. Irrigated and nonirrigated plots were incorporated in Beulah and Bosket soils. In 1982, 30-inch cotton produced the highest yields, but in 1983, 40-inch rows yielded the highest. The average across both years was about the same for each row spacing. Yield response to variety was not influenced by year.

Kerby et al. (1982) conducted three-year row spacing studies in California. In these studies Acala SJ-2 and SJ-5 varieties were used to evaluate yield and fiber quality. Averaged over 19 tests, 30-inch rows produced 172 pounds more seed cotton per acre than 40-inch row spacings. Maturity for both row spacings was considered to be the same.

Gwathmey et al. (1994) reported on West Tennessee 40-inch row cotton cultivars and how they reacted to PIX® application. PIX® application significantly reduced plant height in all early varieties by 18 percent. Late variety heights were reduced by 34 percent. Mainstem node numbers were reduced 0.6 and 2.4 in early and late varieties, respectively. PIX® tended to increase yield in all cultivars except one.

Boquet and Coco (1993) reported on the effects of row spacing with PIX® application on eight cotton varieties in Louisiana. The experiment was planted on silt-

loam and Sharky-Clay soil types. Thirty-inch rows yielded an average of 130 pounds of seed cotton per acre more than cotton grown in 40-inch rows. In silt loam, row spacing by cultivar interaction was significant, although there was no interaction found between the cultivations and the Sharky-Clay soils. In the other soil type, no interaction was found. Canopy size was not affected by row spacing. A higher harvest index was experienced with PIX® treatment plots. Cotton produced in 30-inch rows produced equal or similar yields with the same quantity and distribution of vegetative biomass as cotton produced in 40-inch rows. The effects of row spacing and PIX® were inconsistent. PIX® plots matured three to seven percent earlier than untreated plots.

Williford and Meredith (1993) studied row spacing, growth regulators and how they affect cotton varieties. PIX® significantly increased yield in 30-inch rows. No effect was recorded for cotton planted with 40-inch row spacings.

Eyrich (1992) evaluated narrow row cotton production in delta soils. Narrow row cotton production calls for a stringent cropping schedule. The use of PIX® as a growth regulator is essential when producing cotton in 30-inch row spacing.

Tracy and Sappenfield (1989) concluded a two-year study at the Missouri Delta Research Center on a Tiptonville fine-loamy-sand soil type. Several management practices were tested in the study. Narrow and conventional row spacing with different application rates of nitrogen mixed with and without PIX® was tested. The experiment tested overall for seed cotton yield, lint growth, plant height, physiological growth, and nitrogen content. Irrigation increased yield, which was not dependent on the treatment. PIX® increased cotton yield an average of 58 pounds of lint per acre for the two-year

study. There was no difference in row spacing yield when nitrogen was applied in split application. However, when applied at 80 pounds per acre, 38-inch rows produced more than 30-inch rows by 117 pounds of lint per acre. PIX[®] treated plots also produced a 14 percent higher concentration of nitrogen.

Hake et al. (1991) studied the effects of applying the growth regulator PIX[®]. PIX[®] suppresses cotton cell growth. Although PIX[®]-treated leaves are smaller, they are thicker due to extra layers of cells. This thickness gives treated leaves a darker green appearance compared to untreated leaves. PIX[®] suppresses future cell growth, but does not suppress developed cells. Application of 1/2 pint per acre at early bloom decreases final plant height by eight to 15 percent. Height control by PIX[®] is proportional to the rate of application. For example, plants treated at the rate of one pint per acre were 20 percent shorter than untreated plants. PIX[®] will not reduce plant height when plant height is already being reduced by stress. In several test studies, PIX[®] increased boll retention by 12 percent through the 12th node compared to untreated plots. Thus, PIX[®] showed positive results for short season cotton. Furthermore, light penetration was increased in the lower half of the plant canopy by 20 percent in treated plots. PIX[®] plants matured five to seven days earlier than untreated plants.

Hickey and Dillon (1993) conducted a ten-state study of growth regulators and their effects on early root and canopy development. Parameters studied were first fruiting branches, plant size, earliness, and yield. No significant difference was found between the PIX[®] treated plots and control plots.

Han et al. (1991) conducted a two-year study on nitrogen rates applied to cotton plots. Each plot had the growth regulator PIX® applied. Using yield results, it was determined that lint yield was not directly affected by PIX®. However, a significant interaction was discovered between PIX® and nitrogen application. The plots with the highest nitrogen rate and multiple PIX® applications tended to have the highest yield. PIX® also promoted early maturity.

Weir and Kerby (1988) conducted 20 tests on split applications of PIX® in 30-inch cotton production systems. This three-year study on plant height and lint yield was conducted in large scale field operations at San Joaquin Valley, California. Narrow rows tended to have higher yield potential than conventional row spacing. For higher yields in narrow rows, multiple applications at low rates produced the most (0.12 pint per acre at three applications). Plants ranging from 36-43 inches final height had the greatest response to multiple low PIX® applications. In rank cotton, 56-inches tall or more, one pint per acre performed best.

Weir et al. (1985) evaluated four rates of PIX® on Acala SJ-2 cotton variety in California. In five replicated tests, plots treated with PIX® were an average of five inches shorter than untreated plots. Yield advantages were found in all plots treated with PIX®. This advantage was not significant at the five percent level but a trend was noted.

Plant Physiology and Mapping

Guthrie et al. (1993) discussed the effects of row spacing on cotton production. In their discussion, cotton was compared to trees in a forest. Cotton, like all woody perennials, will take advantage of wide plant spacing. Thus, wider plant spacing will

encourage more complex branch production. Plant stand density has a direct relation to demand for sunlight. During the vegetative stage, a plant population of greater than 60,000 plants per acre tends to grow taller to capture more sunlight. But, in a study comparing plant population densities of 60,000 and 40,000 plants per acre, the high density plants cut out early or quit producing earlier than the low density population plants. The expected plant heights reversed and the lower density test was 10 percent taller. With higher plant population densities, nodes are suppressed throughout the growing season. Also, second position fruit harvest is inversely proportional to plant population densities. Higher plant population densities increase plant stress susceptibility. With lower plant population densities, a plant needs longer maturity time.

Hake et al. (1992) studied square retention and fruiting positions. They found that branches three through eight accounted for 75 percent of cotton yield. Square population on nodes nine through 15 suffered from developing boll competition and insect damage. Boll retention was usually low on nodes nine through 15 unless nodes one through eight had low fruit set. Branches 16 through 20 developed after plant growth cut out. Although these branches retained squares and bolls, weight and fiber quality of lower branches were reduced by deteriorating weather conditions.

Guthrie et al. (1994a) discussed the effective bloom period (EBP) in regions without predictable killing frosts. EBP ends the last day in which a particular bloom on a plant has ample time to become a mature boll. It was determined that for Tennessee, August 20 is the last day for the EBP. The effective squaring period can also be determined by using EBP. This is done by subtracting 20 days from the EBP. Any bolls

produced out of the EBP are considered phantom bolls and should weigh less in making harvest decisions.

Guthrie et al. (1994b) studied growth and fruiting patterns of cotton. They found that leaves and squares are produced on an eight to 10 day schedule. Second position fruit blooms eight to 10 days after first position fruit becomes a boll. First position fruit has the greatest demand for carbohydrates when 15 to 25 days old. Second position fruit survival is riskiest when the first position is in its greatest energy need. After this time period, the plant will likely maintain second position and more fruiting sites.

Kerby and Horrocks (1993) reported on cotton variety Acala SJ-2 in thirteen tests from 1982 to 1989. These tests were conducted in California and concentrated on studying node maturity as affected by fruit development. A node was considered as the number of branches past the cotyledons. To be a node, the leaf must be one inch in diameter. Number of nodes is an adequate indicator of plant age. Their findings concluded that flowering and boll retention slows node growth. They also discovered higher temperatures increase the height to node ratio (HNR) until flowering. After flowering the height slowly begins to decrease.

Heitholt et al. (1990) studied the effects of row spacing on cotton light interception and yield. A significant difference in light interception was detected in 30-inch row spacing. Narrow rows increased solar insolation interception. The only increase in yield among narrow rows was for Okra leaftypes that are usually not grown commercially.

Welch et al. (1993) reported using plant mapping to evaluate specific treatment effects on cotton production in 30- and 40-inch rows in the Mississippi Delta. Two mapping methods were used PMAP and COTMAP. The three-year study determined the feasibility of narrow row cotton. There was a small variation in plant growth characteristics and row spacing. Cotton planted in forty-inch row treatments were taller than plants in 30-inch rows. There was no difference in the first fruiting branch location. Row spacing had little effect on the number of fruiting (sympodia) or vegetative (monopodia) branches. Average number of bolls per plant was higher in treatments with 40-inch row spacing.

McCarty et al. (1993) compared fruiting on wide versus narrow row cotton in the Mississippi Delta. Introduction of narrow-row spindle pickers has increased acreages of narrow row cotton. One year analysis showed that 30-inch rows had more fruit on the lower portion of the plant. Their results also showed that narrow rows matured earlier than 40-inch cotton.

Hoskinson and Howard (1993) studied cotton grown in no-tillage and conventional tillage cropping systems in West Tennessee at the Milan and Jackson Experiment Stations. Cotton grown at the Jackson Experiment Station received irrigation. Results showed that no-tillage plants were taller at the Milan Experiment Station, while conventional tillage plots were taller at Jackson Experiment Station. A total of 35 and 48 plants were mapped at the Milan and Jackson Experiment Station, respectively. Conventional tillage had the highest yield at both stations: 13.7 percent at Jackson Experiment Station and 7.6 percent at Milan Experiment Station. The following maturity

data was taken at Milan. Conventional tillage plots matured on average 11 percent earlier than plants in no-tillage plots. In no-tillage plots, 60 percent of the seed cotton was produced by the first fruiting position, compared to 50 percent in conventional tillage. Fruiting sites one and two produced 83 percent of fruit in both tillage treatments. Boll averages were 11.2 and 10.5 bolls per plant at harvest for conventional tillage and no-tillage, respectively. No-tillage had a 1.1 percent higher gin turnout than conventional tillage. At the Jackson Experiment Station, no-tillage produced 66 percent of the seed cotton at the first position compared to 64 percent for conventional tillage. In bolls per plant at harvest, no-tillage produced 17.4 while conventional tillage produced 13.4. Conventional tillage gin turn out was two percent higher than no-tillage. Both stations average 1.52 plants per foot in no-tillage plots compared to 2.07 plants per foot conventionally tillage plots. Conventional tillage plots yielded an average of 163 pounds of lint per acre while no-tillage plots yielded an average of 89 pounds of lint per acre.

Krieg (1992) conducted research on narrow row cotton production in the Texas High Plains under nonirrigated and irrigated conditions. In his six-year study, cotton grown in 30-inch row spacing consistency yielded more than 40-inch row spacing by an average of 15 percent. Narrow row cotton produced more fruiting sites and maintained a greater percentage of its fruit compared to 40-inch row spacing. Also, a higher percentage of the fruit was produced early in the growing season.

The mixed results over the broad spectrum of researched experiments in the field of cotton production leads one to conclude that other factors may have a substantial effect on cropping systems. These factors could include such things as global position,

production season, and management decision, emphasizing that research be done by regional application.

CHAPTER 3

Field Test Methods and Procedures

Production Systems

Eight production systems were compared to evaluate yield performance of cotton grown in West Tennessee using different cultural practices. The field experiment included a comparison of no-tillage versus a modified conventional tillage system, 30-inch versus 40-inch row spacings, and treatment versus non-treatment with the plant growth regulator PIX®.

Experimental Design and Plot Layout

The experimental design consisted of a randomized complete block with split plots, wherein row spacings made up the whole plots. A two by two factorial arrangement of the various combinations of tillage treatments and application of a growth regulator made up the subplots. Experimental plots consisted of eight rows per treatment, each row 30 feet in length. The eight treatments were replicated four times. Treatments within a replication were contiguous with no border or alleyway. The two outside plot rows were considered border rows to separate adjacent plots. Replications were separated with 20-foot alleyways. Refer to Appendix A for a schematic illustrating plot layout and treatment designations.

Plot Description and Preparation

Test plots were planted in the same location throughout the study; however, minor revisions in treatment locations were made to the 1992 design to allow blocking of treatments such that variations within the plot area could be statistically identified.

Previous cropping history for the plot area included no-till soybeans in 1989 and 1990 and wheat/no-till soybeans double crop in 1991. Predominant surface soil type is a Memphis silt loam with zero to two percent slope. Fertilization, chemical applications, and field operations used for the test plots during the three-year study are summarized in Appendix B.

Tillage systems in the study included no-tillage and conventional tillage cultural practices. The no-till system consisted of planting with a no-till row-crop planter and applying pesticides in liquid form with broadcast application equipment. Conventional tillage consisted of seedbed preparation involving two passes with a pto-driven rotary tiller, followed by planting with a row-crop planter. The pto-driven rotary tiller allowed for easy maneuvering within the established plots. Seedbed preparation for the first year in the conventional tillage system consisted of two passes with a disk harrow, one pass with a cultimulcher, followed by planting with a row crop planter. Neither no-tillage plots nor plots with conventional seedbed preparation were cultivated at any time after planting. Thus, the production system which started with conventional seedbed preparation was, in fact, a modified conventional cultivation production system. Pesticides were applied with broadcast application equipment. Both systems shared the same pesticide application equipment and broadcast application equipment for soil fertility amendments.

Plot Seeding

Two John Deere 7100 row crop planters were used to plant all treatments. Planters were equipped with four row-planting units with one planter adjusted for 30-inch row spacing and the other for 40-inch row spacing. Specific adjustments (planter down

tension springs, ballast, presswheel pressure, etc.) were performed to each planter unit to allow for planting in either conventional or no-tillage plots. Planters were operated at a travel speed of approximately five miles per hour. Planting depth was maintained at approximately one inch. Delta Pine and Land Company DPL-50® acid delinted, triple treated seeds were planted at a seeding rate of 14.9 pounds seed per acre, regardless of row spacing. A preemergence herbicide and an in-furrow fungicide and insecticide were applied to the treatments.

Growth Regulator Application

Test plots receiving the growth regulator PIX® were treated twice during the 1992 and 1994 growing seasons using a 50-50 split application. Plots were treated using a total application rate of 16 ounces of formulation per acre, or 20 grams of active ingredient per acre. Growth regulator applications included a tank mixture of PIX® and water such that the application rate was 20 gallons of solution (PIX® plus water) per acre. Applications were made with a John Deere 6000 (30-inch row spacing) and an International 660 (40-inch row spacing), high clearance sprayers.

Experimental test plots utilizing the growth regulator PIX® were treated with a single application. Plots were treated with eight ounces of formulation per acre (ten grams active ingredient per acre). Application included a tank mixture of PIX® and water such that the application rate was 20 gallons of solution (PIX® plus water) per acre. Treatments were broadcast applied using John Deere 6000 (30-inch row spacing) and International 660 (40-inch row spacing) high clearance sprayers with flat fan nozzles spaced 20 inches apart.

Harvest Procedure

Prior to the actual harvest procedure, defoliant was applied to all plots. The application was made when 60 percent of bolls were visually considered open. Double harvest was used in 1992 and 1994, but was not used in 1993 due to the dry season. A John Deere 9960 four-row spindle picker was used to harvest 30-inch rows in the 1992 season. In 1993 and 1994, a Case 2055 four-row spindle picker was used to harvest the 30-inch plots. Plots planted in 40-inch rows were harvested with a John Deere 9930 four-row spindle picker. The four center rows of each plot were harvested for yield determination and gin quality analysis.

Data Acquisition

Soil Moisture

Soil moisture and temperature measurements were taken at the time of planting. Soil moisture samples were collected from one to two inches below the soil surface. Soil moisture content was determined gravimetrically and computed as a percent dry basis.

Seedling Emergence and Stand Establishment

Seedling emergence was observed for each experimental plot. After planting, plots were monitored regularly to establish the date of emergence. The date of seedling emergence was defined as the day when 80 to 90 percent of the plants present in a plot were past the plumule stage.

Stand densities were established by collecting samples from the four center rows of each experimental plot. Samples consisted of measuring 10-foot random segments

along each row and counting the number of plants present. The four samples were averaged to determine mean plant density for each treatment plot.

Plant Canopy Closure

Plot canopy was routinely monitored for each experimental plot. Daily visual observation of the plots were used to establish the time of canopy closure. Crop canopy closure was considered established when 50 percent of the plants in a given plot were either touching or overlapping plants in adjacent rows.

Plant Physiological Properties

Plant physiological measurements were added to the experiment for the 1993 and 1994 crops. Treatments were visually monitored until pin head square (all visually identifiable pre-anthesis fruit) was reached. At pin head square, two representative plants for each test plot were randomly selected and tagged such that physiological growth could be monitored throughout the growing season. A total of 64 plants were tagged within the 32 test plots. In addition to mapping fruiting sites (i.e., squares: all visually identifiable pre-anthesis fruit; nodes: refers to the branches on the main stem; aborts: either a missing or visually senescing square; bolls: range from a tranverse diamenters of less than one inch to precracking; and, open bolls: ranges from a cracked boll to a boll that is pickable with a spindle harvester), plant heights and stem diameters were also measured (Appendix C and D). A 39-inch ruler was placed where the plant stem and soil surface meet. The ruler was placed directly beside the plant, and height was measured at the terminal bud of the plant. Plant stem diameters were measured at plant stem using a dial caliper. To obtain an

accurate reading of the stalk, two measurements were taken within 180 degrees of each other. Diameters were measured directly above plant cotyledons and averaged.

Yield and Quality Determination

The four center rows for each eight-row experimental unit were harvested and weighed to determine seed cotton yields. Grab samples, weighing approximately 2.5 pounds, were collected from the second and fourth replications for each treatment. These grab samples were combined to generate approximately five-pound samples for use in determining gin turnout percentage. Samples were ginned at The University of Tennessee West Tennessee Experiment Station, Jackson. Total seed cotton from a given plot was multiplied by the gin turnout value for that treatment to estimate lint yield. Additional grab samples were collected in a similar manner for cotton quality analysis of fiber properties and cotton color grades. Lint fiber property analysis and color grading was performed at the cotton classification laboratory located at the USDA AMS Cotton Division, Memphis, Tennessee.

Plant Mapping

The method for training in cotton mapping was a group effort. John Bradley's expertise in cotton mapping was used in developing an understanding of a cotton plant. Physiological specialization of Phillip Hoskinson was utilized as instruction for several plant properties. Charles Brown and Don Gibson were helpful in training for mapping and practical data acquisition.

Numerous cotton mapping programs were examined as data acquisition systems for the project. During the 1993 production season data was recorded in the field using a

modified version of the BASF plant mapping form (Appendix C). This form was cumbersome and inefficient for data transfer. Therefore, a specific data collection sheet was devised. The format of this sheet allowed the mapper to record the date in which a square, abort, boll, or open-boll appeared on a plant. A master sheet for each plant was copied, then taken to the field. Data from the field sheets was used to update each master sheet. This process continued throughout the 1993 season.

Data was later entered onto a spread sheet for statistical analysis. During the production season, this spread sheet was updated after each mapping session. After the last mapping date the spread sheet was then transferred into a statistical analysis program. This process was timely and encountered human error.

During 1994, plant physiological data was stored in the field electronically using a PSION HC120 hand held computer. A computer program was written to input mapping data in the field (Appendix E). Data was stored in a condensed form due to the size of the data sets. A second program was written to download the data in an importable text form. This arrangement allowed the data to be taken in the field and transferred to a spread sheet or statistical analysis program electronically.

CHAPTER 4

Results

Early Season

Soil Moisture and Temperature at Planting

1992 Season: In 1992, soil moisture conditions were extremely dry for no-tillage and conventionally tilled plots. No actual soil moisture data was taken.

1993 Season. The following year, 1993, no-tillage plots averaged 20.2 and conventionally tilled plots averaged 18.9 percent moisture (Appendix F). Soil temperature for 1993 measured 72^o and 73^o F for no-tillage and conventionally tilled plots respectively (Appendix G).

1994 Season. In 1994, soil moisture averaged 12.0 percent in no-tillage and 10.8 percent in conventionally prepared seed beds (Appendix F). The soil temperature was 80^o F for both no-tillage and conventionally tilled seedbeds in the last year of the study (Appendix G).

Seedling Emergence and Stand Establishment

1992 Season. Seedling emergence in 1992 was two days earlier in the no-tillage plots than conventionally tilled plots. However, after the first rain there was no discernible difference between cultivation systems.

1993 Season. Emergence in the 1993 test was low throughout the experimental plots. Poor stand count was attributed to cooler than normal temperatures and wet environmental conditions after planting. Also prior to plant emergence, a heavy rain fell which packed soil over the germinating seedlings, and sealed the furrow impeding plant

emergence in the conventionally tilled plots. Although no-till plots did emerge earlier than conventionally tilled systems, station personnel decided to terminate the experiment and replant the plots due to low stand counts (< 2 plants/ft). No-tillage plots were treated with 1.5 pt per acre Gramoxone Extra® + Triton® AG-98 0.25% v/v PRE to terminate remaining stand. Conventionally tilled plots were retilled with a soil pulverizer (Do-all). Soil temperatures were recorded prior to second planting and averaged 79° F for both planting systems. Soil moisture was not taken for the second planting. Plots were replanted on May 21, 1993, using Delta Pine and Land Company DPL-50® acid delinted, triple treated seeds. A seeding rate of 14.9 pounds per acre was used for the replant.

Average number of days between planting and seedling emergence was recorded for all plots. No-tillage and conventionally tilled 40-inch row spacing and no-tillage 30-inch row spacing plots emerged first (approximately eight to nine days after planting). Thirty inch no-tillage plots emerged 14 -15 days after planting. The late emergence of the no-tillage 30-inch row spacing was attributed to dry weather and depth adjustment on the planter.

Stand densities were measured on June 15, 1993 (25 days after planting) (Appendix H). No-tillage and conventionally tilled plots average 4.0 and 4.3 plants per foot of row respectively (Table 1). On average, plants in 30-inch rows were in the three to four true leaf stage compared to 40-inch rows with plants in the four to five leaf stage.

Table 1. Average plant stand densities for selected tillage/cultural practice combinations for the 1993 production season.

Treatment Description	Average Plant Density (plts./ft.)
30-inch row spacing - conventional tillage	4.2
30-inch row spacing - no-tillage	4.0
40-inch row spacing - conventional tillage	4.4
40-inch row spacing - no-tillage	4.0
Conventional tillage	4.3
No-tillage	4.0

1994 Season. Plots were monitored in 1994 for emergence. On Friday, April 29, no sign of emergence was observed. However, on the next observation day, Tuesday, May 3, all plots had emerged. Unfortunately, a comparison of seedling emergence between tillage treatments was not possible. However, if there were differences among treatments regarding the time from planting to emergence these differences were clearly small, given that plots appeared similar on May 3.

Plant stand densities were measured on May 30, 1994 (34 days after planting) (Appendix H). No-tillage plots averaged 2.4 plants per foot of row and conventionally tilled plots averaged 2.2 plants per foot of row (Table 2). When stand counts were measured no-tillage plants were in the three to four true leaf stage, while plants in the conventionally tilled plots were in the two to three true leaf stage.

Table 2. Average plant stand densities for selected tillage/cultural practice combinations for the 1994 production season.

Treatment Description	Average Plant Density (plts./ft.)
30-inch row spacing - conventional tillage	2.4
30-inch row spacing - no-tillage	2.0
40-inch row spacing - conventional tillage	2.6
40-inch row spacing - no-tillage	2.3
Conventional tillage	2.2
No-tillage	2.4

Mid Season

Effects of Plant Herbicide Injury

1993 Season. In 1993, a herbicide incident was experienced on the experimental plots. Due to insect pressure, plots were sprayed on June 16, 1993, with the insecticide Bidrin®. Soon after spraying, cotton plants stand showed evidence of herbicide injury. Plants began yellowing in the bud, purpling of the nodes and wrinkling of the leaves. The source of herbicide injury was traced back to Beacon® residue in the application equipment. Prior to the application of insecticide on plots, the sprayer had been used to apply the herbicide Beacon® for control of johnsongrass in corn. The Beacon® mixture was allowed to remain in the sprayer tank for a few days before field application. Although the sprayer was rinsed several times, Beacon® residue apparently remained in the system and ultimately caused the damage. All herbicide injury viewed in the plots were symptoms found on Beacon® product label information.

Immediate change of color from dark green to light green was the first evidence of chemical injury. Seven days after spraying, injury continued to increase. Foliage in

the top 1/3 of the plant wrinkled up and then fell off. Due to the spraying scheme, highest concentration of damage was in the center of the plots. This resulted because application was made from the plot alleyways. Overlap of the sprayer boom resulted in higher application rates in the plot centers. Injured plants added no nodes for a period of two weeks. Lesser mature 30-inch plots were affected the most due to a lower number of nodes matured as compared to the more mature 40-inch plots. No new growth was exhibited until the third week after spraying. Another sign of herbicide injury was decreased internodal distance of injured plants compared to uninjured plants.

Effects of Plant Canopy Closure

1994 Season. Canopy was only measured for the 1994 production season (Appendix I). Row spacing significantly affected ($\alpha = 0.05$) the time required to establish canopy closure. Narrow rows reached closure an average of 75.5 days after planting. Forty-inch rows required an average of 84.8 days to produce canopy closure. Tillage treatments of no-tillage and conventionally tilled plant beds did not have a significant ($\alpha = 0.05$) effect on plant canopy. Application of the growth regulator PIX[®] did have a significant ($\alpha = 0.05$) effect on canopy closure. Average time for closure of PIX[®] treated plots was 81.5 days after planting compared to 78.8 days after planting for non-treated plots. Analysis of variance indicated that there was a statistically significant ($\alpha = 0.05$) interaction between tillage and growth regulator treatments. Canopy closure occurred in the no-tillage plots at relatively the same time, with or without PIX[®] application. Conventionally tilled plots which did not receive PIX[®] treatments averaged

83.4 days after planting before canopy was reached, while non-treated plots required only 76.8 days.

Lint Yield

Lint yield was calculated from the product of measured seed cotton yields and percent gin turnout for a given treatment (Appendix I). Grab samples for gin turnout were taken from only two of the four replications for each treatment in the project.

Effects of Tillage

1992 Season. Average gin turnout for the 1992 production season was 33.7 percent with small variation between treatments (Table 3). During this year, no-tillage plots yielded an average of 1245 pounds of lint per acre, and conventionally tilled plots yielded 1179 pounds per acre (Table 4). The 66 pound difference between seedbed preparation was not statistically significant ($\alpha = 0.05$).

1993 Season. In 1993 average gin turnout was 33.5 percent with negligible variation among the tillage and cultural cropping combinations (Table 5). Tillage practice did have a significant ($\alpha = 0.05$) effect on lint yields. Average lint yields for no-tillage plots was 681 pounds of lint per acre, while conventionally tilled plots averaged 586 pounds per acre (Table 6). This 95 pounds per acre lint yield difference was significant ($\alpha = 0.05$).

1994 Season. Gin turnout for the 1994 season was 31.4 percent among tillage and cultural practice combinations (Table 7). No specific treatment had an appreciable effect on gin turnout in this production season. Average lint yield for no-tillage plots

Table 3. Average gin turnout for eight tillage/cultural practice combinations for the 1992 production season.

Treatment Description	Mean Gin Turnout (%)
30-inch row spacing - conventional tillage	33.9
30-inch row spacing - conventional tillage - PIX®	33.8
30-inch row spacing - no-tillage	34.3
30-inch row spacing - no-tillage - PIX®	34.6
40-inch row spacing - conventional tillage	32.9
40-inch row spacing - conventional tillage - PIX®	33.2
40-inch row spacing - no-tillage	33.6
40-inch row spacing - no-tillage - PIX®	33.2
Average	33.7

Table 4. Average lint yields for eight tillage/cultural cropping combinations for the 1992 production season.

Treatment Description	Mean Lint Yield (lbs./acre)
30-inch row spacing - conventional tillage	1111
30-inch row spacing - conventional tillage - PIX®	1077
30-inch row spacing - no-tillage	1170
30-inch row spacing - no-tillage - PIX®	1308
40-inch row spacing - conventional tillage	1216
40-inch row spacing - conventional tillage - PIX®	1313
40-inch row spacing - no-tillage	1172
40-inch row spacing - no-tillage - PIX®	1329

Table 5. Average gin turnout for eight tillage/cultural practice combinations for the 1993 production season.

Treatment Description	Mean Gin Turnout (%)
30-inch row spacing - conventional tillage	33.1
30-inch row spacing - conventional tillage - PIX®	32.5
30-inch row spacing - no-tillage	33.5
30-inch row spacing - no-tillage - PIX®	33.7
40-inch row spacing - conventional tillage	34.3
40-inch row spacing - conventional tillage - PIX®	33.3
40-inch row spacing - no-tillage	34.8
40-inch row spacing - no-tillage - PIX®	32.3
Average	33.5

Table 6. Average lint yields for eight tillage/cultural cropping combinations for the 1993 production season.

Treatment Description	Mean Lint Yield (lbs./acre)
30-inch row spacing - conventional tillage	518
30-inch row spacing - conventional tillage - PIX®	565
30-inch row spacing - no-tillage	716
30-inch row spacing - no-tillage - PIX®	752
40-inch row spacing - conventional tillage	580
40-inch row spacing - conventional tillage - PIX®	680
40-inch row spacing - no-tillage	621
40-inch row spacing - no-tillage - PIX®	635

Table 7. Average gin turnout for eight tillage/cultural practice combinations 1994.

Treatment Description	Mean Gin Turnout (%)
30-inch row spacing - conventional tillage	31.9
30-inch row spacing - conventional tillage - PIX®	32.7
30-inch row spacing - no-tillage	32.0
30-inch row spacing - no-tillage - PIX®	31.1
40-inch row spacing - conventional tillage	30.0
40-inch row spacing - conventional tillage - PIX®	27.6
40-inch row spacing - no-tillage	30.5
40-inch row spacing - no-tillage - PIX®	33.9
Average	31.4

was 1500 pounds of lint per acre, while conventionally tilled plots averaged 1426 pounds of lint per acre (Table 8).

Effects of Row Spacing

1992 Season. Lint yield was significantly ($\alpha = 0.05$) affected by row spacing in the 1992 season. Plots planted in 30-inch rows yielded an average of 1167 pounds of lint per acre while 40-inch plots average 1258 pounds of lint per acre (Table 9). An advantage of 91 pounds of lint per acre for 40-inch row spacing was observed.

1993 Season. Row spacing did not have a significant ($\alpha = 0.05$) effect on lint yield for the 1993 production season. Thirty-inch plots average 638 pounds of lint cotton per acre, while 40-inch rows yielded an average of 629 pounds of lint per acre (Table 10).

Table 8. Average lint yields for eight tillage/cultural cropping combinations 1994.

Treatment Description	Mean Lint Yield (lbs./acre)
30-inch row spacing - conventional tillage	1433
30-inch row spacing - conventional tillage - PIX®	1611
30-inch row spacing - no-tillage	1508
30-inch row spacing - no-tillage - PIX®	1509
40-inch row spacing - conventional tillage	1259
40-inch row spacing - conventional tillage - PIX®	1460
40-inch row spacing - no-tillage	1346
40-inch row spacing - no-tillage - PIX®	1639

Table 9. Average lint yields for four treatment combinations of tillage and row spacing for the 1992 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No-tillage	30	1239
	40	1250
Conventional tillage	30	1094
	40	1264

Table 10. Average lint yields for four treatment combinations of tillage and row spacing for the 1993 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No-tillage	30	734
	40	628
Conventional tillage	30	542
	40	630

1994 Season. In the 1994 season, 30-inch rows had an 89 pound of lint per acre advantage. Thirty-inch plots averaged 1515 pounds per acre, while plots in 40-inch rows averaged 1426 pounds per acre (Table 11). Although the difference was 89 pounds, it was not statistically significant ($\alpha = 0.05$).

Table 11. Average lint yields for four treatment combinations of tillage and row spacing for the 1994 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No-tillage	30	1508
	40	1492
Conventional tillage	30	1522
	40	1359

Effects of Growth Regulator

1992 Season. Application of the growth regulator PIX® had a significant ($\alpha=0.05$) effect on lint yield for the 1992 production season. Plots treated with PIX®

yielded an average of 1257 pounds of lint per acre, while untreated plots averaged 1167 pounds per acre (Table 12). PIX[®] treated plots yielded more than nontreated plots by an average of 90 pounds of lint per acre.

Table 12. Average lint yields for four treatment combinations of growth regulator and row spacing for the 1992 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No PIX [®]	30	1141
	40	1194
PIX [®]	30	1193
	40	1321

1993 Season. In 1993, PIX[®] again had a significant ($\alpha = 0.05$) effect on lint yield. Application of PIX[®] to plots increased yield by 49 pounds of lint per acre. PIX[®] treated plots yielded an average of 658 pounds of lint per acre, while non-treated plots averaged 609 pounds of lint per acre (Table 13).

Table 13. Average lint yields for four treatment combinations of growth regulator and row spacing for the 1993 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No PIX [®]	30	617
	40	601
PIX [®]	30	659
	40	658

1994 Season. A significant ($\alpha = 0.05$) growth regulator effect was experienced in the 1994 season. PIX[®] treated plots yielded an average of 1555 pounds per acre, while non-treated plots averaged 1441 pounds of lint per acre (Table 14). Thus, the advantage of PIX[®] was 90 pounds of lint per acre for the 1994 season.

Table 14. Average lint yields for four treatment combinations of growth regulator application and row spacing for the 1994 production season.

Tillage Practice	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
No PIX [®]	30	1470
	40	1320
PIX [®]	30	1560
	40	1549

Effects of Row Spacing/Tillage Interaction

1992 Season. No significant ($\alpha = 0.05$) interaction between row spacing and tillage effects on lint yields was observed in the 1992 production season. However, a trend toward statistical significance ($\alpha = 0.05$) was observed between row spacing and tillage treatment (Table 9). The interaction among the main treatment effects, tillage treatment and row spacing had a statistically significant effect ($\alpha = 0.05$) upon lint yield. Lint yields for the various treatment combinations of tillage and row spacing are shown in Table 10. Note that for cotton planted in 40-inch rows, there was little difference in average yield between no-till and conventionally tilled treatments. However, when

cotton was planted in 30-inch row spacings, no-tillage treatments yielded an average of 734 pounds of lint per acre while conventionally tilled treatments yield an average of 542 pounds lint per acre (Table 10).

1994 Season. In the 1994 production season, there was no significant ($\alpha = 0.05$) interaction between row spacing and tillage effects on lint yield, yet a trend similar to the row spacing and tillage trend in 1992 was recognized. Based strictly upon the values shown in Table 11, average lint yields from no-tillage plots were similar regardless of row spacing. However, yields in conventionally tilled plots increased by 163 pounds of lint per acre as row spacing was decreased from 40 to 30 inches.

Effects of Row Spacing/Growth Regulator Interaction

1994 Season. Analysis of variance indicated that an interaction between row spacing and growth regulator treatments was present in the lint yields for the 1994 season. Although this interaction was not significant ($\alpha = 0.05$) there did appear to be a trend. Based entirely on the numerical values averaged from plots, PIX® treatments increased yields in 30-inch rows by 90 pounds of lint per acre and, increased yields in 40-inch rows by 247 pounds of lint per acre. Where PIX® was applied, lint yields in both 30- and 40-inch row spacing were similar. Again considering only the average values shown in Table 14, if no PIX® was used the 30-inch row spacing resulted in a 168 pound of lint per acre yield advantage compared with lint yields in 40-inch.

Lint Yield--Three -Year Summary

Effects of Row Spacing. Row spacing did not have a significant ($\alpha = 0.05$) effect on average lint cotton yield over the three-year experiment, which included plots planted

both no-tillage and in a conventional seedbed and plots treated with the growth regulator Pix[®] as well as plots left untreated. Over three years, plots planted in 30-inch rows yielded an average of 1107 pounds of lint per acre while 40-inch plots yielded an average of 1104 pounds lint per acre. However, there was an interaction between row spacing and year that was statistically significant ($\alpha = 0.05$). Average lint yields for the two row spacings for each production year are presented in Table 15. In 1992, plots with 40-inch row spacing produced an average yield advantage of 91 pounds of lint per acre compared to 30-inch rows. However, in 1993, average lint yield differences between the two row spacings were only nine pounds of lint per acre. In 1994, plots planted in 30-inch rows produced an average yield advantage of 89 pounds of lint per acre. Thus, the effect of row spacing upon lint yield appears to be highly dependent upon the production season.

Table 15. Average lint yields for 30- and 40-inch row spacings observed during the three-year study.

Row Spacing (inches)	Production Year			
	1992	1993	1994	Mean
	(pounds of lint per acre)			
30	1167	638	1515	1107
40	1258	629	1426	1104
Differences	91	9	89	3

Effects of Tillage Treatment. Tillage treatment (no-till versus conventional seedbed preparation) significantly ($\alpha = 0.05$) affected the average lint cotton yields for the three-year experiment. Average lint yields for the two tillage treatments for each production year are presented in Table 16. No-till plots produced an average yield of

1142 pounds of lint per acre, while conventionally prepared plots yielded an average of 1069 pounds of lint per acre. Specifically, no-till plots produced an average yield advantage of 73 pounds of lint per acre during the three-year experiment. There was not a statistically significant interaction between tillage treatment and production year, denoting that no-tillage tended to consistently produce greater yields year to year.

Table 16. Average lint yields for tillage treatments observed during the three-year study.

Tillage Practice	Production Year			
	1992	1993	1994	Mean
	(pounds of lint per acre)			
No-tillage	1245	681	1500	1142
Conventional tillage	1179	586	1441	1069
Differences	66	95	59	73

Effects of Growth Regulator. Application of the growth regulator Pix[®] had a significant effect ($\alpha = 0.05$) upon average lint yields observed across the various treatment combinations for the three-year experiment. Average lint yields for the plots treated with the growth regulator for each production year are shown in Table 17. Plots treated with Pix[®] yielded an average of 1152 pounds of lint per acre, while plots receiving no application of the growth regulator produced an average of 1059 pounds of lint per acre over the duration of the experiment. Thus, application of the growth regulator Pix[®] produced an average yield advantage of 93 pounds of lint per acre during the three-year study.

Table 17. Average lint yields for growth regulator treatments observed during the three-year study.

Application of Growth Regulator	Production Year			
	1992	1993	1994	Mean
	(pounds of lint per acre)			
No PIX®	1181	609	1386	1059
PIX®	1244	658	1555	1152
Differences	63	49	169	93

Effects of Growth Regulator/Production Year Interaction. The interaction between the main treatment variables, growth regulator and row spacing, had a statistically significant effect ($\alpha = 0.05$) upon average lint cotton yields. The effect of application of the growth regulator Pix® was much more pronounced in plots planted with 40-inch row spacings than in plots planted using 30-inch rows (Table 17). Specifically, 40-inch plots treated with the growth regulator Pix® produced an average yield advantage of 138 pounds of lint per acre compared with plots with the same row spacing that did not receive applications of the growth regulator. However, Pix®-treated plots which had been planted in 30-inch rows produced an average yield increase of only 49 pounds lint per acre over similar plots which went untreated. Application of the growth regulator PIX® mixed with production year interaction had a significant ($\alpha = 0.05$) effect on average lint yields. Plots treated with PIX® over the experiment period consistently out-produced plots that did not receive growth regulator. The magnitude of yield advantage, although always positive, varied from year to year. In 1992, PIX® treated plots yielded a 63 pound advantage, while in the 1994 production season a 169 pounds of lint per acre advantage

appeared (Table 17). Thus, PIX® does have significant ($\alpha = 0.05$) effects on lint yield which varies according to production season.

Effects of Growth Regulator/Row spacing Interaction. The interaction between the main treatment variables, growth regulator and row spacing, had a statistically significant effect ($\alpha = 0.05$) upon average lint cotton yields. The effect of application of the growth regulator Pix® was much more pronounced in plots planted with 40-inch row spacings than in plots planted using 30-inch rows (Table 18). Specifically, 40-inch plots treated with the growth regulator Pix® produced an average yield advantage of 138 pounds of lint per acre compared with plots with the same row spacing that did not receive applications of the growth regulator. However, Pix®-treated plots which had been planted in 30-inch rows produced an average yield increase of only 49 pounds lint per acre over similar plots which went untreated.

Table 18. Average lint yields for four treatment combinations of row spacing and growth regulator for the three-year study.

Row Spacing (inches)	Application of Growth Regulator	Mean Lint Yield (lbs/acre)
30	No PIX®	1082
	PIX®	1131
40	No PIX®	1035
	PIX®	1173

Maturity

1992 Season

The lint harvested for each treatment combination during the first and second pickings is tabulated in Table 19. The percentage of the total lint yield harvested during the first picking was taken as an indication of plant maturity at harvest time. Analysis of variance showed that tillage treatment has a significant effect ($\alpha=0.05$) upon maturity.

Table 19. Average percentage lint yield harvested during first picking for treatment combinations of row spacing by production year for 1992 and 1994.

Production Year	Row Spacing (inches)	Mean Lint Yield (lbs/acre)
1992	30	85.5
	40	91.9
1994	30	65.2
	40	52.7

Effect of Tillage. No-tillage plots were more mature at the first picking. Specifically, an average of 91 percent of the total lint yield from no-tillage plots was harvested at first picking. In comparison, an average of 86 percent of the total lint was gathered from conventionally cultivated plots during the first pass of the spindle picker.

Effect of Row Spacing. Row spacing also had a statistically significant effect ($\alpha=0.05$) upon maturity. Cotton in 40-inch rows was more mature than cotton in 30-inch rows over the range of treatment combinations. An average of 92 percent of the cotton

in 40-inch rows was harvested during the first pickings as compared to an average of 85 percent in 30-inch rows.

Effect of Growth Regulator. Application of the growth regulator PIX® did not significantly ($\alpha = 0.05$) affect the maturity of cotton in this study. No interactions among the treatment variables were shown to be statistically significant ($\alpha = 0.05$). However, as with lint yield, a trend toward a significant row spacing/tillage treatment interaction was indicated for maturity. The data presented in Table 20 suggests the possibility that varying the row spacing more strongly influences maturity under conventional tillage than with no-tillage. Again, this interaction was not shown to be statistically significant, but a possible trend is indicated.

Table 20. Average percentage of lint yield harvested during first picking for treatment combination of tillage and application of growth regulator for 1992 and 1994.

Tillage Practice	Application of Growth Regulator	Mean Percent Yield for First Picking
No-tillage	No PIX®	60.4
	PIX®	61.2
Conventional tillage	No PIX®	52.3
	PIX®	61.8

1993 Season

Average frequency counts for the number of open cotton bolls per plant located in section one (nodes four to 10), 142 days after planting (five days before harvest), for plots containing the various treatment combinations are presented in Table 21. Analyses of

variance were performed on these frequency counts, and results were taken as an indication of plant maturity. This procedure differs from the one used for the 1992 crop in which the percentage of lint yield harvested during the first picking was taken as an indication of plant maturity at harvest. However, due to the high percentage of bolls open at the first picking it was unnecessary to perform a second picking on the 1993 experimental plots.

Table 21. Average number of open bolls per plant located at nodes 4 -10 for eight tillage cultural cropping combinations 142 days after planting.

Treatment Description	Mean Number Open Bolls Per Plant
30-inch row spacing - conventional tillage	3.6
30-inch row spacing - conventional tillage - PIX®	4.2
30-inch row spacing - no-tillage	4.0
30-inch row spacing - no-tillage - PIX®	4.6
40-inch row spacing - conventional tillage	2.4
40-inch row spacing - conventional tillage - PIX®	3.6
40-inch row spacing - no-tillage	2.6
40-inch row spacing - no-tillage - PIX®	5.9

Effect of Tillage/Row Spacing. Row spacing and tillage treatment did not have a significant effect ($\alpha = 0.05$) upon plant maturity. These results were not consistent with those for the 1992 crop in which both row spacing and tillage treatment did have a significant effect ($\alpha = 0.05$) upon plant maturity. Cotton planted in 40-inch rows was more

mature than cotton in 30-inch rows over the range of treatment combinations. No-tillage plots were more mature at the first picking than conventional tillage plots.

Effect of Growth Regulator. Analysis of variance showed that application of the growth regulator PIX® did significantly ($\alpha = 0.05$) affect the maturity of cotton in this study. Specifically, plots treated with the growth regulator PIX® average 4.6 open bolls per plant while plots receiving no growth regulator averaged 3.2 open bolls per plant in section one. No interactions among the treatment variables were shown to be statistically significant ($\alpha = 0.05$). Again, these results were not consistent with those for the 1992 crop in which application of the growth regulator PIX® did not have a significant effect ($\alpha = 0.05$) on plant maturity.

1994 Season

Effect of Row Spacing. Row spacing had a significant effect ($\alpha = 0.05$) upon plant maturity at the time of first picking, 156 days after planting. In particular, 65.1 percent of the total lint yield was harvested from plots with 30-inch rows during the first picking. This compares with 52.7 percent in plots planted in 40-inch rows (Table 19).

Effect of Tillage Treatment. Tillage treatment (no-till versus conventional seedbed preparation) was not shown to significantly ($\alpha = 0.05$) affect plant maturity. However, numerical values for lint yield did suggest the existence of a tendency for no-till plots to mature somewhat earlier than conventionally tilled plots. Specifically, 60.8 percent of the total lint yield was harvested during the first picking of no-till plots as compared to 57.1 percent for the conventionally tilled plots. This numerical difference,

slightly greater than three percentage points, was not sufficiently great to be declared significant at the five percent level of probability.

Effect of Growth Regulator. Application of the growth regulator PIX® had a significant effect ($\alpha = 0.05$) upon plant maturity across the various treatment combinations. Experimental plots treated with the growth regulator PIX® yielded an average of 61.5 percent of their total yield during the first harvest, with non-treated plots yielding only 56.4 percent at the time of the first harvest.

Effects of Tillage Treatment/Growth Regulator Interaction. Average percentages of total lint yield harvested during the first picking for the four treatment combinations involving tillage and application of the growth regulator PIX® are shown in Table 20. Analysis of variance indicated that an interaction between tillage and growth regulator treatments tended to be present, although this interaction was not shown to be statistically significant ($\alpha = 0.05$). Based solely upon the data shown in Table 20, application of the growth regulator PIX® increased the percentage of lint harvested during the first pick by 9.5 percentage points for conventionally prepared seedbeds in comparison to non-treated plots. In contrast, application of PIX® had little effect on the percentage of lint harvested during the first picking for experimental plots involving no-till. Specifically, application of PIX® resulted in less than a one percentage point difference in harvested lint between non-treated plots during the first pick.

Plant Maturity -- Three-Year Summary

Cotton was harvested in 1992 and 1994 using twice over picking. The percentage of total lint yield harvested during the first picking was in each case taken as an indication

of plant maturity at harvest time. In 1993, the crop was harvested with a single picking. In that year, average frequency counts of the number of open cotton bolls per plant located on nodes four through 10, five days before harvest, were analyzed to indicate plant maturity. Thus, the summary analysis of variance for plant maturity was conducted using the pooled data set from 1992 and 1994.

Effect of Row Spacing. Considering the pooled data set (1992 and 1994), row spacing was not shown to have a significant effect ($\alpha = 0.05$) upon plant maturity. In fact, in 1992, cotton planted in 40-inch rows matured earlier than cotton in 30-inch rows. As noted above, cotton planted in 30-inch row spacings matured earlier during the 1994 production season (Table 19). Data for the 1993 production season further supports the hypothesis that row spacing does not have a significant effect ($\alpha = 0.05$) upon plant maturity; even though a different measure of plant maturity was used in that year (Table 21).

Effect of Tillage Treatment. Analysis of variance showed that tillage treatment had a significant effect ($\alpha = 0.05$) upon plant maturity. No-tillage plots were significantly more mature at the time of first harvest. Specifically, an average of 75.8 percent of the total lint yield of no-tillage plots was harvested at first picking. In comparison, an average of only 71.8 percent of the total lint was gathered from conventionally prepared plots during the first pass of the spindle picker.

Effect of Growth Regulator. Again considering the pooled 1992 and 1994 data set, application of the growth regulator PIX[®] had a significant effect ($\alpha = 0.05$) upon plant maturity across the various treatment combinations. PIX[®]-treated plots were more

mature. Specifically, experimental plots treated with the growth regulator PIX® yielded an average of 75.2 percent of their total yield during the first harvest, while non-treated plots yielded only 72.4 percent at the time of the first harvest.

Row Spacing/Production Year Interaction. The interaction between row spacing and the production year had a statistically significant effect ($\alpha = 0.05$) upon plant maturity. Average percentages of total lint yield harvested during the first picking for the four treatment combinations of row spacing for each production year are shown in Table 19. In 1992, the cotton crop was overall much more mature than the 1994 crop at the time of the first picking. Specifically, 88.7 percent of the total lint yield was harvested during the first pass of the spindle picker in 1992 as compared to only 59.0 percent in 1994. It should also be noted that the first picking of the 1992 crop occurred 179 days after planting, whereas the first pick for the 1994 production season was 156 days after planting. This difference in crop age clearly accounts for the greater maturity of the 1992 crop at first pick, but was not a factor in the interaction. In 1992, experimental plots planted in 40-inch rows matured earlier than plots planted in 30-inch rows. However, in the 1994 production season, 30-inch cotton matured earlier than cotton in 40-inch rows. Thus, the effect of row spacing upon plant maturity appears to be highly dependent upon the production season. This interaction between row spacing and production was also shown to be statistically significant ($\alpha = 0.05$) in the lint yield analysis.

Growth Regulator/Production Year Interaction. Again, considering the pooled 1992 and 1994 data set, analysis of variance indicated that there was a statistically significant interaction ($\alpha = 0.05$) between application of the growth regulator PIX® and the

production year in the matter of earliness. Average percentages of total lint yield harvested during first pick for treatment combinations involving application of the growth regulator for each production year are shown in Table 22. As noted previously, in 1992, the cotton crop was overall much more mature than the 1994 crop at the time of the first pick. In 1992, there was little difference noted between percentages of total lint yield harvested during the first pick for treated and non-treated plots in regard to the application of the growth regulator PIX®. However, as noted above, 1994 experimental plots treated with the growth regulator PIX® yielded an average of 61.5 percent of their total yield during the first harvest compared with non-treated plots yielding only 56.4 percent at the time of the first harvest. Again, data for the 1993 production season further supports the hypothesis that the application of the growth regulator PIX® does have a significant effect ($\alpha = 0.05$) upon plant maturity, even though a different measure of plant maturity was used in that year (Table 21). Thus, as stated above in the discussion of the growth regulator/production year interaction for lint yields, the advantage of applying the growth regulator PIX® was more pronounced in some years than others in the matter of earliness.

Table 22. Average percentage of lint yield harvested during first picking for treatment combination for application of growth regulator by production year.

Production Year	Application of Growth Regulator	Mean Percent Yield for First Picking
1992	No PIX®	88.5
	PIX®	88.8
1994	No PIX®	56.4
	PIX®	61.5

Plant Height at Harvest

1992 Season

Effect of Tillage/Row Spacing. Tillage treatment (no-tilled and conventionally tilled) did not significantly ($\alpha = 0.05$) affect the plant height of the plots studied. There was no significant ($\alpha = 0.05$) effect in row spacing as well.

Effect of Growth Regulator. Although as expected application of the growth regulator PIX[®] did have a significant ($\alpha = 0.05$) effect on plant height. At harvest PIX[®] treated plots had an average height of 41.8 inches compared to 50.8 inches for untreated plots (Table 23). No significant ($\alpha = 0.05$) interactions between the main treatment variables were indicated by analysis of variance.

Table 23. Average plant height for eight tillage/cultural cropping combinations at harvest for 1992.

Treatment Description	Mean Height at Harvest (inches)
30-inch row spacing - conventional tillage	50.5
30-inch row spacing - conventional tillage - PIX [®]	45.8
30-inch row spacing - no-tillage	50.8
30-inch row spacing - no-tillage - PIX [®]	39.0
40-inch row spacing - conventional tillage	52.5
40-inch row spacing - conventional tillage - PIX [®]	41.5
40-inch row spacing - no-tillage	49.2
40-inch row spacing - no-tillage - PIX [®]	41.0

1993 Season

Effect of Tillage/Row Spacing. No significant ($\alpha = 0.05$) effect on plant height measured at harvest was determined between tillage treatments. Similar row spacing did not have a significant ($\alpha = 0.05$) effect on plant height.

Effect of Growth Regulator. However, growth regulator did again have a significant ($\alpha = 0.05$) effect on plant height measured at harvest. PIX[®] treated plots averaged a height of 30.6 inches while untreated plots average 32.6 inches in height at harvest (Table 24). Analysis of variance indicated that there was a significant ($\alpha = 0.05$) interaction between tillage and growth regulator.

Table 24. Average plant height for eight tillage/cultural cropping combinations at harvest for 1993.

Treatment Description	Mean Height at Harvest (inches)
30-inch row spacing - conventional tillage	33.8
30-inch row spacing - conventional tillage - PIX [®]	29.1
30-inch row spacing - no-tillage	29.7
30-inch row spacing - no-tillage - PIX [®]	31.6
40-inch row spacing - conventional tillage	34.4
40-inch row spacing - conventional tillage - PIX [®]	29.9
40-inch row spacing - no-tillage	32.5
40-inch row spacing - no-tillage - PIX [®]	31.7

1994 Season

Effect of Row Spacing. Heights of plants grown in 30-inch row spacings averaged 35.4 inches, while cotton grown in 40-inch rows averaged 41.0 inches in height. Analysis of variance indicated that this plant height difference was statistically significant ($\alpha=0.05$).

Effect of Tillage Treatment. Tillage treatment, conventional or no-tillage, did not significantly ($\alpha=0.05$) affect plant height for the 1994 production season. Average plant heights were 38.4 inches and 38.0 inches for conventional and no-tillage treatments, respectively.

Effect of Growth Regulator. As one might reasonably predict, the addition of the growth regulator Pix® did significantly ($\alpha =0.05$) affect plant height. Pix® treated plants had an average height of 34.0 inches compared with 42.5 inches for plants receiving no growth regulator.

Row Spacing/Growth Regulator Interaction. Average plant heights for the four treatment combinations involving row spacing and growth regulator application for the 1994 production season are shown in Table 25. Analysis of variance indicated that the interaction between row spacing and growth regulator treatment was statistically significant ($\alpha =0.05$). Plants treated with the growth regulator Pix® were an average of 11.7 inches shorter for plots planted in 40-inch row spacings. Treated plants were, on the average, only 5.4 inches shorter in plots planted in 30-inch rows. Average plant heights in plots treated with the growth regulator Pix® differed by 2.5 inches between 30- and 40-inch row spacings. Thirty- and 40-inch plots receiving no growth regulator had an

average plant height difference of 8.8 inches. As noted previously, analysis of variance involving lint yield indicated that interaction between the main effects of row spacing and growth regulator treatment tended to be present, although that interaction was not to be statistically significant ($\alpha = 0.05$).

Table 25. Average plant height for eight tillage/cultural cropping combinations at harvest for 1994.

Treatment Description	Mean Height at Harvest (inches)
30-inch row spacing - conventional tillage	39.3
30-inch row spacing - conventional tillage - PIX®	32.5
30-inch row spacing - no-tillage	37.0
30-inch row spacing - no-tillage - PIX®	33.0
40-inch row spacing - conventional tillage	46.3
40-inch row spacing - conventional tillage - PIX®	35.7
40-inch row spacing - no-tillage	47.5
40-inch row spacing - no-tillage - PIX®	34.7

Plant Height -- Three-Year Summary

Effect of Row Spacing. Row spacing had a statistically significant effect ($\alpha = 0.05$) on average plant height over the three-year experiment for plots planted both in no-tillage and in a conventional seedbed and plots treated with the growth regulator Pix® as well as plots left untreated. Over the three-years, plots planted in 30-inch rows grew to

an average height of 37.6 inches while plants in 40-inch plots averaged 39.7 inches in height.

Effect of Tillage Treatment. Tillage treatment (no-till versus conventional seedbed preparation) did not have a significant effect on average plant height at the five percent level of probability. However, the pooled data indicated a trend toward a tillage effect. Specifically, conventionally prepared plots produced plants which grew to an average height of 39.3 inches, while plants in no-till plots averaged only 38.1 inches.

Effect of Growth Regulator. Application of the growth regulator Pix® significantly affected ($\alpha = 0.05$) plant height. Plants receiving application of the growth regulator grew to an average height of 35.6 inches. Non-treated plants grew to an average height of 41.8 inches.

Row Spacing/Growth Regulator Interaction. Average plant heights for the four treatment combinations involving row spacing and growth regulator application for the 1992 and 1994 studies are shown in Table 26. Analysis of variance indicated that the interaction between row spacing and growth regulator treatment was statistically significant ($\alpha = 0.05$) over the three-year period. Plots treated with the growth applicator Pix® tended to have about the same plant height regardless of row spacing. Average plant heights for plots receiving no treatment of the growth regulator were 40.1 inches and 43.6 inches for treatments planted in 30- and 40-inch row spacings, respectively. Thus, where no Pix® was used, plots planted in 40-inch row spacings had greater average plant heights than plots in 30-inch rows.

Table 26. Average plant height for eight tillage/cultural cropping combination at harvest for 1992 and 1994.

Treatment Description	Mean Height at Harvest (inches)
30-inch row spacing - conventional tillage	44.9
30-inch row spacing - conventional tillage - PIX®	39.2
30-inch row spacing - no-tillage	43.9
30-inch row spacing - no-tillage - PIX®	36.0
40-inch row spacing - conventional tillage	49.4
40-inch row spacing - conventional tillage - PIX®	38.6
40-inch row spacing - no-tillage	48.4
40-inch row spacing - no-tillage - PIX®	37.9

Lint Quality Analysis

Lint quality analysis was conducted similarly throughout the study. Fiber properties and color classification values for the eight treatments are presented in Appendix I. These values were derived from cumulative grab samples from two replications for each of the eight treatments. Due to the method of sample extraction, no statistical analysis was preformed. No discernible differences were observed among treatments numerically.

Chapter 5

Conclusions

The following conclusion were based upon analysis of the pooled data set comprised of measurements taken throughout the three year period (1992, 1993, 1994).

1. Over the three years, row spacing had no significant effect upon lint yields.
However, in individual years, a given row spacing tended to produce more, about the same or less cotton than other spacing. Thus, the effect of row spacing upon lint yield appears to be highly dependent upon the nature of the production season.
2. Cotton planted using no-tillage production practices consistently produced higher lint yields than cotton planted into conventionally prepared seedbeds. Over the three years included in this study, the average yield advantage of no-tillage was 73 pounds per acre.
3. Application of the growth regulator PIX® consistently resulted in significantly increased lint yields. Over three years, PIX® application resulted in an average yield advantage of 93 pounds of lint per acre. While always positive, the magnitude of the yield advantage attributable to PIX® application varied from year to year, indicating that the growing season was a significant factor in determining the relative advantage of applying the growth regulator. Row spacing was also a factor in predicting the advantage of PIX®. In particular, the positive effect of applying PIX® was much more pronounced in plots planted with 40-inch row spacing as compared to 30-inch row spacing.

4. Considering the pooled data from three years, plant maturity at harvest as indicated by the percentage of total lint yield collected during the first picking was not affected by row spacing. However, in one year, 30-inch rows matured earlier. In another, the 40-inch rows matured earlier. Thus, the effect of row spacing upon earliness appears to be related to the nature of the production season.
5. Over the three year test, no-till plots were more mature at the time of first picking in comparison to plots seeded in conventional prepared seed beds.
6. Plants treated with the growth regulator PIX® matured earlier than untreated plants as indicated by the percentage of total lint yield harvested at the first picking. However, the earliest advantage associated with applying PIX® apparently depended upon the nature of the growing season from year to year.
7. At the stage of harvest maturity, plants grown in 30-inch rows were, on the average, about two inches shorter than plants in 40-inch rows.
8. Average heights of plants produced no-tillage and in conventionally prepared seedbeds were not appreciably different.
9. Application of the growth regulator PIX® resulted in plants which were markedly shorter at harvest maturity than plants left untreated. In particular, treated plants were, on average, about six inches shorter.

Disclaimer

Authors of this project in no way promote or repress the use of products mentioned in this report. Names of commercial products are used for the sole purpose of providing specific and complete information to the reader. The use of a commercial product in this experiment should not be construed to imply endorsement by The University of Tennessee, nor should such references be held to imply criticism of similar products not mentioned.

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Appendices

**Appendix A. Plot Layout
1992, 1993, and 1994**

Plot Layout for 1992 Cotton Project I at Milan Experiment Station
Performance Comparison of No-Till/Conventional Tillage Planting Systems in 30-inch and 40-inch Row Spacings

3 CT 401	4 CT 402	1 NT (PIX®) 403	2 NT (PIX®) 404	7 CT (PIX®) 405	8 CT (PIX®) 406	5 NT 407	6 NT 408
5 NT 301	6 NT 302	3 CT 303	4 CT 304	1 NT (PIX®) 305	2 NT (PIX®) 306	7 CT (PIX®) 307	8 CT (PIX®) 308
3 CT 201	4 CT 202	1 NT (PIX®) 203	2 NT (PIX®) 204	7 CT (PIX®) 205	8 CT (PIX®) 206	5 NT 207	6 NT 208
1 NT (PIX®) 101	2 NT (PIX®) 102	3 CT 103	4 CT 104	5 NT 105	6 NT 106	7 CT (PIX®) 107	8 CT (PIX®) 108
30-inch	40-inch	30-inch	40-inch	30-inch	40-inch	30-inch	40-inch

Treatment Number	Treatment Description
1	30-inch row spacing no-till (NT) + PIX®
2	40-inch row spacing no-till (NT) + PIX®
3	30-inch row spacing conventional tillage (CT)
4	40-inch row spacing conventional tillage (CT)
5	30-inch row spacing no-till (NT)
6	40-inch row spacing no-till (NT)
7	30-inch row spacing conventional tillage (CT) + PIX®
8	40-inch row spacing conventional tillage (CT) + PIX®

Plot Layout for 1993 Cotton Project I at Milan Experiment Station
Performance Comparison of No-Till/Conventional Tillage Planting Systems in 30-inch and 40-inch Row Spacings

3 CT 401	4 CT 402	1 NT (PIX®) 403	2 NT (PIX®) 404	7 CT (PIX®) 405	8 CT (PIX®) 406	5 NT 407	6 NT 408
5 NT 301	6 NT 302	3 CT 303	4 CT 304	1 NT (PIX®) 305	2 NT (PIX®) 306	7 CT (PIX®) 307	8 CT (PIX®) 308
7 CT (PIX®) 201	8 CT (PIX®) 202	5 NT 203	6 NT 204	3 CT 205	4 CT 206	1 NT (PIX®) 207	2 NT (PIX®) 208
1 NT (PIX®) 101	2 NT (PIX®) 102	7 CT (PIX®) 103	8 CT (PIX®) 104	5 NT 105	6 NT 106	3 CT 107	4 CT 108
30-inch	40-inch	30-inch	40-inch	30-inch	40-inch	30-inch	40-inch

Treatment Number	Treatment Description
1	30-inch row spacing no-till (NT) + PIX®
2	40-inch row spacing no-till (NT) + PIX®
3	30-inch row spacing conventional tillage (CT)
4	40-inch row spacing conventional tillage (CT)
5	30-inch row spacing no-till (NT)
6	40-inch row spacing no-till (NT)
7	30-inch row spacing conventional tillage (CT) + PIX®
8	40-inch row spacing conventional tillage (CT) + PIX®

Plot Layout for 1994 Cotton Project I at Milan Experiment Station
Performance Comparison of No-Till/Conventional Tillage Planting Systems in 30-inch and 40-inch Row Spacings

3 CT 401	4 CT 402	1 NT (PIX®) 403	2 NT (PIX®) 404	7 CT (PIX®) 405	8 CT (PIX®) 406	5 NT 407	6 NT 408
5 NT 301	6 NT 302	3 CT 303	4 CT 304	1 NT (PIX®) 305	2 NT (PIX®) 306	7 CT (PIX®) 307	8 CT (PIX®) 308
7 CT (PIX®) 201	8 CT (PIX®) 202	5 NT 203	6 NT 204	3 CT 205	4 CT 206	1 NT (PIX®) 207	2 NT (PIX®) 208
1 NT (PIX®) 101	2 NT (PIX®) 102	7 CT (PIX®) 103	8 CT (PIX®) 104	5 NT 105	6 NT 106	3 CT 107	4 CT 108
30-inch	40-inch	30-inch	40-inch	30-inch	40-inch	30-inch	40-inch

Treatment Number	Treatment Description
1	30-inch row spacing no-till (NT) + PIX®
2	40-inch row spacing no-till (NT) + PIX®
3	30-inch row spacing conventional tillage (CT)
4	40-inch row spacing conventional tillage (CT)
5	30-inch row spacing no-till (NT)
6	40-inch row spacing no-till (NT)
7	30-inch row spacing conventional tillage (CT) + PIX®
8	40-inch row spacing conventional tillage (CT) + PIX®

**Appendix B. Field Operation Summaries
1992, 1993, and 1994**

Summary of fertilization, chemical applications, and field operations of test plots for 1992.

Date	Record of Field Operation
04-16-92	Broadcast applied 80 lbs per acre phosphorous and potassium
04-22-92	Broadcast applied 1 qt per acre Roundup® (no-till plots only)
04-27-92	Broadcast applied 80 lbs per acre actual nitrogen (urea)
04-30-92	Disk harrowed twice and cultimulched conventional plots Planted DPL-50 (3.3 lbs per acre Temik® + 10 lbs per acre Ridomil® 15G) Broadcast applied 1.5 lbs per acre Cotoran® + 2 pt per acre Prowl® + (1 qt per acre Gramoxone Extra® + Triton® AG-98 0.25% v/v on no-till plots)
05-19-92	Broadcast applied 3.2 oz per acre Monitor® (control thrips and aphids)
06-01-92	Post-directed 0.75 lbs per Probe® + 2 lbs per acre MSMA Broadcast applied 1.5 pts per acre Fusilade® + 4 oz per acre Bidrin®
06-02-92	Broadcast applied 50 lbs per actual nitrogen (ammonium nitrate)
06-11-92	Broadcast applied 0.33 lbs per acre Orthene® (midseason plant bug insect control)
07-09-92	Broadcast applied 8 oz per acre PIX®
07-28-92	Broadcast applied 1.5 pts per acre Guthion® (weevil control) + 8 oz per acre PIX®
08-04-92	Broadcast applied 1 pt per acre methyl parathion (weevil control)
08-12-92	Broadcast applied 1.5 pts per acre Guthion® (weevil control)
10-02-92	Broadcast applied 1.5 pts per acre Def® + 1 qt per acre Prep® (defoliant and boll opener)
10-26-92	Picked 30-inch row cotton (first pick) Picked 40-inch row cotton (first pick)
11-17-92	Picked 30-inch and 40-inch row cotton (second pick)

Summary of fertilization, chemical applications, and field operations of test plots for 1993.

Date	Record of Field Operation
03-11-93	Broadcast applied 80 lbs per acre phosphorous and potassium
04-19-93	Broadcast applied 1 qt per acre Roundup® + Triton® AG-98 0.25% v/v on No-till plots
04-28-93	Broadcast applied 90 lbs per acre actual nitrogen (urea) Seedbed preparation for conventional tillage treatments utilized two passes with a pto-driven rotary tiller Planted DPL-20 @14.9 lbs seeds per acre (3.5 lbs per acre Temik® + 10 lbs per acre Terraclor® Super-X in furrow) Broadcast applied 1.5 lbs ai per acre Cotoran® + 1 lb. ai per acre Prowl PRE® to conventional Broadcast applied 1.5 lbs ai per acre Cotoran® + 1 lb. ai per acre Prowl + 1 qt per acre Gramoxone Extra® + Triton® AG-98 0.25% v/v PRE on No-till plots
05-21-93	Conventional tillage plots retilled using a Do-al (soil pulverizer) Broadcast applied 1.5 pt per acre Gramoxone Extra® + Triton® AG-98 0.25% v/v PRE to No-till plots
05-21-93	Conventional and No-till plots replanted DPL-50 @14.9 lbs seed per acre (3.5 lbs per acre Temik® + 10 lbs per acre Terraclor® Super-X in furrow)
06-16-93	Broadcast applied 4 oz per acre Bidrin® (thrip control)
06-21-93	Applied 1 lb. ai per acre Cotoran® + 1 lb. ai per acre MSMA post directed
06-23-93	Broadcast applied 5 oz per acre Vydate® (weevil control)
06-28-93	Cultivated conventional plots
06-29-93	Broadcast applied 5 oz per acre Vydate® (weevil control)
07-14-93	Broadcast applied 4 oz per acre Pounce® (worm control)
07-26-93	Broadcast applied 1.5 pt per acre Methyl Parathion®
07-27-93	Broadcast applied 8 oz per acre PIX® for planned treatments
08-02-93	Broadcast applied 10 oz per acre Asana® (worm control)
08-10-93	Broadcast applied 1 pt per acre Guthion® + 6.4 oz per acre Ambush®
08-13-93	Broadcast applied 1.5 pt per acre Methyl Parathion® (weevil control)
08-17-93	Broadcast applied 5 oz per acre Karate® (weevil/worm control)
08-26-93	Broadcast applied 5 oz per acre Karate® (weevil/worm control)
09-29-93	Applied 1.5 pt per acre Def® + 1 pt per acre Prep® (harvest aid/boll opener)
10-15-93	Harvested plots

Summary of fertilization, chemical applications, and field operations of test plots for 1994.

Date	Record of Field Operation
04-18-94	Broadcast applied 1 qt per acre Roundup® + 0.25% v/v LI700 on No-till plots
04-20-94	Broadcast applied 60 lbs per acre phosphorous and potassium
04-21-94	Broadcast applied 80 lbs per acre actual nitrogen (urea)
04-26-94	Seedbed preparation for conventional tillage treatments utilized two passes with a pto-driven rotary tiller and cultimulched Planted DPL-50 @ 14.9 lbs seeds per acre (3.5 lbs per acre Temik® + 8 lbs per acre Terraclor® Super-X in furrow) Broadcast applied 1.5 lbs ai per acre Cotoran® + 1.2 lb. ai per acre Prowl PRE® to conventional Broadcast applied 1.5 lbs ai per acre Cotoran® + 1.2 lb. ai per acre Prowl + 0.63 lbs ai per acre Gramoxone Extra® + 0.25% v/v LI700 on No-till plots
05-10-94	Broadcast applied 6.4 ounce per acre Ambush® (cutworm control)
06-01-94	Broadcast applied 4 oz per acre Bidrin® (thrip control)
06-18-94	Broadcast applied 1 pt per acre Guthion® (weevil/worm control)
06-21-94	Post directed 30-inch plots with 1 lb. ai per acre Bladex® + 2 lb. ai per acre MSMA®
06-22-94	Post directed 40-inch plots with 1 lb. ai per acre Bladex® + 2 lb. ai per acre MSMA®
06-28-94	Broadcast applied 3.2 oz per acre Dimethoate®
06-30-94	Broadcast applied 8 oz per acre PIX® + X-77 0.25% for planned treatments
07-01-94	Broadcast applied 3 pt per acre Biobit®
07-11-94	Broadcast applied 1.5 pt per acre Guthion® (weevil/worm control)
07-19-94	Broadcast applied 8 oz per acre PIX® + X-77 0.25% for planned treatments
08-09-94	Broadcast applied 1.5 pt per acre Methyl Parathion®
08-17-94	Broadcast applied 1 pt per acre Guthion® (weevil/worm control)
08-19-94	Broadcast applied 1.5 pt per acre Methyl Parathion®
08-24-94	Broadcast applied 1.5 pt per acre Methyl Parathion®
09-20-94	Applied 8 oz per acre Del® + 1.5 pt per acre Prep® + 0.10 lb per acre Dropp®
09-29-94	First harvest of plots
11-02-94	Second harvest of plots

Appendix C. Mapping Sheet

COTTON PROJECT _____

PLOT NO. _____

TREATMENT NO. _____

REP NO. _____

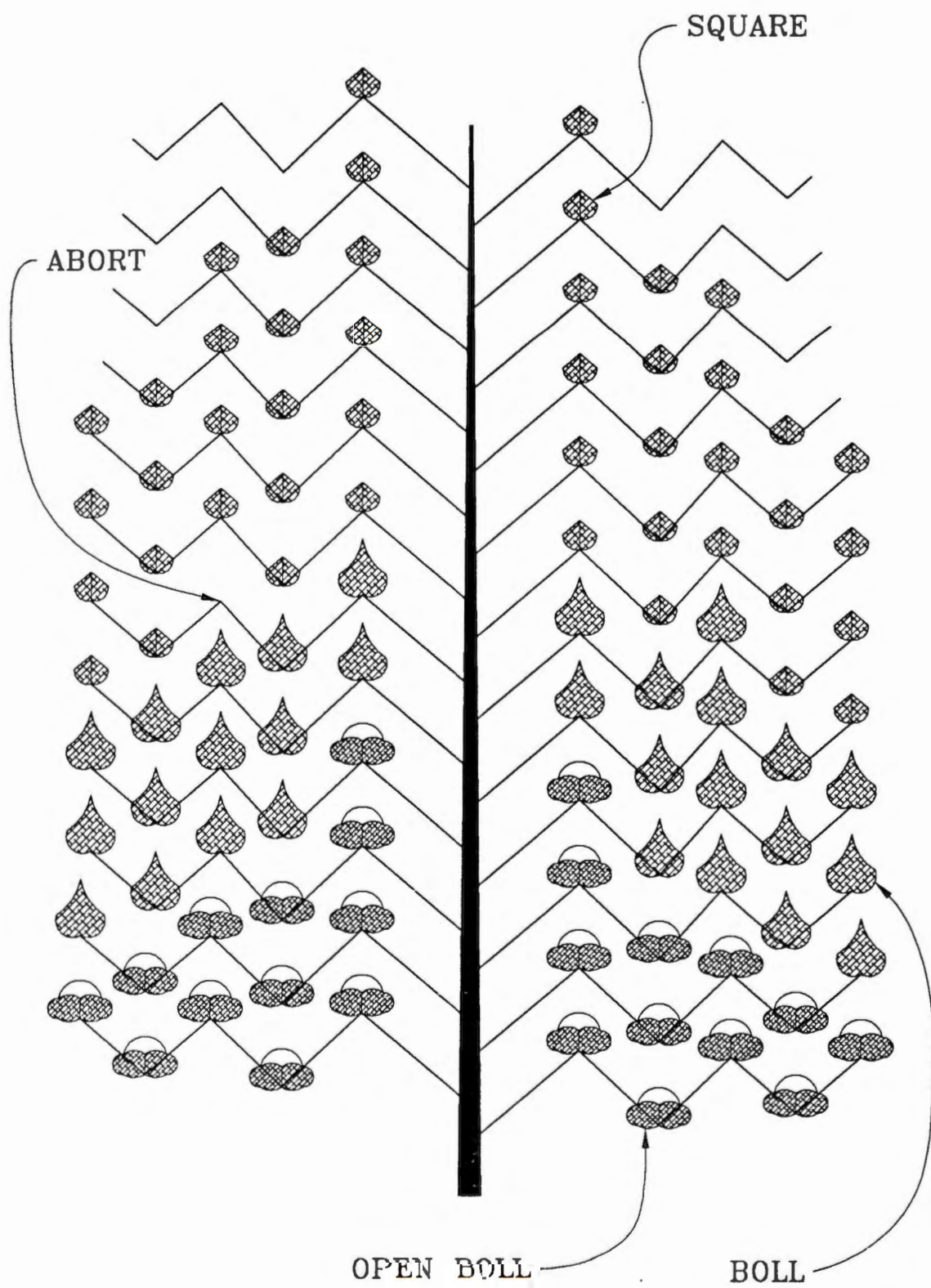
A = ABSCISED
B = BOLL
S = SQUARE
T = TERMINATED
V = VEGETATIVE

PLANT NO. _____

FINAL PLANT HEIGHT _____

FINAL STEM DIAMETER _____

Appendix D. Plant Fruiting



Ag-Vet. Ref Library

AgVet

11/14/90 04:02PM

ATRON: 115287

NAME: LENTON, JAMES M

REF: 3902702588042

TITLE: No-tillage and conventional tillage
cotton production in 30-inch and 40-inch

LL NO: TW5185.825

AG+H

TE DUE: 03/26/91

Please keep slip with book

Appendix E. Mapping Program

```

*Mapping Program
proc tommy:
*Name of procedure*
local name$(10)
*Project name*
print "Enter filename:"
*Prompt for file name*
input name$
*Line for name*
if not exist(name$)
*Check to see if file exist*
create name$.a.type$.data$
*If not create a file*
a.type$="DA"
a.data$=DATIM$
*Put date in at startof file*
append
*Write data out to file*
print "Enter study:"
*Prompt for study*
input a.data$
a.type$="SU"
*Input study information*
append
*Write data out to file*
else
open name$.a.type$.data$
*If file is already open then find file*
endif
plot:
close
endp

```

```

proc plot:
  *Name of procedure*
  local plot$(3)
  *Enter plot number three letters*
  print "Enter plot #:"
  *Prompts for plot number*
  input plot$
  *Line input for plot number*
  while plot$ <> "0"
  *When plot number is "0" program goes to proc tommy*
    a.type$="PL"
  *Set data to*
    a.data$=plot$
  *Set data to*
    append
  *Write data to file*
    plant:
  *Run proc plant*
    print "Enter plot #:"
  *Prompt for plot*
    input plot$
  *Line for input*
  endwh
endp

```

```

proc plant:
  *Name of procedure*
  local plant$(1),dia1,dia2,hgt
  print "Enter plant #:"
  *Prompt for plant number*
  input plant$
  *Line to input plant*
  while plant$ <> "0"
    *When plant number goes to 0 program goes to proc plot*
    a.type$="PT"
    *Set type*
    a.data$=plant$
    *Set data to*
    append
    *Write to file*
    print "Enter Height:"
    *Prompt for plant height*
    input hgt
    *Input plant height*
    a.type$="HT"
    *Set type*
    a.data$=fix$(hgt,1,4)
    *Get data*
    append
    *Write to file*
    print "Enter Dia. 1"
    *Prompt for diameter*
    input dia1
    *Input line for data*
    print "Enter Dia. 2"
    *Prompt for diameter*
    input dia2
    *Input line for data*
    a.type$="DI"
    *Set type*
    a.data$=fix$(((dia1+dia2)/2,3,5)
    *Add diameter one and two then average*
    append
    *write to file*
    node:

```

```
*Run proc node*  
  print "Enter plant #:"  
*Prompt for plant*  
  input plant$  
*input line for plant*  
endwh  
endp
```

```

proc node:
*Name of procedure*
local count%, info$(6)
*Read variable*
count%=1
*Increments node by one*
print "Node :", count%
*Prompps incremented node*
print "-----"
*Input line for node*
input info$
*Get data*
while info$ <> "0"
*When input is 0 goto proc plant*
  a.type$="NI"
*Get type*
  a.data$=info$
*Set data*
  append
*Write to file*
  count%=count%+1
*increment node*
  print "Node :", count%
*Prompts node number*
  print "-----"
*Input line for data*
  input info$
*Input line*
endwh
endp

```

```

*Down loading Program PSION
#include <l_menu.opb>
*Includes menu header*
#include <l_menu.mac>
*Defines menu macros*

#define NUMBER_CARDS 2
*Two menu cards are used*

proc main:
  GLOBALS_FOR_MENU(NUMBER_CARDS)
  *Declare globals for menu bar*
  local m%,mArgs%(2)
  *Define local variables*

  LOADM "m:\lib\l_menu"
  *Loads menu library code into cord*
  SET_MCARD(1,"Mapping","Map","M")
  *Define menu card one*
  SET_MCARD(2,"Utility","Link\List","LT")
  *Define menu card two*

  DO
    m%=menu%:(NUMBER_CARDS,addr(mArgs%()))
  *Present menu*
    if m%
  *Inputs M>0*
      @%("cmd"+chr$(m%)):
  *Call CMD X ware X is accel*
      endif
    until m%=()
  *Escape process*
    unloadm "m:\lib\l_menu"
    off
  endp

proc cmdM%:
  *Map*
  loadm "m:\opo\cotton"
  *Load Module*
  tommy:

```

```
*Call proc tommy*  
  unloadm "m:\opo\cotton"  
*Unload module*  
  cls  
endp
```

```

proc cmdL%:
*Link*
  local pid%,ret%
*Local to keep tabs of what process is open*
  loadm "m:\lib\link"
*Loads link libraries*
  loadm "m:\lib\wsrv"
*Load windows*
  pid%=LKSTART%:
*Start link*
  ret%=WSALRTW%:("Link is active","", "", "", "")
*Display windows*
  ret%=LKTERM%:(pid%)
*Terminating link*
  unloadm "m:\lib\wsrv"
  unloadm "m:\lib\link"
*Unload libraries*
endp

```

```

proc cmdT%:
*List*
  local pid%,ret%
*Local to keep tabs on open processes*
  loadm "m:\lib\link"
*Load link library*
  loadm "m:\opo\listit"
*Listit program module*
  pid%=LKSTART%:
*Start link*
  listit:
*Call and list module*
  ret%=LKTERM%:(pid%)
*Close link*
  unloadm "m:\opo\listit"
  unloadm "m:\lib\link"
*Clear module*
  cls
endp

```

```

*Listing program to print out data
proc listit:
  *Name of procedure*
  local a$(2),b$(24),c$(10),d$(10)
  *define local strings*
  print "Enter outfile:"
  *Prompt for response*
  input d$
  *Ask for local file name*
  lopen "rem::c:\tommy\"+d$+".txt"
  *Open file on remote*
  print "Enter infile:"
  *Prompt for *
  input c$
  *Add for local file name*
  open c$.a,type$,data$
  *Open local file*
  while not EOF
    a$=a.type$
    b$=a.data$
    lprint a$, b$
  next
endwh
*Read and print data until end of file*
close
*close file*
lclose
*close file link*
endp

```

DIM Site(1 TO 5) AS STRING * 1

Dimention site as an array of 5 single characters

INPUT "Please enter file name to convert:"; InFile\$

Prompt for and get filename

INPUT "Please enter the Julian Date to use:"; JulDate\$

Prompt for and get date

OPEN InFile\$ + ".TXT" FOR INPUT AS #1

OPEN InFile\$ + ".PRN" FOR OUTPUT AS #2

Open files "TXT" and "PRN"

WHILE NOT EOF(1)

While loop based on "TXT" file

LINE INPUT #1, FileLine\$

Get line of data from "TXT"

Type\$ = LEFT\$(FileLine\$, 2)

Determine type of information

IF LEN(FileLine\$) > 3 THEN

If line contains data (over measured values)

 Data\$ = RIGHT\$(FileLine\$, LEN(FileLine\$) - 3)

Get data First (three left most characters)

ELSE

 Data\$ = ""

Otherwise if line has no data is blank

END IF

SELECT CASE Type\$

Do search based on data type

 CASE "NI"

Node information

 Node% = Node% + 1

Increment node by one

 FOR NodeCount% = 1 TO 5

 IF MID\$(Data\$, NodeCount%, 1) > " " THEN

 Site(NodeCount%) = MID\$(Data\$, NodeCount%, 1)

 ELSE

 Site(NodeCount%) = "."

```

        END IF
    *Record each of the five sites and put a "." if site is blank*
    NEXT
    IF UCASE$(RIGHT$(Data$, 1)) = "V" THEN
        Veggie$ = "V"
    ELSE
        Veggie$ = "F"
    END IF
    *After five sites have been designated assigns for site six vegetative or fruiting*

    IF Node% < 10 THEN Node$ = " " + STR$(Node%) ELSE Node$ =
    STR$(Node%)
    *Lines column up for statistical program acceptance*

    PRINT #2, JulDate$ + " " + Plot$ + " " + Plant$ + " " + Height$ + " " +
    Diameter$ + " ";
    PRINT #2, Node$ + " " + Veggie$ + " " + Site(1) + " " + Site(2) + " " +
    Site(3) + " " + Site(4) + " " + Site(5)
    *Print out string of data*
    CASE "PT"
    *New plant*
        Node% = 0
    *Reset node to "0"*
        Plant$ = Data$
    *Add plant id number to string*

    CASE "HT"
    *Plant height*
        Height$ = Data$
    *Add height to string*

    CASE "DI"
    *Plant Diameter*
        Diameter$ = Data$
    *Add diameter to string*

    CASE "PL"
        Plot$ = Data$
    *Add plot number to string*

    CASE ELSE

```

END SELECT

WEND

CLOSE

**Appendix F. Soil Moisture
1993 and 1994**

Soil moisture data for first planting in 1993

TRT MNT	TILLAGE	CAN #	TOT WET	TOT DRY	CAN WT	SOIL WET	SOIL DRY	% D.B.	AVG
3	CT	132	444.42	385.45	94.64	349.78	290.81	20.28	
4	CT	158	393.61	345.68	93.39	300.22	252.29	19.00	
7	CT	124	440.17	386.70	93.72	346.45	292.98	18.25	
8	CT	128	502.35	439.67	94.26	408.09	345.41	18.15	18.9
1	NT	146	476.17	411.79	92.82	383.35	318.97	20.18	
2	NT	148	545.66	471.32	93.11	452.55	378.21	19.66	
5	NT	164	517.67	444.09	93.49	424.18	350.60	20.99	
6	NT	125	499.77	432.85	94.68	405.09	338.17	19.79	20.2

Soil Moisture data for first planting 1994

Plt	Rep	Trt	Bk	Till Trt	Can Wt.	TOT WET	TOT DRY	SOIL WET	SOIL DRY	% D.B.	AVG.
303	3	3	2	CT	89.03	293.60	271.06	204.57	182.03	12.38	10.8
401	4	3	1	CT	90.84	280.49	262.15	189.65	171.31	10.71	
107	1	3	4	CT	88.79	296.69	276.37	207.90	187.58	10.83	
205	2	3	3	CT	88.48	388.90	354.36	300.42	265.88	12.99	
402	4	4	1	CT	92.37	277.81	263.14	185.44	170.77	8.59	
304	3	4	2	CT	89.83	348.93	325.16	259.10	235.33	10.10	
206	2	4	3	CT	88.74	315.45	292.72	226.71	203.98	11.14	
108	1	4	4	CT	88.24	302.75	285.44	214.51	197.20	8.78	
103	1	7	2	CT	88.30	296.47	279.04	208.17	190.74	9.14	
405	4	7	3	CT	89.51	332.64	300.73	243.13	211.22	15.11	
307	3	7	4	CT	88.92	369.02	333.99	280.10	245.07	14.29	12.0
201	2	7	1	CT	89.17	316.96	300.54	227.79	211.37	7.77	
202	2	8	1	CT	89.14	300.32	284.96	211.18	195.82	7.84	
104	1	8	2	CT	88.50	310.53	290.60	222.03	202.10	9.86	
406	4	8	3	CT	94.26	329.29	303.92	235.03	209.66	12.10	
308	3	8	4	CT	88.89	340.07	314.77	251.18	225.88	11.20	
305	3	1	3	NT	94.63	331.12	305.46	236.49	210.83	12.17	
403	4	1	2	NT	87.46	329.04	298.14	241.58	210.68	14.67	
101	1	1	1	NT	90.67	264.90	249.81	174.23	159.14	9.48	
207	2	1	4	NT	88.81	300.02	276.34	211.21	187.53	12.63	

Soil Moisture data for first planting 1994

Plt	Rep	Trt	Bk	Till	Can	TOT	TOT	SOIL	SOIL	%D.B.	AVG.
				Trt	Wt	WET	DRY	WET	DRY		
102	1	2	1	NT	88.94	278.20	264.25	189.26	175.31	7.96	
208	2	2	4	NT	87.92	337.24	310.00	249.32	222.08	12.27	
306	3	2	3	NT	90.68	300.60	274.21	209.92	183.53	14.38	
404	4	2	2	NT	90.23	327.89	297.87	237.66	207.64	14.46	
407	4	5	4	NT	95.40	306.40	280.56	211.00	185.16	13.96	
301	3	5	1	NT	89.25	312.73	295.98	223.48	206.73	8.10	
105	1	5	3	NT	88.51	280.03	265.84	191.52	177.33	8.00	
203	2	5	2	NT	88.08	288.62	268.01	200.54	179.93	11.45	
408	4	6	4	NT	88.81	360.74	323.92	271.93	235.11	15.66	
106	1	6	3	NT	88.73	276.21	259.72	187.48	170.99	9.64	
204	2	6	2	NT	94.31	324.31	296.79	230.00	202.48	13.59	
302	3	6	1	NT	91.57	322.19	293.91	230.62	202.34	13.98	

**Appendix G. Soil Temperature
1993 and 1994**

Soil Temperature for cotton1 after DO-AL befor second planting
 Temperatures taken at approximately 2-inch depth for 1993

PLOT NO.	TILLAGE TRTMNT	ROW SPACING	SOIL TEMP	
101	NT	30	86	
102	NT	40	82	
103	CT	30	79	
104	CT	40	81	
105	NT	30	81	
106	NT	40	80	
107	CT	30	79	
108	CT	40	80	
201	CT	30	79	
202	CT	40	78	
203	NT	30	80	
204	NT	40	76	
205	CT	30	79	CT AVG
206	CT	40	80	TEMP 78.8
207	NT	30	83	
208	NT	40	81	NT AVG
301	NT	30	75	TEMP 79.0
302	NT	40	76	
303	CT	30	77	
304	CT	40	79	
305	NT	30	79	
306	NT	40	81	
307	CT	30	79	
308	CT	40	78	
401	CT	30	78	
402	CT	40	77	
403	NT	30	77	
404	NT	40	75	
405	CT	30	79	
406	CT	40	79	
407	NT	30	75	
408	NT	40	77	

Soil temperature for 1994 taken at 2-inch depth

PLOT NO.	TILLAGE TRTMNT	ROW SPACING	SOIL TEMP	
307	30	CT	82	
205	30	CT	82	
202	40	CT	81	
303	30	CT	82	
401	30	CT	79	
308	40	CT	82	
206	40	CT	79	
402	40	CT	77	
201	30	CT	82	
104	40	CT	81	
103	30	CT	82	CT AVG
304	40	CT	81	TEMP 80.7
406	40	CT	80	
108	40	CT	80	NT AVG
107	30	CT	81	TEMP 80.1
405	30	CT	80	
306	40	NT	78	
407	30	NT	80	
408	40	NT	80	
403	30	NT	80	
404	40	NT	80	
106	40	NT	81	
203	30	NT	82	
105	30	NT	81	
101	30	NT	79	
102	40	NT	80	
204	40	NT	80	
302	40	NT	81	
305	30	NT	79	
301	30	NT	80	
207	30	NT	81	
208	40	NT	80	

**Appendix H. Stand Density
1993 and 1994**

Stand density for 1993

PLT	TRT	REP					AVG	AVG	TRT
NO.	MNT	NO.	NPR	NPR	NPR	NPR	NPR	PLTS	MNT
	NO.	NO.	1	2	3	4		/FT	PLTS
									/FT
101	1	1	38	34	47	41	40.0	4.0	
207	1	2	34	16	35	9	23.5	2.4	
305	1	3	52	32	30	40	38.5	3.9	
403	1	4	45	31	44	49	42.3	4.2	3.6
102	2	1	35	47	39	41	40.5	4.1	
208	2	2	33	40	29	33	33.8	3.4	
306	2	3	28	42	42	36	37.0	3.7	
100 404	2	4	46	35	42	44	41.8	4.2	3.8
107	3	1	51	20	21	48	35.0	3.5	
205	3	2	43	41	39	57	45.0	4.5	
303	3	3	47	32	33	53	41.3	4.1	
401	3	4	53	30	40	35	39.5	4.0	4.0
108	4	1	46	43	46	41	44.0	4.4	
206	4	2	47	39	43	48	44.3	4.4	
304	4	3	33	47	49	34	40.8	4.1	
402	4	4	48	53	36	43	45.0	4.5	4.4
105	5	1	42	34	40	43	39.8	4.0	

Stand density for 1993

PLT	TRT	REP					AVG	AVG	TRT
	MNT								MNT
NO.	NO.	NO.	NPR	NPR	NPR	NPR	NPR	PLTS	PLTS
			1	2	3	4		/FT	/FT
203	5	2	40	54	32	53	44.8	4.5	
301	5	3	43	45	34	44	41.5	4.2	
407	5	4	54	39	32	51	44.0	4.4	4.3
106	6	1	47	37	38	43	41.3	4.1	
204	6	2	38	48	42	38	41.5	4.2	
302	6	3	39	33	51	42	41.3	4.1	
408	6	4	39	42	56	49	46.5	4.7	4.3
103	7	1	48	45	45	39	44.3	4.4	
101 201	7	2	51	38	36	44	42.3	4.2	
307	7	3	48	43	32	37	40.0	4.0	
405	7	4	57	23	39	56	43.8	4.4	4.3
104	8	1	45	46	41	44	44.0	4.4	
202	8	2	50	45	45	45	46.3	4.6	
308	8	3	43	45	52	48	47.0	4.7	
406	8	4	45	46	40	44	43.8	4.4	4.5

Stand density 1994

PLT NO.	REP NO.	TRTMNT NO.	BK NO.	row 1 NPR1	row2 NPR2	row3 NPR3	row4 NPR4	AVG NPR	TRTMNT PLTS/FT
403	4	1	2	28	31	12	33	2.6	2.4
305	3	1	3	12	19	23	29	2.1	
101	1	1	1	37	26	23	18	2.6	
207	2	1	4	19	30	23	24	2.4	
208	2	2	4	39	20	22	18	2.5	2.1
404	4	2	2	9	25	25	17	1.9	
306	3	2	3	20	16	22	17	1.9	
102	1	2	1	28	29	17	15	2.2	
102 205	2	3	3	22	20	31	33	2.7	2.2
303	3	3	2	26	23	27	30	2.7	
107	1	3	4	9	29	26	15	2.0	
401	4	3	1	20	14	15	10	1.5	
402	4	4	1	10	15	6	9	1.0	2.0
304	3	4	2	31	17	18	19	2.1	
108	1	4	4	23	11	13	22	1.7	
206	2	4	3	28	43	42	14	3.2	
203	2	5	2	31	34	36	34	3.4	2.7
105	1	5	3	26	22	25	18	2.3	
407	4	5	4	26	27	20	20	2.3	

Stand density for 1994

PLT	REP	TRTMNT	BK	row 1	row2	row3	row4	AVG	TRTMNT
NO.	NO.	NO.	NO.	NPR1	NPR2	NPR3	NPR4	NPR	PLTS/FT
301	3	5	1	42	21	25	20	2.7	
204	2	6	2	43	21	26	42	3.3	2.4
106	1	6	3	23	12	18	29	2.1	
302	3	6	1	23	20	23	31	2.4	
408	4	6	4	18	16	14	21	1.7	
103	1	7	2	22	36	24	27	2.7	2.6
405	4	7	3	27	18	21	21	2.2	
307	3	7	4	10	24	31	28	2.3	
201	2	7	1	31	28	33	28	3.0	
104	1	8	2	25	15	13	18	1.8	1.9
406	4	8	3	22	12	17	10	1.5	
202	2	8	1	37	13	19	42	2.8	
308	3	8	4	29	8	15	9	1.5	

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**Appendix I. Yield Data
1992, 1993, and 1994**

1992 YIELD DATA COTTON PROJECT 1

YEAR	PLOT NO.	BLACK NO.	REP NO.	TRT NO.	RS	TILL	GR	1ST SEDCOT RAW	2ND SEDCOT RAW	1ST SEDCOT LBS/AC	2ND SEDCOT LBS/AC	TOT SEDCOT LBS/AC	1ST PRCNT YIELD	PRCNT GIN	1ST UNTCOT LBS/AC	2ND UNTCOT LBS/AC	TOT UNTCOT LBS/AC	HGHT HRVST RAW
1992	101	1	1	1	30	NT	P	20.0	2.5	2904.0	363.0	3267.0	88.9	0.3469	1007.4	125.9	1133.3	37
1992	102	1	1	2	40	NT	P	33.5	2.4	3648.2	261.4	3909.5	93.3	0.3323	1212.3	86.8	1299.1	41
1992	103	2	1	3	30	CT	NP	21.4	3.8	3107.3	551.8	3659.0	84.9	0.3394	1054.6	187.3	1241.9	47
1992	104	2	1	4	40	CT	NP	28.9	3.1	3147.2	337.6	3484.8	90.3	0.3291	1035.7	111.1	1146.8	48
1992	105	3	1	5	30	NT	NP	22.2	2.4	3223.4	348.5	3571.9	90.2	0.3436	1107.6	119.7	1227.3	46
1992	106	3	1	6	30	NT	NP	30.6	1.7	3332.3	185.1	3517.5	94.7	0.3361	1120.0	62.2	1182.2	44
1992	107	4	1	7	30	CT	P	15.3	3.3	2221.6	479.2	2700.7	82.3	0.3386	752.2	162.2	914.5	48
1992	108	4	1	8	40	CT	P	33.3	2.7	3626.4	294.0	3920.4	92.5	0.3322	1204.7	97.7	1302.4	37
1992	201	1	2	3	30	CT	NP	15.8	3.3	2294.2	479.2	2773.3	82.7	0.3394	778.6	162.6	941.3	44
1992	202	1	2	4	40	CT	NP	30.5	3.2	3321.5	348.5	3669.9	90.5	0.3291	1093.1	114.7	1207.8	52
1992	203	2	2	1	30	NT	P	24.5	2.7	3557.4	392.0	3949.4	90.1	0.3469	1234.1	136.0	1370.1	34
1992	204	2	2	2	40	NT	P	31.9	2.6	3473.9	283.1	3757.1	92.5	0.3323	1154.4	94.1	1248.5	36
1992	205	3	2	7	30	CT	P	17.0	4.7	2468.4	682.4	3150.8	78.3	0.3386	835.8	231.1	1066.9	42
1992	206	3	2	8	40	CT	P	33.3	2.8	3626.4	304.9	3931.3	92.2	0.3322	1204.7	101.3	1306.0	36
1992	207	4	2	5	30	NT	NP	18.6	2.2	2700.7	319.4	3020.2	89.4	0.3436	928.0	109.8	1037.7	48
1992	208	4	2	6	40	NT	NP	31.3	1.7	3408.6	185.1	3593.7	94.8	0.3361	1145.6	62.2	1207.8	42
1992	301	1	3	5	30	NT	NP	18.7	3.8	2715.2	551.8	3267.0	83.1	0.3436	833.0	189.6	1122.5	52
1992	302	1	3	6	40	NT	NP	27.4	3.2	2983.9	348.5	3332.3	89.5	0.3361	1002.9	117.1	1120.0	52
1992	303	2	3	3	30	CT	NP	17.0	4.6	2468.4	667.9	3136.3	78.7	0.3394	837.8	226.7	1064.5	56
1992	304	2	3	4	40	CT	NP	30.4	5.1	3310.6	555.4	3866.0	85.6	0.3291	1089.5	182.8	1272.3	57
1992	305	3	3	1	30	NT	P	22.2	3.5	3223.4	508.2	3731.6	86.4	0.3469	1118.2	176.3	1294.5	39
1992	306	3	3	2	40	NT	P	35.9	2.0	3909.5	217.8	4127.3	94.7	0.3323	1298.1	72.4	1371.5	39
1992	307	4	3	7	30	CT	P	14.5	4.4	2105.4	638.9	2744.3	76.7	0.3386	712.9	216.3	929.2	50
1992	308	4	3	8	40	CT	P	32.6	3.4	3550.1	370.3	3920.4	90.6	0.3322	1179.4	123.0	1302.4	42
1992	401	1	4	3	30	CT	NP	20.7	3.6	3005.6	522.7	3528.4	85.2	0.3394	1020.1	177.4	1197.5	55
1992	402	1	4	4	40	CT	NP	31.7	2.8	3452.1	304.9	3757.1	91.9	0.3291	1136.1	100.3	1236.4	53
1992	403	2	4	1	30	NT	P	26.2	2.3	3804.2	334.0	4138.2	91.9	0.3469	1319.7	115.9	1435.5	46
1992	404	2	4	2	40	NT	P	36.1	2.5	3931.3	272.3	4203.5	93.5	0.3323	1306.4	90.5	1396.8	48
1992	405	3	4	7	30	CT	P	25.8	2.6	3746.2	377.5	4123.7	90.8	0.3386	1268.4	127.8	1396.3	43
1992	406	3	4	8	40	CT	P	34.0	3.1	3702.6	337.6	4040.2	91.6	0.3322	1230.0	112.1	1342.2	51
1992	407	4	4	5	30	NT	NP	22.8	3.1	3310.6	450.1	3760.7	88.0	0.3436	1137.5	154.7	1292.2	57
1992	408	4	4	6	40	NT	NP	29.8	2.4	3245.2	261.4	3506.6	92.5	0.3361	1090.7	87.8	1178.6	59

1993 YIELD DATA COTTON PROJECT 1
HARVESTED 10/15/93

YEAR	PLOT NO.	BLCK NO.	REP NO.	TRT NO.	RS	TILL	GR	1ST SEDCOT (LBS)	HNDPK SEDCOT RAW (GRAMS)	TOTAL SEDCOT LBS/PLOT	TOTAL SEDCOT LBS/AC	GIN IN LBS	GIN OUT LBS	PRCNT GIN	1ST LINTCOT LBS/AC	PLTS PER FT	HIGHT HARVEST INCH
1993	101	1	1	1	30	NT	P	15.6	56.51	0.12	2283.2	5.9	1.99	0.3373	770.1	4.0	26.0
1993	102	1	1	2	40	NT	P	21.2	40.33	0.09	2318.4	6.4	2.07	0.3234	749.8	4.1	36.3
1993	103	2	1	7	30	CT	P	12.4	41.04	0.09	1813.6	6.7	2.18	0.3254	590.1	4.4	27.3
1993	104	2	1	8	40	CT	P	16.0	58.62	0.13	1756.5	5.6	1.87	0.3339	586.5	4.4	26.5
1993	105	3	1	5	30	NT	NP	13.3	51.26	0.11	1947.6	6.0	2.01	0.3350	652.4	4.0	28.0
1993	106	3	1	6	40	NT	NP	13.3	39.08	0.09	1457.8	6.0	2.09	0.3483	507.8	4.1	26.5
1993	107	4	1	3	30	CT	NP	6.5	30.27	0.07	953.5	6.1	2.02	0.3311	315.7	3.5	30.3
1993	108	4	1	4	40	CT	NP	9.4	27.25	0.06	1030.2	6.5	2.23	0.3431	353.4	4.4	28.0
1993	201	1	2	7	30	CT	P	12.9	36.42	0.08	1884.7	6.7	2.18	0.3254	613.2	4.2	30.0
1993	202	1	2	8	40	CT	P	22.1	51.96	0.11	2419.2	5.6	1.87	0.3339	807.8	4.6	31.0
1993	203	2	2	5	30	NT	NP	15.2	42.72	0.09	2220.7	6.0	2.01	0.3350	743.9	4.5	28.5
1993	204	2	2	6	40	NT	NP	20.0	62.38	0.14	2193.0	6.0	2.09	0.3483	763.9	4.2	29.8
1993	205	3	2	3	30	CT	NP	11.2	34.45	0.08	1637.3	6.1	2.02	0.3311	542.2	4.5	33.0
1993	206	3	2	4	40	CT	NP	14.6	72.08	0.16	1607.2	6.5	2.23	0.3431	551.4	4.4	33.0
1993	207	4	2	1	30	NT	P	13.3	81.12	0.18	1957.1	5.9	1.99	0.3373	660.1	2.4	30.5
1993	208	4	2	2	40	NT	P	13.5	72.05	0.16	1487.5	6.4	2.07	0.3234	481.1	3.4	26.0
1993	301	1	3	5	30	NT	NP	14.6	33.99	0.07	2130.8	6.0	2.01	0.3350	713.8	4.2	32.5
1993	302	1	3	6	40	NT	NP	16.5	57.30	0.13	1810.6	6.0	2.09	0.3483	630.7	4.1	37.5
1993	303	2	3	3	30	CT	NP	11.7	34.45	0.08	1709.9	6.1	2.02	0.3311	566.2	4.1	32.5
1993	304	2	3	4	40	CT	NP	16.3	62.50	0.14	1790.1	6.5	2.23	0.3431	614.1	4.1	37.5
1993	305	3	3	1	30	NT	P	14.4	73.16	0.16	2114.3	5.9	1.99	0.3373	713.1	3.9	34.0
1993	306	3	3	2	40	NT	P	16.9	41.38	0.09	1850.3	6.4	2.07	0.3234	598.5	3.7	31.5
1993	307	4	3	7	30	CT	P	7.3	27.38	0.06	1068.7	6.7	2.18	0.3254	347.7	4.0	30.5
1993	308	4	3	8	40	CT	P	17.5	44.27	0.10	1916.4	5.6	1.87	0.3339	639.9	4.7	28.8
1993	401	1	4	3	30	CT	NP	13.3	80.50	0.18	1956.9	6.1	2.02	0.3311	648.0	4.0	39.5
1993	402	1	4	4	40	CT	NP	21.3	67.35	0.15	2335.7	6.5	2.23	0.3431	801.3	4.5	39.0
1993	403	2	4	2	30	NT	P	17.5	57.26	0.13	2559.3	5.9	1.99	0.3373	863.2	4.2	34.0
1993	404	2	4	2	40	NT	P	20.0	75.21	0.17	2196.1	6.4	2.07	0.3234	710.3	4.2	33.0
1993	405	3	4	7	30	CT	P	14.9	58.09	0.13	2182.1	6.7	2.18	0.3254	710.0	4.4	28.5
1993	406	3	4	8	40	CT	P	18.8	40.83	0.09	2057.1	5.6	1.87	0.3339	686.9	4.4	33.5
1993	407	4	4	5	30	NT	NP	15.4	58.45	0.13	2254.8	6.0	2.01	0.3350	755.4	4.4	29.8
1993	408	4	4	6	40	NT	NP	15.2	84.58	0.19	1675.6	6.0	2.09	0.3463	583.7	4.7	36.3

1994 YIELD DATA COTTON PROJECT 1
PLANTED APRIL 26, 1994 - JULIAN 116
HARVESTED 09/29/94 AND 11/02/94

YEAR	PLT NO	BLOCK NO	REP NO	TRT NO	RS	TILL	GR	1STPK SEDCOT RAW (LBS)	2NDPK SEDCOT RAW (LBS)	1ST SEDCOT (LBS/A)	2ND SEDCOT (LBS/A)	TOTAL SEDCOT LBS/AC	1ST PCTNT YIELD	GIN IN LBS	GIN OUT LBS	PCTNT GIN TNO/AC	1ST LINTCOT LBA	2ND LINTCOT LBA	TOTAL LINTCOT LBS/AC	HVST HEIGHT INCH	PLANT CANOPY JULIAN	PLANT CANOPY DAP
1994	101	1	1	1	30	NT	P	25.9	7.60	3750.7	1103.5	4864.2	77.3	8.0	2.80	0.3111	1170.0	34.3	1513.3	31.0	199	73
1994	102	1	1	2	40	NT	P	33.6	16.70	3699.0	1816.8	5477.7	68.8	8.9	3.02	0.3383	1241.6	61.7	1858.7	37.0	204	88
1994	103	2	1	7	30	CT	P	26.0	6.70	3775.2	972.8	4748.0	79.5	7.1	2.32	0.3288	1233.6	317.9	1551.5	26.5	206	90
1994	104	2	1	8	40	CT	P	28.0	18.60	3049.2	2025.5	5074.7	60.1	7.5	2.21	0.2947	898.5	596.9	1495.4	32.0	204	88
1994	105	3	1	5	30	NT	NP	22.8	7.20	3310.6	1045.4	4356.0	76.0	8.5	2.72	0.3200	1059.4	334.5	1393.9	35.0	193	77
1994	106	3	1	6	40	NT	NP	26.5	11.30	2885.9	1230.6	4116.4	70.1	9.4	2.87	0.3053	881.1	375.7	1256.8	41.0	204	88
1994	107	4	1	3	30	CT	NP	19.7	11.30	2860.4	1640.8	4501.2	63.5	7.3	2.33	0.3182	913.0	523.7	1436.7	36.0	196	83
1994	108	4	1	4	40	CT	NP	16.2	21.60	1764.2	2352.2	4116.4	42.9	8.6	2.58	0.3000	529.3	705.7	1234.9	43.0	199	83
1994	201	1	2	7	30	CT	P	24.4	6.90	3542.9	1001.9	4544.8	78.0	7.1	2.32	0.3268	1157.7	327.4	1485.0	32.3	201	85
1994	202	1	2	8	40	CT	P	36.5	16.90	4192.7	1840.4	6033.1	69.5	7.5	2.21	0.2947	1235.4	542.3	1777.7	37.8	204	88
1994	203	2	2	5	30	NT	NP	25.6	9.20	3717.1	1335.8	5053.0	73.6	8.5	2.72	0.3200	1189.5	427.5	1616.9	32.3	199	83
1994	204	2	2	6	40	NT	NP	24.2	18.90	2833.4	2038.2	4863.6	56.1	9.4	2.87	0.3053	804.6	628.4	1433.0	45.3	199	83
1994	205	3	2	3	30	CT	NP	20.2	11.90	2933.0	1727.8	4660.9	62.9	7.3	2.33	0.3182	936.2	551.5	1487.7	35.0	189	73
1994	206	3	2	4	40	CT	NP	27.5	16.80	2994.8	1829.5	4824.3	62.1	8.6	2.58	0.3000	898.4	548.9	1447.3	39.5	204	88
1994	207	4	2	1	30	NT	P	22.1	14.00	3208.9	2032.8	5241.7	61.2	9.0	2.80	0.3111	998.3	632.4	1630.8	34.0	193	77
1994	208	4	2	2	40	NT	NP	17.6	20.20	1816.6	2199.8	4116.4	46.6	8.9	3.02	0.3383	650.4	746.4	1396.8	28.8	204	88
1994	301	1	3	5	30	NT	NP	16.6	12.40	2410.3	1800.5	4210.8	57.2	8.5	2.72	0.3200	771.3	576.2	1347.5	40.5	193	77
1994	302	1	3	6	40	NT	NP	20.3	21.70	2210.7	2263.1	4573.8	48.3	9.4	2.87	0.3053	675.0	721.5	1396.5	55.5	199	83
1994	303	2	3	3	30	CT	NP	20.2	12.00	2933.0	1742.4	4675.4	62.7	7.3	2.33	0.3182	936.2	551.1	1492.3	39.3	186	70
1994	304	2	3	4	40	CT	NP	10.7	21.70	1165.2	2363.1	3528.4	33.0	8.6	2.58	0.3000	349.6	708.9	1058.5	52.0	193	77
1994	305	3	3	1	30	NT	P	18.5	11.70	2696.2	1698.8	4395.0	61.3	9.0	2.80	0.3111	835.7	528.5	1364.2	34.0	186	70
1994	306	3	3	2	40	NT	P	24.2	18.40	2833.4	2003.8	4837.1	56.8	8.9	3.02	0.3383	894.3	678.9	1574.2	39.0	204	88
1994	307	4	3	7	30	CT	P	23.2	13.50	3368.6	1960.2	5328.8	63.2	7.1	2.32	0.3288	1100.7	640.5	1741.3	36.0	189	73
1994	308	4	3	8	40	CT	P	17.2	20.90	1873.1	2276.0	4149.1	45.1	7.5	2.21	0.2947	551.9	670.7	1222.6	33.5	199	83
1994	401	1	4	3	30	CT	NP	13.7	14.70	1899.2	2134.4	4123.7	48.2	7.3	2.33	0.3182	634.8	681.3	1316.2	47.0	186	70
1994	402	1	4	4	40	CT	NP	17.2	22.40	1873.1	2439.4	4312.4	43.4	8.6	2.58	0.3000	561.9	731.8	1293.7	50.5	199	83
1994	403	2	4	1	30	NT	P	21.4	12.40	3107.3	1800.5	4907.8	63.3	9.0	2.80	0.3111	966.7	560.1	1526.9	33.0	186	70
1994	404	2	4	2	40	NT	P	26.4	20.30	2875.0	1800.5	5065.5	56.5	8.9	3.02	0.3383	975.5	750.1	1725.7	34.0	199	83
1994	405	3	4	7	30	CT	P	20.0	15.10	2904.0	2192.5	5096.5	57.0	7.1	2.32	0.3268	948.9	716.4	1665.3	39.5	193	77
1994	406	3	4	8	40	CT	P	17.7	24.20	1927.5	2635.4	4562.9	42.2	7.5	2.21	0.2947	568.0	776.6	1344.5	39.5	199	83
1994	407	4	4	5	30	NT	NP	20.8	15.20	3020.2	2207.0	5227.2	57.8	8.5	2.72	0.3200	866.5	706.3	1572.7	40.0	199	83
1994	408	4	4	6	40	NT	NP	17.2	21.80	1873.1	2374.0	4247.1	44.1	9.4	2.87	0.3053	571.9	724.8	1296.7	48.0	199	83

Appendix J. Summary of Fiber Properties

Summary of fiber properties for eight tillage/cultural cropping combinations for 1992.

Treatment Description	Fiber Properties					Color		
	Micronaire	Strength (g/tex)	Length (inch)	Uniform (%)	Trash (% area)	Grade	RD	+B
30-inch row spacing - conventional tillage	3.3	26.2	1.16	83	1.2	41-3	71	9.1
30-inch row spacing - conventional tillage - PIX®	3.5	26.7	1.14	81	0.5	31-4	74	9.3
30-inch row spacing - no-tillage	3.5	24.3	1.15	82	0.7	41-3	72	8.6
30-inch row spacing - no-tillage - PIX®	3.7	24.8	1.15	81	0.4	41-3	71	9.0
40-inch row spacing - conventional tillage	3.3	24.1	1.14	82	0.9	41-3	74	8.6
40-inch row spacing - conventional tillage - PIX®	3.7	27.0	1.13	81	0.5	31-4	75	8.6
40-inch row spacing - no-tillage	3.7	24.8	1.13	82	0.9	41-1	74	8.0
40-inch row spacing - no-tillage - PIX®	2.9	26.2	1.13	80	0.9	41-1	74	8.1
Averages	3.45	25.5	1.141	81.5	0.75	----	73.1	8.66

Summary of fiber properties for eight tillage/cultural practice combinations for 1993.

Treatment Description	Fiber Properties					Color		
	Micronaire	Strength (g/tex)	Length (inch)	Uniform (%)	Trash (% area)	Grade	RD	+B
30-inch row spacing - conventional tillage	4.4	28.2	1.13	83	1.3	41-3	72	8.6
30-inch row spacing - conventional tillage - PIX®	4.1	29.1	1.12	82	0.6	41-1	73	8.2
30-inch row spacing - no-tillage	4.2	28.9	1.12	83	0.6	41-1	74	8.1
30-inch row spacing - no-tillage - PIX*	4.3	29.6	1.11	84	0.6	41-1	74	8.1
40-inch row spacing - conventional tillage	4.2	28.4	1.12	82	0.5	31-2	75	8.4
40-inch row spacing - conventional tillage - PIX*	4.2	28.8	1.13	82	0.5	41-1	75	8.0
40-inch row spacing - no-tillage	4.3	30.4	1.13	83	0.9	41-1	74	7.8
40-inch row spacing - no-tillage - PIX®	4.6	29.5	1.15	83	0.5	41-1	74	8.2
Averages	4.3	29.1	1.13	83	0.7	----	74	8.2

Summary of properties for eight tillage/cultural cropping combinations for 1994								
Treatment Description	Fiber Properties					Color		
	Micronaire	Strength (g/tex)	Length (inch)	Uniform (%)	Trash (% area)	Grade	RD	+B
30-inch row spacing - conventional tillage	4.1	29.6	1.20	83	1.1	31-2	75	8.4
30-inch row spacing - conventional tillage - PIX [®]	4.0	28.2	1.18	82	1.1	31-2	76	8.1
30-inch row spacing - no-tillage	4.1	28.8	1.20	82	1.0	41-3	74	8.7
30-inch row spacing - no-tillage - PIX [®]	4.3	28.7	1.18	82	0.7	31-4	73	8.6
40-inch row spacing - conventional tillage	4.3	28.6	1.18	82	1.0	41-3	71	9.0
40-inch row spacing - conventional tillage - PIX [®]	4.1	29.0	1.20	82	0.9	41-3	72	9.1
40-inch row spacing - no-tillage	4.2	29.2	1.18	83	1.0	41-3	72	9.0
40-inch row spacing - no-tillage - PIX [®]	4.3	29.4	1.19	83	0.8	41-3	73	9.0
Averages	4.2	28.9	1.19	82	1.0	----	73	8.7

VITA

Tommy Everett Morgan was born in Knoxville, Tennessee, on March 21, 1971. He attended elementary school in Rutledge, Tennessee, and graduated from Rutledge High School in May, 1989.

The following September he entered Walters State Community College, and received an Associate of Science degree in Agricultural Science and Natural Resources in May, 1991. His education was furthered when he entered The University of Tennessee, Knoxville, and received a Bachelor of Science degree in Agricultural Education in May, 1993. The following month he accepted a research assistantship and entered The University of Tennessee Graduate School. He completed the requirements for a Master of Science degree with a major in Agricultural Engineering Technology in August, 1995.

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