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AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATION
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IN COOPERATION WITH THE UNITED STATES DEPARTMENT
OF AGRICULTURE
DIVISION OF DRY-LAND AGRICULTURE

# COTTON EXPERIMENTS at the Lawton (Oklahoma) Field Station 1916-1931

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# COTTON EXPERIMENTS AT LAWTON (OKLAHOMA) FIELD STATION, 1916-1931[1]

## Introduction

The farm operations and cropping systems of southwestern Oklahoma have always reserved a major place for cotton as a cash crop. Significant factors that contribute to this arrangement are (1) the desire and often the necessity of growing a more or less dependable crop that can be converted quickly and directly into cash, (2) the lack of equipment to handle a diversified crop program, (3) the adaptability of cotton to long, hot summers and to a wide range of soils, (4) the comparative freedom from boll weevil damage, (5) the possibility of low cost of production, and (6) a prevalent system of farm tenancy.

Although cotton production is widely distributed over central, southeastern, southern, and western Oklahoma, a group of 13 counties in the southwestern part of the State produced an average of approximately 42 per cent of the total State crop from 1916 to 1930, as shown by data on cotton production in the United States assembled by the Bureau of Census, U. S. Department of Commerce, and by the U. S. Department of Agriculture.

Figure 1 shows the average number of bales produced by counties in southwestern Oklahoma from 1916 to 1930, inclusive. From 1919 to 1925, cotton production was expanded northward, including 6 counties as indicated by the heavy line in Figure 1. Figures in the six counties represent the date when production figures were first available and the average yearly production (bales) since that time. Temporary periods of abnormally high prices, spectacular profits made in older cotton territory, and the introduction of new varieties that were improved in respect to hardiness and early maturity, and comparative freedom from destructive crop insects were largely responsible for the expansion of cotton acreage and production.

Although the acreage of cotton has advanced to the north and northwest, the average acre yields of lint for the State of Oklahoma have gradually decreased as shown in Figure 2. Five-year moving averages indicate a reduction from 177 pounds to the acre in 1910-1914 to 141 pounds to the acre in 1928-1932. Reduction over a long period is not peculiar to Oklahoma, but it is a widely recognized fact in many of the older cotton producing States. Soils that are impoverished by intensive cultivation, continuous cropping, the lack of additional organic matter, the loss of soil and plant food by erosion, improper maintainance of well improved varieties, and insect enemies all add to the complicated problem of maintaining an acre yield that will be sufficiently high to warrant increased costs in methods of production.

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[1]The work with cotton at Lawton is conducted in cooperation with the Division of Cotton, Rubber, and Other Tropical Plants, Bureau of Plant Industry, U. S. Department of Agriculture.

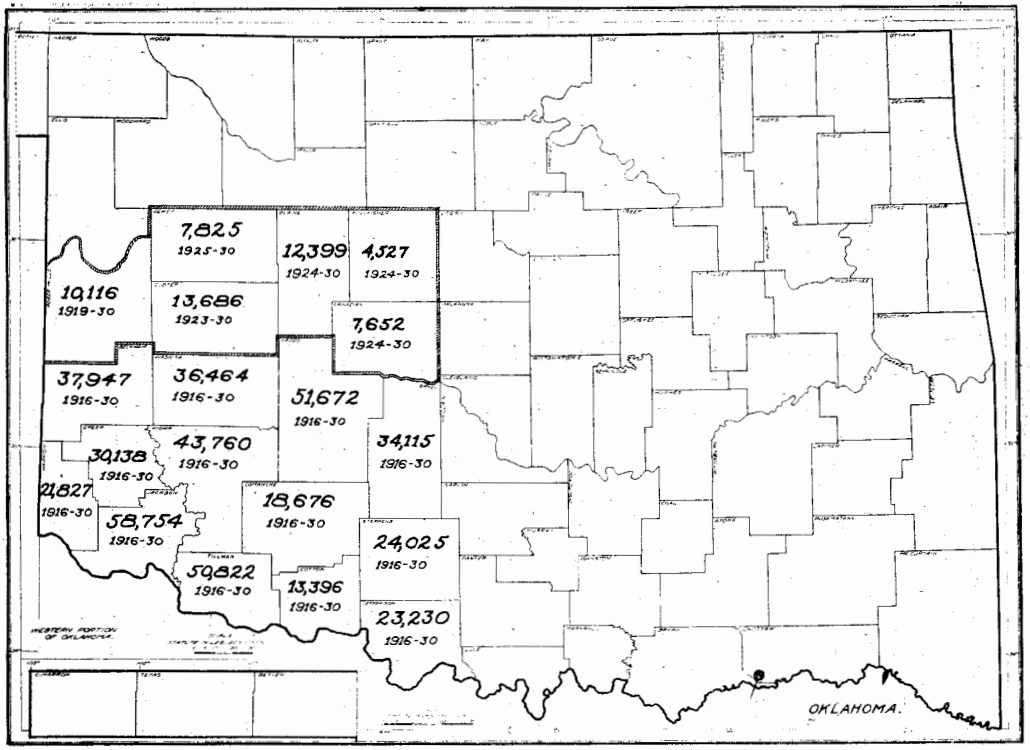


**FIG. 1.—Average number of bales of cotton produced by counties in Southwestern and Central Oklahoma, 1916-1930.**

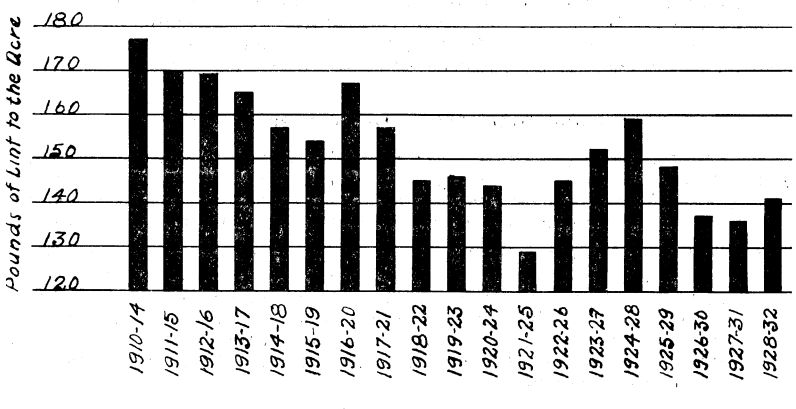


**FIG. 2.—Acre yields of lint cotton in Oklahoma, 1910-1932.**

The results presented in this bulletin pertain to experiments with different varieties of cotton, dates of seeding, and methods of spacing.

These experiments were conducted on the United States Dry-Land Field Station, situated near Lawton, in Comanche county, southwestern Oklahoma. The altitude is approximately 1,150 feet, and the annual precipitation is nearly 31 inches. The average annual precipitation is sufficient to warrant dependable crop production; but the torrential character of the rainfall and its highly variable monthly distribution, and the more or less protracted periods of drought in the summer, result in a wide fluctuation of cotton yields from year to year.

### Soil

The soil is a reddish-brown clay loam that has been classified as Tishomingo,[2] and is representative of an isolated area in the Red Prairies.

The water storage capacity of this soil is low because of its shallow depth. Rapid run-off of storm water and resultant erosion are frequent, and the growing crop must depend upon a well distributed rainfall during the growing season, when approximately 61 per cent of the annual precipitation is received.

### Climatic Records

Climatic records of precipitation, evaporation, and temperatures from 1916 to 1931, inclusive, are shown in Tables I and II. During this 16-year period, the seasonal precipitation, April to September, inclusive, ranged from 10.77 inches to 22.10 inches, and the annual precipitation varied from 17.28 inches to 43.65 inches. A comparison of cotton yields with climatic records indicates that the total seasonal precipitation is unimportant when compared with its distribution.

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[2]Bennett, H. H., The Soils and Agriculture of the Southern States. Macmillan Co., New York, 1921. 399 pp., maps.

The average frost-free period of 219 days extending from March 29, the average date of the last killing frost in the spring, to November 3, the average date of the first killing frost in the fall, provides a sufficiently long growing period for normal maturity of cotton under average conditions.

**Crop and Meterological Observations by Years**

In the following paragraphs is given a brief summary by years of crop and meterological observations, and other facts and incidents that occurred during the growing season that would influence the crop yield or modify the effect of soil and climate each year that the experiments were conducted.

1916—Cool weather during the first half of May delayed planting until about two weeks later than normal. Germination was good and growth was normal up to the fruiting period. Unfavorable weather at this time caused a heavy abortion of squares, and only a top crop was produced. Hot winds and drought continued throughout the latter part of July and all of August. The first killing frost in the fall was recorded October 19.

1917—The crop was injured in June by extreme fluctuations of temperature and winds of high velocity. Hot winds inflicted further damage the latter half of June and the first half of July. The first half of August was favorable, but the abortion of squares was heavy during this period. September was cool and dry, and the late development of bolls was caught by a killing frost October 8.

1918—A dry soil at planting time resulted in uneven germination, and a stunted plant growth continued the entire season by reason of drought and hot winds. Fruiting was light and abortion was persistent. The September and October rains increased plant growth and fruiting, but they were too late. The crop was an entire failure.

1919—Poor stands resulted from the early planting, and the majority of the plantings were delayed until May 20 to 22. Moisture was abundant during the growing season and the vegetative growth was rank and vigorous. Wet weather in the fall continued plant growth and delayed maturity, and hard freezes in November caught the crop with a large percentage of green bolls. The total yields were good, but the high percentage of bolly lint of low market value reduced the yield of good, marketable lint.

1920—Torrential rains in June made some replanting necessary, but the summer season as a whole was favorable to normal growth and development. Heavy October rains damaged the quality of unpicked cotton.

1921—A severe drought beginning the middle of July, hot winds and high temperatures in August, and a dry fall all resulted in very low yields.

1922—Heavy and prolonged rains in May delayed planting until the 20th to the 26th. A few weevils were present in the early part of the season, but the intense drought of July, August, and September controlled them and caused low yields, short staple, and weak lint.

1923—Cotton was injured by cold, wet weather in May and was damaged by webworms in June, by drought and grasshoppers in July and August and by excessive precipitation in the fall.

1924—A heavy invasion of grasshoppers and two infestations of webworms constituted the chief menaces to cotton production in 1924. Many fields were lost entirely by grasshopper damage. Weather conditions were favorable during the growing and the picking seasons.

1925—Dry weather in June and July retarded plant growth and reduced fruiting. Rains during the first 10 days in August renewed plant growth and developed a late top crop. The cotton bollworm imposed severe damage the latter half of August, and hot, dry weather up to September 10 retarded growth. Late seasonal development and cold wet weather in October made it necessary to snap a large percentage of the crop. In direct contrast to the high grade of lint marketed in 1924, the 1925 production was heavily weather damaged and trashy.

1926—The spring season was sufficiently cool to favor the growth and maturity of small grains rather than an optimum growth of cotton. Hot, dry weather in June and hot winds July 1 to 10, with only local rains during July, were relieved by general rains in August, when the monthly total amounted to 7.48 inches. Variable temperatures and excessive precipitation characterized the fall, with 16.80 inches of precipitation from August 15 to October 15. Cotton profited by the late rains and produced more than the average yields.

1927—Cotton grew rather slowly and made less than normal development up to June 15. After that date weather conditions were favorable, and the plants were well developed and heavily fruited by the middle of August. The cotton flea hopper was present in early July, but damage was negligible. The cotton leaf worm appeared August 15 to 20, and control measures were necessary to prevent damage. Some bollworm damage occurred during the fall. Hot, dry weather the first three weeks of September brought about early high yields that were gathered with but little loss by fall weather damage.

1928—Wide and sudden fluctuations in temperature, deficient precipitation, and prevailing high wind velocity all contributed to an unfavorable spring season. Early plantings germinated slowly and unsatisfactorily. May and June brought destructive hail, rain, and wind storms that made unusually late planting and replanting necessary in many localities. The precipitation in June was 8.01 inches. Webworms were responsible for considerable damage the latter part of July, when vegetative growth was luxuriant and fruiting was heavy. By August 18, cotton was wilting, and abortion of squares and young bolls was heavy during a period of hot, sultry weather. Some bollworm and boll weevil damage was evident but was not important. Deterioration of very promising yields continued, and a small crop was gathered early in the season. Picking was completed by October 15. A heavy infestation of boll weevils existed in all late, immature bolls.

1929—Dry weather in the spring of 1929 continued until May 11, when a rain storm of 7.39 inches proved disastrous to early plantings and to seed beds that were prepared. Rainfall on 11 days from May 8 to 30 required much extra tillage and subjected the crop to the hazards of late planitng. Cotton planted April 15 and May 1 made practically no growth up to the first of June, and stands were very uneven. Such plantings as were made May 27 and 28 emerged rapidly and satisfactorily. The vegetative growth was slow in June, but responded quickly to hot weather the first half of July. The maximum temperature registered 100° to 106° on 18 days from July 21 to August 31, and the precipitation for this period amounted to only 0.31 inch. This period of heat and drought imposed severe punishment on wilted, stunted cotton plants, and they persistently shed such blooms as were produced. The September rains and lower temperatures that broke the long summer drought were of some benefit to cotton in that boll maturity was not prematurely forced. September and October weather was optimum for maturity, and nearly all of the crop was obtained in two pickings without weather damage.

**TABLE I.—Monthly, Seasonal and Annual Precipitation and Average Monthly and Seasonal Evaporation at the Lawton (Oklahoma) Station from 1916 to 1931.**

| Year | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Seasonal April to Sept. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1916 | 2.34 | 0.03 | 1.19 | 3.52 | 1.81 | 4.06 | 4.60 | 0.87 | 1.11 | 1.49 | 1.36 | 0.06 | 15.87 | 22.44 |
| 1917 | .30 | .57 | 1.74 | 1.28 | 4.50 | 1.01 | 3.02 | 2.84 | .72 | .19 | 1.08 | .03 | 13.37 | 17.28 |
| 1918 | .20 | .25 | 2.16 | 2.36 | 1.29 | 3.08 | 2.57 | 1.48 | 4.18 | 8.68 | 1.20 | 3.50 | 14.96 | 30.95 |
| 1919 | .54 | 1.41 | 2.99 | 4.60 | 5.44 | 4.36 | 3.71 | 1.98 | 1.67 | 13.78 | 2.25 | .92 | 21.76 | 43.65 |
| 1920 | 1.04 | .61 | 1.84 | 3.14 | 7.53 | .69 | 1.88 | 4.18 | 2.05 | 8.78 | 2.29 | .86 | 19.47 | 34.89 |
| 1921 | 1.15 | 1.47 | 2.05 | 2.14 | 1.30 | 5.93 | 2.95 | .83 | 2.13 | .03 | T | .53 | 15.28 | 20.51 |
| 1922 | .89 | .46 | .97 | 6.85 | 6.63 | 1.01 | 3.40 | .64 | 1.61 | 2.46 | 1.04 | .21 | 20.14 | 26.17 |
| 1923 | 4.37 | .70 | 1.30 | 3.48 | 5.56 | 2.68 | 1.25 | 1.79 | 4.99 | 9.04 | 3.51 | 1.76 | 19.75 | 40.43 |
| 1924 | .20 | .11 | 2.47 | 3.88 | 3.05 | 3.36 | 1.39 | 4.15 | .61 | .78 | .50 | .99 | 16.44 | 21.49 |
| 1925 | .95 | .82 | T | 5.78 | 2.00 | .65 | 2.01 | 3.52 | 7.73 | 3.58 | 1.83 | .11 | 21.69 | 28.98 |
| 1926 | 1.33 | .00 | 1.67 | 2.22 | 3.79 | 1.20 | 2.10 | 7.48 | 4.67 | 4.78 | .22 | 4.50 | 21.46 | 33.96 |
| 1927 | 1.45 | 1.41 | 2.37 | 3.22 | 3.17 | 2.71 | 3.44 | 2.65 | 4.67 | 1.71 | .72 | 1.33 | 19.86 | 28.85 |
| 1928 | .59 | 1.26 | 1.08 | 1.90 | 2.78 | 8.01 | 2.28 | 1.21 | .66 | 2.02 | 2.67 | 1.28 | 16.84 | 25.74 |
| 1929 | .94 | .80 | 3.10 | .01 | 12.26 | 1.94 | 3.15 | .31 | 4.43 | 2.30 | 1.25 | .23 | 22.10 | 30.72 |
| 1930 | .82 | .19 | .26 | 4.03 | 5.75 | 2.47 | .57 | .55 | 1.70 | 9.74 | 1.64 | 2.67 | 15.12 | 30.44 |
| 1931 | .82 | 1.84 | 1.77 | 2.14 | .93 | 1.20 | 4.75 | 1.70 | .05 | 5.22 | 6.24 | 1.40 | 10.77 | 28.06 |
| Average | 1.12 | .75 | 1.69 | 3.16 | 4.24 | 2.77 | 2.69 | 2.26 | 2.69 | 4.66 | 1.74 | 1.27 | 17.81 | 29.04 |
| Evaporation, average 16 yyrs | | | | 5.53 | 6.32 | 7.91 | 8.80 | 8.68 | 6.58 | | | | 43.82 | |

**TABLE II.—Mean Monthly Maximum, Minimum, and Mean Temperatures at the Lawton Field Station for the 16 Years, 1916-1931.**

| | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 49 | 56 | 64 | 73 | 80 | 90 | 94 | 95 | 87 | 75 | 62 | 51 |
| Minimum | 25 | 30 | 38 | 48 | 57 | 66 | 69 | 69 | 62 | 50 | 37 | 27 |
| Mean | 37 | 43 | 51 | 60 | 68 | 78 | 82 | 82 | 75 | 63 | 49 | 39 |

1930—The growth of cotton was about normal in June, and some squares were forming by July 5 on plants that were in vigorous growth. Blooms developed rather lightly until the week ending July 26. Shedding of squares was persistent, and the crop showed an acute need of moisture as it wilted under high temperatures. Continuation of this condition throughout August resulted in a stunted plant growth that produced but few bolls. The small bolls opened prematurely, and picking was necessary by August 20. A weak, short fiber, resulting in cotton of inferior quality and low yields, characterized the crop as one of the poorest on record.

1931—Cotton seed planted previous to May 15 rotted in cold soil so extensively that stands were either failures or too poor to leave. Although germinating conditions were somewhat improved the last of May, about eight days were required for emergence. Growth was about normal in June, but it was definitely inhibited by hot, dry weather from the latter part of the month until July 17 to 20, when conditions were relieved by 4.48 inches of precipitation. During a subsequent period that was favorable to plant growth, normal development was obtained by August 1. The very few bolls that set early in the season were well grown, and the later fruiting on the new plant growth was very heavy. The crop carried a heavy invasion of webworms during the week ending August 8, and damage was severe in many instances, especially in the June plantings. Cotton plants wilted perceptibly the latter part of August, and early maturing varieties opened with considerable rapidity. Hot, dry weather during September forced boll maturity and depreciated the strength and quality of fiber. By September 20, 85 to 90 per cent of the total crop was ready to pick. The lint was undamaged by weather until October 11, when 5.22 inches of gently falling rains within a period of eight days produced only a little stain.

### Variety Tests

The variety test as conducted during the 16 years, 1916 to 1931 inclusive, did not include a large number of miscellaneous varieties, but it did embrace important varieties and strains that showed evidence of local adaptation and sufficient value to be grown on the farms of southwestern Oklahoma. New varieties of similar merit were added in the later years when their inclusion was warranted. The seed was obtained from sources of known reliability, and, when at all possible, from the same source each year.

The varieties were grown in rows 44 inches apart with the plants spaced a uniform distance of approximately 14 inches by measurement and count. Continuous cropping on plowed land with intervening tillage that provided a good seed bed and subsequent clean cultivation was practiced. Seeding was done in May as soon as climatic conditions were favorable to rapid germination. Duplicate series of 4-row plots, each 0.04 acre in size, were most generally used. All four rows were harvested and the yields presented are the average of two plots. The varieties were ginned separately on a 30-saw gin to obtain the lint percentages, from which the acre yields of lint were calculated. The length of staple was determined by measuring the fiber to the nearest sixteenth inch on representative combed samples of seed cotton.

The annual and average yields of lint and seed cotton for each variety grown during the 16 years, 1916 to 1931 inclusive, are given in Table III. In Table IV the annual and average percentage of lint, length of staple, and per cent stand for each variety are given for the period grown.

Two types of cotton are represented by the first four varieties in Table III. Acala 5 and Mebane represent the medium early type that produces average size bolls, a 15/16 to 1 inch staple, and more than 33 per cent of lint. A comparison of the average yields of lint produced by these two varieties over three periods of years, 1916 to 1931, 1924 to 1931, and 1926 to 1931, shows only a negligible difference. The length of Acala 5 staple averaged 1/16 inch longer than that of Mebane, but the lint percentage was more than 2 per cent lower. Rowden and Lone Star, representative of the big boll, late maturing type, produced a satisfactory length of staple and lint percentage, but the average yields were consistently less than those of Acala 5 and Mebane.

**TABLE III.—Annual and Average Yields of Cotton Varieties at the Lawton Station for the Years Specified.**

| Variety | ACRE YIELDS OF LINT (POUNDS) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
| Acala 5* | 120 | 194 | 0 | 215 | 392 | 150 | 152 | 205 | 427 | 213 |
| Mebane | 159 | 216 | 0 | 215 | 485 | 145 | 186 | 210 | 388 | 188 |
| Rowden | 95 | 152 | 0 | 150 | 475 | 145 | | 149 | 334 | 113 |
| Lone Star | 90 | 180 | 0 | 138 | 430 | 90 | 140 | 211 | 328 | 125 |
| Oklahoma Triumph 44 | --- | --- | --- | --- | --- | --- | 224 | 189 | 387 | 188 |
| Trice | --- | --- | --- | --- | --- | --- | --- | 134 | 298 | 138 |
| Burnett | --- | --- | --- | --- | --- | --- | --- | 167 | 363 | 188 |
| Half and Half | --- | --- | --- | --- | --- | --- | --- | --- | 478 | 200 |
| Russell | --- | --- | --- | --- | --- | --- | --- | --- | --- | 175 |
| Westex | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Delfos | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lawton Acala | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| | ACRE YIELDS OF LINT (POUNDS) | | | | | | AVERAGES | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1916 to 1931 | 1924 to 1931 | 1926 to 1931 |
| Acala 5* | 328 | 528 | 154 | 235 | 54 | 281 | 228 | 278 | 263 |
| Mebane | 319 | 485 | 160 | 263 | 47 | 264 | 233 | 264 | 256 |
| Rowden | 279 | 450 | 97 | 226 | 69 | 265 | 200** | 229 | 231 |
| Lone Star | 260 | 506 | 144 | 238 | 85 | 284 | 203 | 246 | 253 |
| Oklahoma Triumph 44 | 335 | 513 | 200 | 313 | 69 | 303 | --- | 289 | 289 |
| Trice | 244 | 447 | 197 | 282 | 75 | 296 | --- | 247 | 257 |
| Burnett | 294 | 472 | 197 | 263 | --- | --- | --- | --- | --- |
| Half and Half | 416 | 597 | 181 | 285 | 116 | 351 | --- | 328 | 324 |
| Russell | 282 | 466 | 129 | 241 | 69 | 241 | --- | --- | 238 |
| Westex | 344 | 575 | 200 | 313 | 81 | 314 | --- | --- | 305 |
| Delfos | 281 | 538 | 150 | 241 | 56 | 234† | --- | --- | 250 |
| Lawton Acala | 356 | 625 | 194 | 269 | 66 | 289 | --- | --- | 300 |

*Acala 5 superseded by Acala 5-37 in 1929.

**15-year average.

†Average of Missdel Nos. 1 and 2, which are strains that have superseded Delfos.

**TABLE III.—(Continued)**

| Variety | ACRE YIELDS OF SEED COTTON (POUNDS) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
| Acala 5* | 341 | 508 | 0 | 580 | 1,098 | 433 | 428 | 577 | 1,113 | 550 |
| Mebane | 421 | 501 | 0 | 573 | 1,323 | 368 | 468 | 548 | 963 | 438 |
| Rowden | 281 | 426 | 0 | 413 | 1,348 | 390 | | 420 | 825 | 300 |
| Lone Star | 241 | 469 | 0 | 373 | 1,193 | 250 | 383 | 607 | 775 | 313 |
| Oklahoma Triumph 44 | --- | --- | --- | --- | --- | --- | 623 | 568 | 1,075 | 513 |
| Trice | --- | --- | --- | --- | --- | --- | --- | 386 | 1,025 | 450 |
| Burnett | --- | --- | --- | --- | --- | --- | --- | 550 | 1,175 | 563 |
| Half and Half | --- | --- | --- | --- | --- | --- | --- | --- | 1,113 | 488 |
| Russell | --- | --- | --- | --- | --- | --- | --- | --- | --- | 450 |
| Westex | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Delfos | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lawton Acala | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| | ACRE YIELDS OF SEED COTTON (POUNDS) | | | | | | AVERAGES | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1916 to 1931 | 1924 to 1931 | 1926 to 1931 |
| Acala 5* | 875 | 1,369 | 447 | 594 | 151 | 816 | 618 | 739 | 709 |
| Mebane | 866 | 1,172 | 397 | 625 | 135 | 725 | 595 | 665 | 653 |
| Rowden | 769 | 1,228 | 272 | 632 | 200 | 825 | 555** | 631 | 654 |
| Lone Star | 716 | 1,219 | 367 | 613 | 216 | 791 | 533 | 626 | 654 |
| Oklahoma Triumph 44 | 910 | 1,404 | 566 | 822 | 197 | 979 | --- | 808 | 813 |
| Trice | 754 | 1,319 | 575 | 760 | 210 | 929 | --- | 753 | 758 |
| Burnett | 844 | 1,366 | 572 | 750 | | | --- | | |
| Half and Half | 997 | 1,260 | 394 | 694 | 247 | 841 | --- | 754 | 739 |
| Russell | 782 | 1,188 | 338 | 622 | 191 | 691 | --- | --- | 635 |
| Westex | 988 | 1,650 | 585 | 850 | 244 | 1,003 | --- | --- | 887 |
| Delfos | 875 | 1,506 | 430 | 704 | 175 | 760† | --- | --- | 742 |
| Lawton Acala | 900 | 1,469 | 507 | 681 | 160 | 822 | --- | --- | 757 |

*Acala 5 superseded by Acala 5-37 in 1929.

**15-year average.

†Average of Missdell Nos. 1 and 2, which are strains that have superseded Delfos.

Oklahoma Triumph 44, Trice, Burnett, and Half and Half were added to the variety test in 1922, 1923, and 1924. These varieties are of the prolific fruiting, small boll, early maturing, medium to small size plant, light foliage type. Oklahoma Triumph 44, originally selected from an old type of Mebane at the Oklahoma Experiment Station, Stillwater, Oklahoma, produced a 15/16 inch staple and slightly more than 35 per cent lint. During the 8 years, 1924 to 1931, when seven varieties were grown, Oklahoma Triumph 44 produced the second highest average yield of lint to the acre. In the 6-year period, 1926 to 1931, with 11 varieties available for comparison, the average lint yield of this variety ranked fourth, being only 35 pounds to the acre less than Half and Half, 16 pounds less than Westex, and 11 pounds less than Lawton Acala. Although Half and Half and Westex led all other varieties in acre yields of lint during the six years, 1926 to 1931, it is significant that these varieties, naturally high in lint percentage, produced an average staple of only 11/16 to 12/16 inch. This is less than tenderable

**TABLE IV.—Annual and Average Per cent Lint, Staple Length, and Per cent Stand of Cotton Varieties at the Lawton (Oklahoma) Station for the Years Specified**

| Variety | LINT (PER CENT) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| Acala 5* | 35.2 | 38.2 | ... | 37.1 | 35.7 | 34.6 | 35.5 | 35.5 | 38.4 |
| Mebane | 37.8 | 43.1 | ... | 37.5 | 36.7 | 39.4 | 39.8 | 38.3 | 40.3 |
| Rowden | 33.8 | 35.7 | ... | 36.3 | 35.3 | 37.2 | | 35.5 | 40.4 |
| Lone Star | 37.3 | 38.4 | ... | 37.0 | 36.0 | 36.0 | 36.6 | 34.8 | 42.3 |
| Okla. Triumph 44 | ... | ... | ... | ... | ... | ... | 36.0 | 33.3 | 36.0 |
| Trice | ... | ... | ... | ... | ... | ... | ... | 34.7 | 29.1 |
| Burnett | ... | ... | ... | ... | ... | ... | ... | 30.4 | 30.9 |
| Half and Half | ... | ... | ... | ... | ... | ... | ... | ... | 42.9 |
| Russell | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Westex | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Delfos | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Lawton Acala | ... | ... | ... | ... | ... | ... | ... | ... | ... |

| | LINT (PER CENT) | | | | | | | AVERAGES | |
|---|---|---|---|---|---|---|---|---|---|
| | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1926 to 1931 |
| Acala 5* | 38.7 | 37.5 | 38.6 | 34.5 | 39.6 | 35.8 | 34.4 | 37.2 | 36.7 |
| Mebane | 42.9 | 36.8 | 41.4 | 40.3 | 42.1 | 34.8 | 36.4 | 39.4 | 38.6 |
| Rowden | 37.7 | 36.3 | 36.6 | 35.7 | 35.8 | 34.5 | 32.1 | 36.2 | 35.2 |
| Lone Star | 39.9 | 36.3 | 41.5 | 39.2 | 38.8 | 39.4 | 35.9 | 39.2 | 38.5 |
| Okla. Triumph 44 | 36.7 | 36.8 | 36.5 | 35.3 | 38.1 | 35.0 | 30.9 | 35.7 | 35.4 |
| Trice | 30.7 | 32.4 | 33.9 | 34.3 | 37.1 | 35.7 | 31.9 | 33.1 | 34.2 |
| Burnett | 33.4 | 34.8 | 34.6 | 34.4 | 35.1 | | | | |
| Half and Half | 41.0 | 41.7 | 47.4 | 45.9 | 41.1 | 47.0 | 41.7 | 43.6 | 44.1 |
| Russell | 38.9 | 36.1 | 39.2 | 38.2 | 38.7 | 36.1 | 34.9 | ... | 37.2 |
| Westex | | 34.8 | 34.8 | 34.2 | 36.8 | 33.2 | 31.3 | ... | 34.2 |
| Delfos | ... | 32.1 | 35.7 | 34.9 | 34.2 | 32.0 | 30.8* | ... | 33.3 |
| Lawton Acala | ... | 39.6 | 42.5 | 38.3 | 39.5 | 41.3 | 35.2 | ... | 39.4 |

| | LENGTH OF STAPLE (SIXTEENTHS INCH) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| Acala 5* | 17 | ... | ... | ... | 17 | 16 | 16 | 18 | 17 |
| Mebane | 15 | ... | ... | ... | 16 | 16 | 17 | 17 | 16 |
| Rowden | 16 | ... | ... | ... | 16 | 15 | ... | 17 | 17 |
| Lone Star | 15 | ... | ... | ... | 16 | 15 | 17 | 17 | 17 |
| Okla. Triumph 44 | ... | ... | ... | ... | ... | ... | 14 | 16 | 16 |
| Trice | ... | ... | ... | ... | ... | ... | ... | 15 | 16 |
| Burnett | ... | ... | ... | ... | ... | ... | ... | 14 | 15 |
| Half and Half | ... | ... | ... | ... | ... | ... | ... | ... | 11 |
| Russell | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Westex | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Delfos | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Lawton Acala | ... | ... | ... | ... | ... | ... | ... | ... | ... |

*Acala 5 superseded by Acala 5-37 in 1929.
**Average of Missdell Nos. 1 and 2, which are strains that have superseded Delfos.

**TABLE IV.—(Continued)**

| Variety | LENGTH OF STAPLE (SIXTEENTHS INCH) | | | | | | | AVERAGES | |
|---|---|---|---|---|---|---|---|---|---|
| | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1926 to 1931 |
| Acala 5* | 17 | 17 | 17 | 17 | 16 | 12 | 16 | 16 | 16 |
| Mebane | 16 | 14 | 16 | 16 | 15 | 12 | 14 | 15 | 15 |
| Rowden | 16 | 16 | 16 | 17 | 14 | 13 | 15 | 16 | 15 |
| Lone Star | 16 | 17 | 16 | 17 | 16 | 12 | 14 | 16 | 15 |
| Okla. Triumph 44 | 16 | 15 | 17 | 16 | 15 | 13 | 14 | 15 | 15 |
| Trice | 15 | 16 | 17 | 17 | 15 | 12 | 14 | 15 | 15 |
| Burnett | 16 | 12 | 12 | 12 | 13 | --- | --- | | |
| Half and Half | 9 | 13 | 11 | 12 | 11 | 9 | 12 | 11 | 11 |
| Russell | 17 | 16 | 16 | 17 | 14 | 12 | 14 | --- | 15 |
| Westex | --- | 10 | 12 | 13 | 11 | 11 | 14 | --- | 12 |
| Delfos | --- | 19 | 20 | 17 | 18 | 14 | 15** | --- | 17 |
| Lawton Acala | --- | 17 | 17 | 18 | 16 | 13 | 16 | --- | 16 |

| | STAND (PER CENT) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| Acala 5* | --- | --- | --- | --- | 86 | 103 | 107 | --- | 96 |
| Mebane | --- | --- | --- | --- | 89 | 103 | 87 | --- | 100 |
| Rowden | --- | --- | --- | --- | 88 | 103 | | --- | 100 |
| Lone Star | --- | --- | --- | --- | 93 | 103 | 90 | --- | 102 |
| Okla. Triumph 44 | --- | --- | --- | --- | --- | --- | 104 | --- | 99 |
| Trice | --- | --- | --- | --- | --- | --- | --- | --- | 98 |
| Burnett | --- | --- | --- | --- | --- | --- | --- | --- | 100 |
| Half and Half | --- | --- | --- | --- | --- | --- | --- | --- | 99 |
| Russell | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Westex | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Delfos | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lawton Acala | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| | STAND (PER CENT) | | | | | | | AVERAGES | |
|---|---|---|---|---|---|---|---|---|---|
| | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1926 to 1931 |
| Acala 5* | 102 | 101 | 101 | 82 | 100 | 104 | 104 | 99 | 99 |
| Mebane | 104 | 104 | 102 | 99 | 98 | 104 | 103 | 102 | 102 |
| Rowden | 103 | 102 | 101 | 91 | 96 | 100 | 106 | 100 | 99 |
| Lone Star | 101 | 101 | 101 | 94 | 89 | 99 | 101 | 99 | 98 |
| Okla. Triumph 44 | 102 | 102 | 103 | 90 | 94 | 104 | 104 | 100 | 100 |
| Trice | 102 | 100 | 104 | 93 | 98 | 105 | 107 | 101 | 101 |
| Burnett | 102 | 103 | 101 | 90 | 95 | --- | --- | --- | --- |
| Half and Half | 101 | 101 | 98 | 89 | 97 | 99 | 103 | 98 | 98 |
| Russell | 97 | 105 | 102 | 95 | 96 | 102 | 105 | --- | 101 |
| Westex | --- | 101 | 101 | 94 | 99 | 100 | 104 | --- | 100 |
| Delfos | --- | 88 | 98 | 97 | 95 | 104 | 102** | --- | 97 |
| Lawton Acala | --- | 102 | 99 | 89 | 98 | 103 | 104 | --- | 99 |

*Acala 5 superseded by Acala 5-37 in 1929.
**Average of Missdell Nos. 1 and 2, which are strains that have superseded Delfos.

cotton (7/8 inch); and such a short fiber, that is also coarse, rough, and harsh, meets only the demand for cheaper and often inferior products of the spinner. Burnett, a strain of Half and Half, was grown 7 years, 1923 to 1929. It produced an average yield of 278 pounds of lint to the acre, with an average lint percentage of 33.4 and an average staple length of 13/16 inch. This variety, poor in storm-proof character, like many of the small boll, early maturing, short staple varieties, frequently suffers some lost and weather damaged lint. Burnett was discontinued in 1930 in favor of Westex, a selection from Burnett that consistently showed higher yielding ability than the parent variety during the 4 years that the two were grown.

Russell, a big boll late maturing variety, was added to the variety test in 1925 and produced an average lint yield of 229 pounds to the acre for the 7 years that it was grown. This variety yielded 15 pounds of lint to the acre less than Lone Star during the six years 1926 to 1931. The staple length of both varieties was the same, and the lint percentage of Lone Star was only 1.3 per cent higher.

A comparison of the three varieties, Rowden, Lone Star, and Russell, representing the large-boll, late-maturing type, shows that Rowden was the lowest in acre yield of lint and percentage of lint during the 6 years 1926 to 1931, but the average staple length of each was the same.

Additions to the variety test in 1926 included Delfos and Lawton Acala. Although the yield of 250 pounds of lint to the acre for Delfos and its average staple length of 1 1/16 inches may be considered as satisfactory, the fiber produced in this section is considered as soft, weak, and wasty. This variety, coming from the Mississippi Delta where it is extensively grown, does not seem to be well adapted to southwestern Oklahoma. Lawton Acala, a local selection made from Acala 5 on this station in 1923, is not a commercial strain. It was added to the variety test in 1926 because of its apparent combination of desirable characters, medium early maturity, prolific fruiting habit, storm resistance, a fiber character that is comparable with other good strains of Acala, a staple length of 1 inch, a lint percentage of approximately 39, and its high yielding ability. The average yield of 300 pounds of lint to the acre during the 6-year period, 1926 to 1931, was only 5 pounds less than the average for Westex, and 24 pounds below the average for Half and Half, both high-yielding, short-staple varieties. When compared with varieties of a similar type it exceeded the lint yield of Acala 5 and Mebane by 37 pounds and 44 pounds to the acre, respectively.

### Date-of-planting Tests

The length of the frost-free period, the presence of a warm moist soil for germination, and favorable temperatures for early subsequent growth influence production and bear directly on varietal adaptation. Conditions of temperature, and sometimes those of moisture, generally prevent good, uniform stands from plantings made previous to the first 10 days in May. Good stands are frequently secured from plantings made as early as April 10 to 15, but normal growth of the young plants is likely to be inhibited to such an extent that the stand is seriously reduced by dead plants or stunted ones that never recover normal growth. On the other hand, planting as late as June 1 to 15 is sometimes made necessary through loss of stand by subnormal temperatures, torrential rains, or destructive storms or to utilize good tillable land that would otherwise remain idle the greater portion of the year.

In order to obtain information relative to the possibilities of early and late planting, the optimum date, and the varietal response to the various planting dates, a date-of-planting test was begun in 1924. It included early, medium, and late maturing varieties of cotton planted April 15, May 1, May 15, June 1, and June 15.

The annual and average per cent stand, length of staple, lint percentage, yield of seed cotton, and yield of lint for each variety on each date planted are presented in Table V. Wet weather made planting impossible on May 15, 1929, and on May 1, 1930. In 1931, the seed of all varieties planted April 15 failed to emerge, nearly all of it rotting in the ground because of cold weather. The stands obtained from April 15 plantings showed considerable variation from year to year, and they nearly always lacked uniformity. The use of a heavy rate of seeding on this early planting did not seem to overcome this difficulty. The average per cent stand obtained for each variety on each date, during the entire period of this test, as shown in Table V, was considerably less than that obtained on any other date.

The variety, and the seasonal effects of the year that it was grown, had more influence on the length of staple and the percentage of lint produced than the time of planting. The staple of the June 1 and 15 plantings was, in general, slightly shorter than that from earlier plantings, and the fiber was usually regarded as soft and weak.

These late plantings frequently subject the young cotton plants to the hazards of drought and insect enemies that make normal plant growth impossible. Fruiting may also be delayed and depressed, thereby developing a late top crop that requires a late fall for maturity. Although any or all of these conditions that are so closely related to yields may produce similar effects when the crop is planted on the intermediate dates, May 1 and 15, the chances for survival and for average production are greatly in favor of such plantings. Less seed is required to secure a stand; and the possibility of rapid germination, uniform emergence, and normal growth and development under more favorable temperatures are all in favor of plantings made May 1 to 15.

A comparison of the average and annual yields of lint and seed cotton for each of the varieties planted at 15-day intervals, from April 15 to June 15, during the 8 years, 1924 to 1931, as shown in Table V, further substantiates the fact that the best results are to be obtained from the May 1 and 15 planting dates. The April 15 planting ranked third, the June 1 planting fourth, and the June 15 planting fifth in the acre yield of lint.

The average acre yield of lint for all varieties planted June 15 was less than one-third of the yield obtained from the May 1 planting. The 8-year average yield of 316 pounds of lint to the acre for all varieties planted May 1 was 88 pounds more than the April 15 average, 43 pounds more than the May 15 average, and 124 pounds more than the June 1 average. The average lint yields of all varieties from the April 15 planting equalled or exceeded those from the May 1 planting only twice in 8 years, in 1927 and 1929. In 1925 and 1926 the June 15 plantings were complete failures because of drought.

The yields of each variety for each planting date, as shown in Table V, indicate that when it is necessary to plant as late as June 1 or 15 such varieties as Acala, Oklahoma Triumph 44, and Half and Half will produce appreciably larger average yields of lint than the later-maturing varieties, Mebane, Rowden, and Russell.

**TABLE V.—Annual and Average Data Obtained in a Date-of-planting Experiment with Six Varieties of Cotton at Lawton, Oklahoma, from 1924 to 1931 Inclusive.**

| Variety and date of planting | STAND (PER CENT) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
| **Acala** | | | | | | | | | |
| April 15 | 71 | 97 | 93 | 98 | 101 | 103 | 98 | 0 | 83 |
| May 1 | 96 | 100 | 99 | 102 | 100 | 88 | | 108 | 99 |
| May 15 | 81 | 96 | 92 | 100 | 101 | | 103 | 107 | 97 |
| June 1 | 101 | 97 | 86 | 100 | 102 | 99 | 103 | 100 | 99 |
| June 15 | 100 | | | 117 | 92 | 97 | 106 | 102 | 102 |
| **Mebane** | | | | | | | | | |
| April 15 | | | 94 | 89 | 98 | 80 | 92 | 0 | 76 |
| May 1 | 79 | 98 | 93 | 101 | 102 | 86 | | 102 | 94 |
| May 15 | 83 | 100 | 92 | 100 | 98 | | 104 | 103 | 97 |
| June 1 | 101 | 93 | 95 | 96 | 101 | 97 | 102 | 102 | 98 |
| June 15 | 100 | | | 102 | 97 | 101 | 83 | 102 | 98 |
| **Rowden** | | | | | | | | | |
| April 15 | 53 | 97 | 97 | 98 | 88 | 81 | 94 | 0 | 76 |
| May 1 | 76 | 99 | 92 | 99 | 98 | 59 | | 99 | 89 |
| May 15 | 77 | 99 | 88 | 98 | 101 | | 103 | 105 | 96 |
| June 1 | 102 | 97 | 88 | 101 | 99 | 102 | 104 | 103 | 100 |
| June 15 | 99 | | | 124 | 99 | 101 | 101 | 99 | 104 |
| **Half and Half** | | | | | | | | | |
| April 15 | 85 | 95 | 87 | 95 | 100 | 69 | 89 | 0 | 78 |
| May 1 | 82 | 101 | 94 | 99 | 104 | 69 | | 100 | 93 |
| May 15 | 75 | 98 | 91 | 98 | 95 | | 105 | 102 | 95 |
| June 1 | 99 | 93 | 91 | 83 | 95 | 97 | 101 | 88 | 93 |
| June 15 | 95 | | | 109 | 97 | 98 | 104 | 98 | 100 |
| **Okla. Triumph 44** | | | | | | | | | |
| April 15 | | 96 | 96 | 96 | 101 | 89 | 85 | 0 | 80 |
| May 1 | | 101 | 99 | 101 | 109 | 89 | | 105 | 101 |
| May 15 | 82 | 96 | 93 | 101 | 98 | | 103 | 104 | 97 |
| June 1 | 99 | 96 | 89 | 96 | 103 | 99 | 104 | 104 | 99 |
| June 15 | 98 | | | 104 | 99 | 102 | 104 | 101 | 101 |
| **Russell** | | | | | | | | | |
| April 15 | | | 98 | 98 | 94 | 78 | 92 | 0 | 77 |
| May 1 | | 100 | 98 | 100 | 97 | 61 | | 108 | 94 |
| May 15 | | 99 | 97 | 101 | 100 | | 105 | 104 | 101 |
| June 1 | | 95 | 99 | 99 | 99 | 100 | 100 | 98 | 99 |
| June 15 | | | | 123 | 96 | 98 | 99 | 92 | 102 |
| | LENGTH OF STAPLE (SIXTEENTHS INCH) | | | | | | | | |
| **Acala** | | | | | | | | | |
| April 15 | | | 17 | 17 | 17 | 16 | 13 | | 16 |
| May 1 | | | 17 | 17 | 17 | 16 | | 13 | 16 |
| May 15 | | | 17 | 16 | 16 | | 12 | 14 | 15 |
| June 1 | | | 17 | 16 | 16 | 16 | 12 | 15 | 15 |
| June 15 | | | | 16 | 16 | 16 | 13 | 15 | 15 |
| Average | | | 17 | 16 | 16 | 16 | 13 | 14 | 15 |

**TABLE V.—(Continued)**

| Variety and date of planting | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
|---|---|---|---|---|---|---|---|---|---|
| **Mebane** | | | | | | | | | |
| April 15 | | | 15 | 17 | 16 | 15 | 11 | | 15 |
| May 1 | | | 17 | 16 | 16 | 15 | | 16 | 16 |
| May 15 | | | 16 | 17 | 16 | | 10 | 15 | 15 |
| June 1 | | | 16 | 16 | 15 | 15 | 12 | 15 | 15 |
| June 15 | | | | 15 | 14 | 15 | 13 | 14 | 14 |
| Average | | | 16 | 16 | 15 | 15 | 12 | 15 | 15 |
| **Rowden** | | | | | | | | | |
| April 15 | | | 15 | 17 | 16 | 16 | 11 | | 15 |
| May 1 | | | 16 | 16 | 16 | 16 | | 15 | 16 |
| May 15 | | | 17 | 16 | 16 | | 13 | 15 | 15 |
| June 1 | | | 17 | 17 | 14 | 15 | 12 | 15 | 15 |
| June 15 | | | | 16 | 14 | 15 | 12 | 15 | 14 |
| Average | | | 16 | 16 | 15 | 16 | 12 | 15 | 15 |
| **Half and Half** | | | | | | | | | |
| April 15 | | | 14 | 11 | 12 | 11 | 9 | | 11 |
| May 1 | | | 10 | 11 | 10 | 11 | | 11 | 11 |
| May 15 | | | 9 | 11 | 10 | | 9 | 11 | 10 |
| June 1 | | | 10 | 11 | 10 | 11 | 10 | 11 | 11 |
| June 15 | | | | 11 | 10 | 11 | 10 | 11 | 11 |
| Average | | | 11 | 11 | 10 | 11 | 10 | 11 | 11 |
| **Okla. Triumph 44** | | | | | | | | | |
| April 15 | | | 16 | 16 | 16 | 16 | 15 | | 16 |
| May 1 | | | 16 | 16 | 16 | 16 | | 15 | 16 |
| May 15 | | | 16 | 16 | 15 | | 14 | 15 | 15 |
| June 1 | | | 16 | 16 | 15 | 14 | 14 | 16 | 15 |
| June 15 | | | | 16 | 15 | 15 | 12 | 16 | 15 |
| Average | | | 16 | 16 | 15 | 15 | 14 | 16 | 15 |
| **Russell** | | | | | | | | | |
| April 15 | | | 17 | 17 | 16 | 15 | 12 | | 15 |
| May 1 | | | 15 | 17 | 16 | 15 | | 16 | 16 |
| May 15 | | | 17 | 16 | 16 | | 12 | 15 | 15 |
| June 1 | | | 17 | 16 | 15 | 15 | 13 | 15 | 15 |
| June 15 | | | | 16 | 15 | 15 | | 16 | 16 |
| Average | | | 17 | 16 | 16 | 15 | 12 | 16 | 15 |
| **Average, all varieties** | | | | | | | | | |
| April 15 | | | 16 | 16 | 16 | 15 | 12 | | 15 |
| May 1 | | | 15 | 16 | 15 | 15 | | 14 | 15 |
| May 15 | | | 15 | 15 | 15 | | 12 | 14 | 14 |
| June 1 | | | 16 | 15 | 14 | 14 | 12 | 15 | 14 |
| June 15 | | | | 15 | 14 | 15 | 12 | 15 | 14 |
| Average | | | 15 | 15 | 15 | 15 | 12 | 14 | 14 |

**TABLE V.—(Continued)**

| Variety and date of planting | LINT PERCENTAGE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
| **Acala** | | | | | | | | | |
| April 15 | 39.2 | 32.4 | 38.0 | 38.1 | 36.5 | 41.2 | 30.4 | | 36.5 |
| May 1 | 37.9 | 40.7 | 36.6 | 36.8 | 36.7 | 40.3 | | 35.3 | 37.8 |
| May 15 | 34.4 | 41.2 | 36.2 | 40.2 | 37.0 | | 39.4 | 35.3 | 37.7 |
| June 1 | 38.1 | 41.2 | 35.7 | 40.7 | 39.2 | 40.2 | 42.0 | 35.8 | 39.1 |
| June 15 | 39.1 | | | 42.8 | 38.6 | 40.2 | 40.0 | 34.9 | 39.3 |
| Average | 37.7 | 38.9 | 36.6 | 39.7 | 37.6 | 40.5 | 38.0 | 35.3 | 38.1 |
| **Mebane** | | | | | | | | | |
| April 15 | | | 38.0 | 39.8 | 39.8 | 42.6 | 47.1 | | 41.5 |
| May 1 | 36.6 | 45.7 | 38.7 | 38.6 | 38.5 | 41.5 | | 39.5 | 39.9 |
| May 15 | 35.5 | 40.5 | 39.5 | 40.4 | 42.3 | | 42.3 | 38.4 | 39.8 |
| June 1 | 33.3 | 38.5 | 34.3 | 41.6 | 40.6 | 38.8 | 40.0 | 39.7 | 38.4 |
| June 15 | 37.5 | | | 41.9 | 40.4 | 41.1 | 39.3 | 38.3 | 39.8 |
| Average | 35.7 | 41.6 | 37.6 | 40.5 | 40.3 | 41.0 | 42.2 | 39.0 | 39.9 |
| **Rowden** | | | | | | | | | |
| April 15 | 37.5 | 44.8 | 36.6 | 35.4 | 34.3 | 39.2 | 37.5 | | 37.9 |
| May 1 | 38.1 | 43.5 | 34.9 | 35.7 | 34.7 | 38.0 | | 31.9 | 36.7 |
| May 15 | 40.7 | 39.5 | 36.4 | 36.9 | 34.3 | | 37.5 | 31.9 | 36.7 |
| June 1 | 42.0 | 40.0 | 35.7 | 36.1 | 39.2 | 33.9 | 34.8 | 33.0 | 36.8 |
| June 15 | 31.3 | | | 36.2 | 35.5 | 36.3 | 37.5 | 31.7 | 34.8 |
| Average | 37.9 | 42.0 | 35.9 | 36.1 | 35.6 | 36.9 | 36.8 | 32.1 | 36.6 |
| **Half and Half** | | | | | | | | | |
| April 15 | 40.5 | 43.3 | 40.0 | 47.8 | 44.0 | 47.2 | 47.8 | | 44.4 |
| May 1 | 39.1 | 46.3 | 41.0 | 46.0 | 45.7 | 48.8 | | 42.2 | 44.2 |
| May 15 | 44.4 | 43.8 | 38.2 | 47.4 | 47.2 | | 51.5 | 43.8 | 45.2 |
| June 1 | 46.1 | 43.8 | 39.0 | 49.5 | 43.8 | 40.4 | 47.5 | 41.6 | 44.0 |
| June 15 | 50.0 | | | 49.4 | 45.8 | 39.3 | 46.2 | 42.4 | 45.5 |
| Average | 44.0 | 44.3 | 39.6 | 48.0 | 45.3 | 43.9 | 48.3 | 42.5 | 44.7 |
| **Okla. Triumph 44** | | | | | | | | | |
| April 15 | | 31.6 | 38.1 | 36.7 | 34.3 | 35.3 | 34.6 | | 35.1 |
| May 1 | | 37.8 | 37.7 | 36.2 | 35.7 | 38.3 | | 30.9 | 36.1 |
| May 15 | 31.8 | 39.6 | 36.8 | 36.9 | 35.3 | | 34.2 | 30.9 | 35.1 |
| June 1 | 31.0 | 38.5 | 37.2 | 39.2 | 34.4 | 36.2 | 35.0 | 31.4 | 35.4 |
| June 15 | 33.3 | | | 43.2 | 36.2 | 36.8 | 35.7 | 33.3 | 36.4 |
| Average | 32.0 | 36.9 | 37.5 | 38.4 | 35.2 | 36.7 | 34.9 | 31.6 | 35.6 |
| **Russell** | | | | | | | | | |
| April 15 | | | 37.3 | 37.7 | 37.7 | 39.2 | 37.5 | | 37.9 |
| May 1 | | 41.5 | 36.6 | 38.2 | 38.1 | 38.1 | | 35.6 | 38.0 |
| May 15 | | 45.2 | 39.1 | 39.1 | 38.5 | | 40.4 | 35.9 | 39.7 |
| June 1 | | 41.7 | 34.1 | 38.0 | 39.6 | 36.0 | 35.6 | 38.3 | 37.7 |
| June 15 | | | | 41.9 | 37.5 | 37.1 | 36.8 | 33.0 | 37.3 |
| Average | | 42.8 | 36.8 | 39.0 | 38.3 | 37.6 | 37.6 | 35.8 | 38.1 |

**TABLE V.—(Continued)**

| Variety and date of planting | LINT PERCENTAGE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
| **Average, all varieties** | | | | | | | | | |
| April 15 | 39.1 | 38.0 | 38.0 | 39.3 | 37.8 | 40.8 | 39.2 | --- | 38.9 |
| May 1 | 37.9 | 42.6 | 37.6 | 38.6 | 38.2 | 40.8 | | 35.9 | 38.8 |
| May 15 | 37.4 | 41.6 | 37.7 | 40.2 | 39.1 | | 40.9 | 36.0 | 39.0 |
| June 1 | 38.1 | 40.6 | 36.0 | 40.9 | 39.5 | 37.6 | 39.2 | 36.7 | 38.6 |
| June 15 | 38.2 | --- | --- | 42.6 | 39.0 | 38.5 | 39.3 | 35.6 | 38.9 |
| Average | 38.1 | 40.7 | 37.3 | 40.3 | 38.7 | 39.4 | 39.6 | 36.1 | 38.8 |
| | ACRE YIELDS OF SEED COTTON (POUNDS) | | | | | | | | |
| **Acala** | | | | | | | | | |
| April 15 | 488 | 567 | 692 | 1,696 | 625 | 680 | 115 | 0 | 608 |
| May 1 | 1,088 | 450 | 900 | 1,563 | 600 | 595 | | 855 | 864 |
| May 15 | 962 | 850 | 829 | 1,225 | 635 | | 165 | 850 | 788 |
| June 1 | 938 | 567 | 233 | 992 | 370 | 435 | 250 | 598 | 548 |
| June 15 | 600 | 0 | 0 | 458 | 220 | 485 | 175 | 350 | 286 |
| Average | 815 | 487 | 531 | 1,187 | 490 | 549 | 176 | 531 | 619 |
| **Mebane** | | | | | | | | | |
| April 15 | --- | --- | 746 | 1,288 | 415 | 610 | 85 | 0 | 524 |
| May 1 | 888 | 583 | 808 | 1,317 | 455 | 650 | | 715 | 774 |
| May 15 | 835 | 700 | 696 | 1,083 | 485 | | 130 | 745 | 668 |
| June 1 | 788 | 433 | 146 | 921 | 320 | 335 | 325 | 530 | 475 |
| June 15 | 350 | 0 | 0 | 329 | 235 | 450 | 140 | 267 | 221 |
| Average | 715 | 429 | 479 | 988 | 382 | 511 | 170 | 451 | 532 |
| **Rowden** | | | | | | | | | |
| April 15 | 463 | 483 | 604 | 1,483 | 510 | 600 | 80 | 0 | 528 |
| May 1 | 950 | 383 | 704 | 1,354 | 490 | 540 | | 715 | 734 |
| June 1 | 650 | 500 | 117 | 729 | 255 | 310 | 230 | 483 | 409 |
| May 15 | 382 | 717 | 550 | 983 | 495 | | 200 | 705 | 576 |
| June 15 | 300 | 0 | 0 | 229 | 155 | 455 | 120 | 233 | 187 |
| Average | 549 | 417 | 395 | 956 | 381 | 476 | 158 | 427 | 487 |
| **Half and Half** | | | | | | | | | |
| April 15 | 913 | 500 | 708 | 1,629 | 670 | 615 | 115 | 0 | 644 |
| May 1 | 988 | 683 | 833 | 1,496 | 590 | 625 | | 720 | 848 |
| May 15 | 806 | 800 | 796 | 1,188 | 615 | | 165 | 690 | 723 |
| June 1 | 913 | 533 | 267 | 808 | 320 | 470 | 305 | 480 | 512 |
| June 15 | 475 | 0 | 0 | 354 | 240 | 445 | 195 | 267 | 247 |
| Average | 819 | 503 | 521 | 1,095 | 487 | 539 | 195 | 431 | 595 |
| **Okla. Triumph 44** | | | | | | | | | |
| April 15 | --- | 317 | 788 | 1,758 | 715 | 765 | 130 | 0 | 639 |
| May 1 | --- | 617 | 829 | 1,775 | 785 | 810 | --- | 795 | 935 |
| May 15 | 848 | 800 | 804 | 1,321 | 750 | --- | 190 | 810 | 789 |
| June 1 | 888 | 650 | 325 | 1,138 | 465 | 525 | 300 | 650 | 618 |
| June 15 | 450 | 0 | 0 | 579 | 290 | 570 | 210 | 342 | 305 |
| Average | 729 | 477 | 549 | 1,314 | 601 | 668 | 208 | 519 | 657 |

**TABLE V.—(Continued)**

| Variety and date of planting | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
|---|---|---|---|---|---|---|---|---|---|
| **Russell** | | | | | | | | | |
| April 15 | | | 638 | 1,558 | 490 | 650 | 80 | 0 | 569 |
| May 1 | | 683 | 763 | 1,408 | 420 | 565 | | 780 | 770 |
| May 15 | | 700 | 725 | 1,150 | 520 | | 235 | 700 | 672 |
| June 1 | | 400 | 171 | 900 | 240 | 335 | 295 | 453 | 399 |
| June 15 | | 0 | 0 | 308 | 150 | 388 | 95 | 208 | 164 |
| Average - - - | | 446 | 459 | 1,065 | 364 | 485 | 176 | 428 | 515 |
| **Average, all varieties** | | | | | | | | | |
| April 15 | 621 | 467 | 696 | 1,569 | 571 | 653 | 101 | 0 | 585 |
| May 1 | 979 | 567 | 806 | 1,486 | 557 | 631 | | 763 | 821 |
| May 15 | 767 | 761 | 733 | 1,158 | 583 | | 181 | 750 | 703 |
| June 1 | 835 | 514 | 210 | 915 | 328 | 402 | 284 | 532 | 494 |
| June 15 | 435 | 0 | 0 | 376 | 215 | 466 | 156 | 278 | 235 |
| Average - - - | 727 | 462 | 489 | 1,101 | 451 | 538 | 181 | 465 | 568 |
| | ACRE YIELDS OF LINT (POUNDS) | | | | | | | | |
| **Acala** | | | | | | | | | |
| April 15 | 191 | 183 | 263 | 646 | 230 | 280 | 35 | 0 | 229 |
| May 1 | 412 | 183 | 329 | 575 | 220 | 240 | | 302 | 323 |
| May 15 | 331 | 350 | 300 | 492 | 235 | | 65 | 300 | 296 |
| June 1 | 358 | 233 | 83 | 404 | 145 | 175 | 105 | 214 | 215 |
| June 15 | 235 | 0 | 0 | 196 | 85 | 195 | 70 | 123 | 113 |
| Average - - - | 305 | 190 | 195 | 463 | 183 | 223 | 69 | 188 | 235 |
| **Mebane** | | | | | | | | | |
| April 15 | | | 283 | 513 | 165 | 260 | 40 | 0 | 210 |
| May 1 | 325 | 267 | 313 | 508 | 175 | 270 | | 282 | 306 |
| May 15 | 297 | 283 | 275 | 438 | 205 | | 55 | 286 | 263 |
| June 1 | 263 | 167 | 50 | 383 | 130 | 130 | 130 | 211 | 183 |
| Jne 15 | 132 | 0 | 0 | 138 | 95 | 185 | 55 | 102 | 88 |
| Average - - - | 254 | 179 | 184 | 396 | 154 | 211 | 70 | 176 | 210 |
| **Rowden** | | | | | | | | | |
| April 15 | 174 | 217 | 221 | 525 | 175 | 235 | 30 | 0 | 197 |
| May 1 | 363 | 167 | 246 | 483 | 170 | 205 | | 228 | 266 |
| May 15 | 156 | 283 | 200 | 363 | 170 | | 75 | 225 | 210 |
| June 1 | 275 | 200 | 42 | 263 | 100 | 105 | 80 | 159 | 153 |
| June 15 | 94 | 0 | 0 | 83 | 55 | 165 | 45 | 74 | 65 |
| Average - - - | 212 | 173 | 142 | 343 | 134 | 178 | 58 | 137 | 178 |
| **Half and Half** | | | | | | | | | |
| April 15 | 370 | 217 | 283 | 779 | 295 | 290 | 55 | 0 | 286 |
| May 1 | 386 | 317 | 342 | 688 | 270 | 305 | | 304 | 373 |
| May 15 | 356 | 350 | 304 | 563 | 290 | | 85 | 302 | 321 |
| June 1 | 421 | 233 | 104 | 400 | 140 | 190 | 145 | 200 | 229 |
| June 15 | 238 | 0 | 0 | 175 | 110 | 175 | 90 | 113 | 113 |
| Average - - - | 354 | 223 | 207 | 521 | 221 | 240 | 94 | 184 | 264 |

**TABLE V.—(Continued)**

| Variety and date of planting | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Ave. |
|---|---|---|---|---|---|---|---|---|---|
| **Okla. Triumph 44** | | | | | | | | | |
| April 15 | --- | 100 | 300 | 646 | 245 | 270 | 45 | 0 | 229 |
| May 1 | --- | 233 | 313 | 642 | 280 | 310 | | 246 | 337 |
| May 15 | 270 | 317 | 296 | 488 | 265 | | 65 | 250 | 279 |
| June 1 | 275 | 250 | 121 | 446 | 160 | 190 | 105 | 204 | 219 |
| June 15 | 150 | 0 | 0 | 250 | 105 | 210 | 75 | 114 | 113 |
| Average - - - | 232 | 180 | 206 | 494 | 211 | 245 | 73 | 163 | 235 |
| **Russell** | | | | | | | | | |
| April 15 | --- | --- | 238 | 588 | 185 | 255 | 30 | 0 | 216 |
| May 1 | --- | 283 | 279 | 538 | 160 | 215 | | 278 | 292 |
| May 15 | --- | 317 | 283 | 450 | 200 | | 95 | 251 | 266 |
| June 1 | --- | 167 | 58 | 342 | 95 | 120 | 105 | 176 | 152 |
| June 15 | --- | 0 | 0 | 129 | 56 | 144 | 35 | 69 | 62 |
| Average - - - | --- | 192 | 172 | 409 | 139 | 184 | 66 | 155 | 198 |
| **Average, all varieties** | | | | | | | | | |
| April 15 | 245 | 179 | 265 | 616 | 216 | 265 | 39 | 0 | 228 |
| May 1 | 372 | 242 | 304 | 572 | 213 | 258 | | 273 | 316 |
| May 15 | 282 | 317 | 276 | 466 | 228 | | 73 | 269 | 273 |
| June 1 | 318 | 208 | 76 | 373 | 128 | 152 | 112 | 194 | 192 |
| June 15 | 170 | 0 | 0 | 162 | 84 | 179 | 62 | 99 | 92 |
| Average - - - | 277 | 190 | 184 | 438 | 174 | 213 | 71 | 167 | 220 |

### Spacing Tests

The optimum distance and arrangement of cotton plants in the row to produce maximum yields has been the subject of much experimentation among investigators and of discussion and trial by practical growers. Within recent years the problem has received extensive and serious consideration throughout the entire cotton growing belt.

In the boll-weevil sections where precipitation and humidity are high, the system of closer spacing proved advantageous by increasing the rapidity of fruiting development and hastening maturity, thereby reducing boll-weevil damage. Within recent years the possibilities of closer spacing have received rather extensive consideration in western Oklahoma and in western Texas where the boll weevil is not a menace, but where a deficiency of precipitation, cool spring temperatures, disastrous soil-blowing winds, and hot growing seasons are likely to be determining factors in the yields obtained. It is also important in the northern edge of these sections that maturity be advanced as rapidly as possible to avoid early killing frosts. Thinning cotton to a satisfactory distance has always been an important factor in the cost of production. If this cost can be materially reduced or eliminated by thick spacing, even though it results in slightly lower yields, the method at once commands careful attention and thorough trial in any section of the cotton-growing belt.

Factors other than yields enter into the determination of the most advantageous spacing of cotton. The 3-inch spacing may be regarded as an extreme in close spacing and the 18-inch space in 88-inch rows as an extreme in wide spacing. The use of a large amount of seed and favorable germinating conditions are required to produce a 3-inch stand or even a

6-inch stand that is uniform. On the other hand, farm machinery is not adapted to the planting or cultivating of wide rows and some extra labor is entailed under such an arrangement.

When the thick spacing is practiced, climatic conditions may become so severe that normal plant growth and fruiting development are restricted. Furthermore, this condition may continue late in the fall and the small bolls will not open sufficiently to permit picking until late in the season. On the other hand, vegetable growth and development on the wide spacings may be stimulated and continued so late in the season as to interfere with normal maturity.

A single comparison of yields from 6-inch and 12-inch spacings from 1916 to 1931, with the exception of one year, 1919, is presented in Table VI. During the 15 years compared, the 6-inch spacing outyielded the 12-inch spacing in only three years, 1916, 1917, and 1918. In 1929 the yield of lint was the same from each spacing. In the remaining 11 years the increased yield from the 12-inch spacing ranged from 7 to 108 pounds of lint to the acre. The average increase in yield of lint cotton from the 12-inch spacing for the 15 years was 29 pounds to the acre.

Results obtained from more extensive spacing tests from 1924 to 1931 are shown in Table VII.

**TABLE VI.—Annual and Average Yields of Cotton Spaced 6 Inches and 12 Inches Apart in 44-inch Rows at Lawton, Oklahoma, for the Years Specified.**

| | ACRE YIELD OF LINT (POUNDS) | | ACRE YIELD OF SEED COTTON (POUNDS) | |
|---|---|---|---|---|
| Year | Spaced 6 inches | Spaced 12 inches | Spaced 6 inches | Spaced 12 inches |
| 1916 | 140 | 120 | 376 | 331 |
| 1917 | 124 | 118 | 325 | 311 |
| 1918 | 0 | 0 | 0 | 0 |
| 1920 | 342 | 385 | 955 | 1,090 |
| 1921 | 123 | 145 | 353 | 420 |
| 1922 | 72 | 86 | 224 | 245 |
| 1923 | 121 | 192 | 341 | 541 |
| 1924 | 380 | 405 | 1,000 | 1,067 |
| 1925 | 150 | 211 | 367 | 533 |
| 1926 | 242 | 350 | 633 | 850 |
| 1927 | 467 | 492 | 1,233 | 1,292 |
| 1928 | 208 | 200 | 567 | 533 |
| 1929 | 233 | 233 | 608 | 642 |
| 1930 | 50 | 75 | 125 | 167 |
| 1931 | 247 | 331 | 740 | 971 |
| Average, 15 years | 194 | 223 | 523 | 600 |

**TABLE VII.—Annual and Average Yields of Cotton in Spacing Tests at Lawton, Oklahoma, from 1924 to 1931 Inclusive.**

| Width of row and spacing of plants in the row | ACRE YIELDS OF LINT (POUNDS) | | | | | | | | AVERAGE | | 1925-1931 departure from single plant, 18-inch space, 44-inch row | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1925 to 1931 | Pounds lint | Per cent |
| **44-inch rows** | | | | | | | | | | | | |
| 3 inches | | 122 | 192 | 475 | 200 | 192 | 42 | 249 | | 210 | −91 | 30.2 |
| 6 inches | 380 | 150 | 242 | 467 | 208 | 233 | 50 | 247 | 247 | 228 | −73 | 24.3 |
| 12 inches | 405 | 211 | 350 | 492 | 200 | 233 | 75 | 331 | 287 | 270 | −31 | 10.3 |
| 12 inches (2 plants) | 371 | 178 | 233 | 508 | 183 | 200 | 67 | 357 | 262 | 247 | −54 | 17.9 |
| 18 inches | 461 | 232 | 317 | 558 | 200 | 292 | 75 | 434 | 321 | 301 | 0 | 0 |
| 18 inches (2 plants) | | 187 | 233 | 500 | 200 | 283 | 67 | 427 | | 271 | −30 | 10.0 |
| 24 inches | 451 | 232 | 333 | 517 | 217 | 283 | 67 | 390 | 311 | 291 | −10 | 3.3 |
| 24 inches (2 plants) | | 230 | 275 | 500 | 225 | 325 | 67 | 351 | | 282 | −19 | 6.3 |
| **88-inch rows** | | | | | | | | | | | | |
| 3 inches | | 167 | 321 | 313 | 158 | 250 | 50 | 281 | | 220 | −81 | 26.9 |
| 6 inches | 317 | 204 | 358 | 354 | 188 | 221 | 50 | 273 | 246 | 235 | −66 | 21.9 |
| 12 inches | 291 | 237 | 367 | 350 | 183 | 204 | 71 | 315 | 252 | 247 | −54 | 17.9 |
| 12 inches (2 plants) | 291 | 212 | 313 | 354 | 183 | 217 | 67 | 344 | 248 | 241 | −60 | 19.9 |
| 18 inches | 266 | 240 | 300 | 350 | 163 | 217 | 71 | 326 | 242 | 238 | −63 | 20.9 |
| 18 inches (2 plants) | 253 | 275 | 321 | 350 | 175 | 204 | 79 | 339 | 250 | 249 | −52 | 17.3 |

**TABLE VII.—(Continued)**

| Width of row and spacing of plants in the row | ACRE YIELDS OF SEED COTTON (POUNDS) | | | | | | | | AVERAGE | | 1925-1931 departure from single plant, 18-inch space, 44-inch row | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1925 to 1931 | Pounds lint | Per cent |
| **44-inch rows** | | | | | | | | | | | | |
| 3 inches | | 300 | 483 | 1,233 | 525 | 550 | 92 | 717 | | 557 | | |
| 6 inches | 1,000 | 367 | 633 | 1,233 | 567 | 608 | 125 | 740 | 659 | 610 | | |
| 12 inches | 1,067 | 533 | 850 | 1,292 | 533 | 642 | 167 | 971 | 757 | 713 | | |
| 12 inches (2 plants) | 975 | 433 | 617 | 1,308 | 483 | 550 | 158 | 1,021 | 693 | 653 | | |
| 18 inches | 1,213 | 567 | 792 | 1,442 | 517 | 770 | 167 | 1,252 | 840 | 787 | | |
| 18 inches (2 plants) | | 467 | 617 | 1,300 | 533 | 742 | 167 | 1,229 | | 722 | | |
| 24 inches | 1,188 | 567 | 900 | 1,350 | 550 | 733 | 142 | 1,179 | 826 | 774 | | |
| 24 inches (2 plants) | | 567 | 725 | 1,367 | 533 | 850 | 150 | 1,050 | | 749 | | |
| **88-inch rows** | | | | | | | | | | | | |
| 3 inches | | 408 | 838 | 796 | 442 | 646 | 133 | 848 | | 587 | | |
| 6 inches | 833 | 500 | 950 | 913 | 488 | 575 | 129 | 808 | 650 | 623 | | |
| 12 inches | 767 | 583 | 950 | 925 | 483 | 546 | 175 | 931 | 670 | 656 | | |
| 12 inches (2 plants) | 767 | 517 | 846 | 917 | 463 | 571 | 154 | 1,001 | 655 | 638 | | |
| 18 inches | 700 | 592 | 783 | 917 | 413 | 571 | 188 | 977 | 643 | 634 | | |
| 18 inches (2 plants) | 667 | 683 | 838 | 892 | 450 | 546 | 183 | 1,025 | 661 | 660 | | |

In spacing experiments where Acala cotton was used, the plants were thinned by count and measurement to conform as nearly as possible to the space desired. Plants spaced 12 to 24 inches apart were thinned at the usual time, when 4 to 6 true leaves had developed. Thinning of the thick spacings, 3 and 6 inches, was delayed until crowding was sufficient to suppress vegetative branches. Eight or more true leaves were usually present at this time. Each plot in the 44-inch rows was 0.05 acre in size, but the two outside rows were used as guard rows and the yields were calculated from the inside rows, which equalled 0.03 acre. Plots involving 88-inch rows were handled in the same manner, but the plot yield was calculated from 0.06 acre. All rates of spacing with open cotton were picked at the same time, and the weight of each row recorded separately.

In 1924, plant stands in the 3-inch spacing in the 44-inch and the 88-inch rows varied from 6.5 to 8.3 inches, making it impossible to include yields and other data in the accompanying tables. The use of two plants to the hill in the 18-inch and in the 24-inch spacings in both row widths was begun in 1925.

In the 44-inch rows the average yield of lint cotton increased with each increase in the space between plants up to the 18-inch spacing, from 210 pounds on the 3-inch spacing to 301 pounds on the 18-inch spacing, one plant to the hill. The difference of 91 pounds between the lowest and highest average yield amounts to 30.2 per cent in favor of single plants spaced 18 inches apart. In the 88-inch rows the average yields of lint cotton on the 3-inch and the 6-inch spacings were slightly less than from any other spacings. Although the difference in average yields between all spacings in the 88-inch rows is small, the preference seems to be in favor of single plants spaced 12 inches apart or two plants per hill 18 inches apart. Yields from the close spacings of 3 and 6 inches in the 88-inch rows were not sufficiently greater than those in the 44-inch rows to justify the use of wide rows. The 7-year average yield of 228 pounds of lint from the 6-inch spacing in the 44-inch rows, the third lowest yield of all spacings tested, was 18 pounds more than that on the 3-inch spacing, and 42 and 73 pounds less than that on the 12-inch and the 18-inch spacings, respectively.

When the average yields for 7 years from single plants spaced 12, 18, and 24 inches apart in 44-inch rows are compared, the 18-inch spacing has an advantage of 31 pounds of lint over the 12-inch spacing, but only 10 pounds more than the 24-inch spacing. This would indicate that a variation in space from 18 to 24 inches between plants may be practiced with but little difference in yield.

The use of two plants to the hill spaced 12, 18, and 24 inches apart in the 44-inch rows depressed the yield of lint cotton in each instance, the more significant decreases occurring in the 12-inch and 18-inch spacings. However, the yield of lint is slightly increased when the yields from two plants to the hill spaced 12 and 24 inches apart are compared with those from single plants spaced 6 and 12 inches apart.

In the 88-inch rows, two plants to the hill yielded 6 pounds less than single plants spaced 12 inches apart and 11 pounds more than single plants when spaced 18 inches apart. When two plants to the hill were spaced 12 inches apart in the 88-inch rows, the average yield of lint was only 6 pounds greater than that obtained from single plants 6 inches apart.

The data in Table VII emphasize the fact that climatic conditions will have a determining influence on the yields to be obtained from the different spacings. In 1930 the drought was so severe that lint cotton yields were negligible regardless of the row width and the plant space used.

The actual space obtained between plants in the row each year is shown in Table VIII. The actual space secured generally was very close to the desired distance.

**TABLE VIII.—Annual and Average Actual Plant Space in the Row for Cotton Spacing Tests at the Lawton, Oklahoma, Field Station for the Years Specified.**

| Width of row and spacing of plants in the row | ACTUAL PLANT SPACE (INCHES) | | | | | | | | AVERAGE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1925 to 1931 |
| **44-inch rows** | | | | | | | | | | |
| 3 inches | --- | 2.9 | 2.7 | 3.0 | 3.0 | 3.0 | 3.1 | 3.0 | --- | 3.0 |
| 6 inches | 9.4 | 7.2 | 6.2 | 6.1 | 6.1 | 5.9 | 5.7 | 5.9 | 6.6 | 6.2 |
| 12 inches | 12.1 | 12.7 | 12.0 | 12.0 | 12.2 | 12.6 | 12.1 | 12.0 | 12.2 | 12.2 |
| 12 inches (2 plants) | 9.4 | 6.2 | 6.0 | 6.2 | 6.7 | 6.4 | 5.9 | 6.3 | 6.6 | 6.2 |
| 18 inches | 18.9 | 17.7 | 18.0 | 17.9 | 18.4 | 18.7 | 17.5 | 17.9 | 18.1 | 18.0 |
| 18 inches (2 plants) | --- | 9.3 | 9.0 | 9.1 | 10.2 | 9.6 | 9.1 | 9.1 | --- | 9.3 |
| 24 inches | 23.3 | 22.8 | 23.6 | 23.0 | 25.0 | 26.1 | 23.1 | 23.6 | 23.8 | 23.9 |
| 24 inches (2 plants) | --- | 12.0 | 11.9 | 12.0 | 12.7 | 12.8 | 11.9 | 12.2 | --- | 12.2 |
| **88-inch rows** | | | | | | | | | | |
| 3 inches | --- | 3.3 | 2.8 | 3.2 | 3.0 | 3.0 | 3.0 | 3.0 | --- | 3.0 |
| 6 inches | 7.8 | 6.5 | 6.0 | 6.5 | 6.1 | 6.0 | 5.9 | 6.0 | 6.4 | 6.1 |
| 12 inches | 11.1 | 12.5 | 12.0 | 12.3 | 11.8 | 13.2 | 12.0 | 12.3 | 12.2 | 12.3 |
| 12 inches (2 plants) | 7.8 | 6.6 | 6.0 | 6.1 | 6.2 | 6.3 | 6.0 | 6.2 | 6.4 | 6.2 |
| 18 inches | 18.7 | 18.9 | 17.7 | 18.3 | 18.1 | 18.7 | 18.3 | 18.1 | 18.4 | 18.3 |
| 18 inches (2 plants) | 10.8 | 9.4 | 9.2 | 8.9 | 9.5 | 9.2 | 9.0 | 9.0 | 9.4 | 9.2 |

Table IX shows the number of days from emergence to each picking and the percentage of the total crop picked on each picking date for each spacing from 1925 to 1931.

In 1925 when hot, dry seasonal conditions were so severe, 100 per cent of the crop from the 3-inch and the 6-inch spacings in the 44-inch rows was picked November 21 to 24, and approximately 70 per cent of the crop from the 18-inch and 56 per cent from the 24-inch spacings was picked October 6 and 7. The percentages of the total crop picked on the first picking date of the extreme thick spacing of 3 inches in the 44-inch rows and the thin spacing of single plants 18-inches apart in the 88-inch rows, from 1926 to 1931, show that maturity is distinctly hastened by thick spacing. Comparisons of spacings in individual years show somewhat similar results, but there are frequent exceptions due to climatic conditions.

As shown in Table IX, the first picking date ranged from August 20 to October 6, and the last picking date ranged from October 12 to December 5. In the 44-inch rows the number of pickings never exceeded three, but in the 88-inch rows four pickings were necessary three years out of eight.

**TABLE IX.—Percentage of the Total Crop of Cotton Picked on Each Picking Date in the Spacing Tests at Lawton, Oklahoma, from 1925 to 1931.**

| Date of picking | Number of days from emergence to picking | PERCENTAGE OF CROP PICKED ON EACH DATE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 44-INCH ROWS | | | | | | | | 88-INCH ROWS | | | | | |
| | | 3-in. space | 6-in. space | 12-in. space | 12-in. space (2 plts.) | 18-in. space | 18-in. space (2 plts.) | 24-in. space | 24-in. space (2 plts.) | 3-in. space | 6-in. space | 12-in. space | 12-in. space (2 plts.) | 18-in. space | 18-in. space (2 plts.) |
| **1925**—October 6-7 | 131 | --- | --- | 68.7 | 57.7 | 70.6 | 71.4 | 55.9 | 57.4 | 51.0 | 43.8 | 49.3 | 45.2 | 40.1 | 30.7 |
| October 30 | 155 | | | | --- | | --- | 25.0 | 19.1 | 16.3 | 28.9 | 25.7 | 22.6 | 28.9 | 34.0 |
| November 21-24 | 117 | 100.0 | 100.0 | 31.3 | 42.3 | 29.4 | 28.6 | 19.6 | 23.5 | 32.7 | 27.3 | 25.0 | 32.2 | 31.0 | 35.3 |
| **1926**—September 17-20 | 117 | 78.2 | 74.9 | 57.9 | 87.4 | 55.6 | 76.1 | 53.2 | 70.6 | 30.3 | 40.8 | 28.4 | 40.9 | 25.0 | 22.5 |
| October 26-28 | 156 | 27.8 | 25.1 | 42.1 | 12.6 | 44.4 | 23.1 | 46.8 | 29.4 | 69.7 | 59.2 | 71.6 | 59.1 | 75.0 | 77.5 |
| **1927**—September 19 | 119 | 61.6 | 56.7 | 56.4 | 58.4 | 41.6 | 49.3 | 44.2 | 44.6 | 14.5 | 20.5 | 23.4 | 27.4 | 19.3 | 22.8 |
| October 11 | 141 | 30.8 | 36.1 | 36.0 | 35.0 | 43.4 | 40.4 | 40.0 | 42.4 | 33.0 | 38.1 | 37.0 | 37.9 | 32.2 | 37.7 |
| November 11 | 172 | 7.6 | 7.4 | 7.6 | 6.4 | 15.0 | 10.3 | 15.7 | 13.0 | 41.5 | 33.5 | 30.1 | 27.2 | 39.6 | 31.1 |
| December 5 | 196 | --- | --- | --- | --- | --- | --- | --- | --- | 11.0 | 7.9 | 9.5 | 7.4 | 8.9 | 8.4 |
| **1928**—September 13 | 119 | 76.2 | 76.5 | 67.2 | 62.1 | 54.8 | 56.3 | 53.0 | 50.0 | 38.1 | 32.5 | 37.1 | 38.7 | 31.3 | 25.9 |
| September 24 | 130 | 20.6 | 20.6 | 29.7 | 36.2 | 37.1 | 35.9 | 39.4 | 40.6 | 48.6 | 50.4 | 44.8 | 45.9 | 47.4 | 45.4 |
| October 12 | 148 | 3.1 | 2.9 | 3.1 | 1.7 | 8.1 | 7.8 | 7.6 | 9.4 | 13.3 | 17.1 | 18.1 | 15.3 | 21.2 | 28.7 |
| **1929**—September 20 | 109 | 33.3 | 32.4 | 42.2 | 48.5 | 40.2 | 48.3 | 31.8 | 40.2 | 25.8 | 23.9 | 25.2 | 26.2 | 24.1 | 29.0 |
| October 8 | 127 | 53.0 | 58.1 | 50.6 | 43.9 | 53.3 | 46.1 | 53.4 | 51.0 | 58.1 | 58.7 | 61.1 | 60.6 | 58.4 | 59.5 |
| November 2 | 152 | 13.6 | 9.5 | 7.7 | 7.6 | 6.5 | 5.6 | 14.8 | 8.8 | 16.1 | 17.4 | 13.8 | 13.1 | 17.5 | 11.5 |
| **1930**—August 20 | 88 | 40.0 | 31.7 | 21.8 | 27.0 | 20.5 | 20.0 | 15.2 | 17.8 | 17.8 | 20.8 | 0 | 0 | 0 | 0 |
| August 29 | 97 | 35.6 | 35.0 | 32.1 | 32.4 | 28.2 | 31.3 | 30.3 | 31.5 | 35.7 | 27.2 | 30.3 | 35.1 | 21.0 | 21.3 |
| September 18 | 117 | 24.4 | 33.3 | 46.2 | 40.5 | 51.3 | 48.8 | 54.6 | 50.7 | 46.5 | 52.0 | 63.7 | 59.5 | 67.4 | 74.1 |
| November 7 | 167 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 6.0 | 5.4 | 11.6 | 4.6 |
| **1931**—September 10 | 107 | 34.6 | 25.6 | 50.9 | 49.4 | 34.8 | 40.0 | 35.5 | 44.3 | 12.2 | 11.3 | 27.8 | 30.1 | 28.7 | 26.2 |
| September 22 | 119 | 44.5 | 41.4 | 41.2 | 41.8 | 53.4 | 48.8 | 51.6 | 45.4 | 42.4 | 39.3 | 44.6 | 47.3 | 49.8 | 51.6 |
| October 8 | 135 | 20.9 | 32.9 | 7.9 | 8.8 | 12.8 | 11.2 | 12.9 | 10.3 | 41.4 | 43.3 | 26.7 | 21.3 | 20.7 | 21.3 |
| November 9 | 167 | --- | --- | --- | --- | --- | --- | --- | --- | 4.1 | 6.1 | .8 | 1.4 | .9 | .8 |

**TABLE X.—Annual and Average Percentages of Lint and Length of Staple for Cotton in the Spacing Tests at Lawton, Oklahoma, from 1924 to 1931.**

| Width of row and spacing of plants in the row | LINT PERCENTAGE | | | | | | | | AVERAGE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1924 to 1931 | 1925 to 1931 |
| **44-inch rows** | | | | | | | | | | |
| 3 inches | | 40.7 | 39.7 | 38.5 | 38.1 | 34.9 | 45.5 | 34.7 | | 38.9 |
| 6 inches | 38.0 | 41.0 | 38.2 | 37.9 | 36.8 | 38.4 | 40.0 | 33.4 | 38.0 | 38.0 |
| 12 inches | 38.0 | 39.6 | 41.2 | 38.1 | 37.5 | 36.4 | 45.0 | 34.1 | 38.7 | 38.8 |
| 12 inches (2 plants) | 38.0 | 41.0 | 37.8 | 38.8 | 37.9 | 36.4 | 42.1 | 35.0 | 38.4 | 38.4 |
| 18 inches | 38.0 | 41.0 | 40.0 | 38.7 | 38.7 | 38.0 | 45.0 | 34.7 | 39.3 | 39.4 |
| 18 inches (2 plants) | | 40.0 | 37.8 | 38.5 | 37.5 | 38.2 | 40.0 | 34.7 | | 38.1 |
| 24 inches | 38.0 | 41.0 | 37.0 | 38.3 | 39.4 | 38.6 | 47.1 | 33.1 | 39.1 | 39.2 |
| 24 inches (2 plants) | | 40.6 | 37.9 | 36.6 | 42.2 | 38.2 | 44.4 | 33.4 | | 39.0 |
| **88-inch rows** | | | | | | | | | | |
| 3 inches | | 41.0 | 38.3 | 39.3 | 35.8 | 38.7 | 37.5 | 33.1 | | 37.7 |
| 6 inches | 38.0 | 40.7 | 37.7 | 38.8 | 38.5 | 38.4 | 38.7 | 33.8 | 38.1 | 38.1 |
| 12 inches | 38.0 | 40.6 | 38.6 | 37.8 | 37.9 | 37.4 | 40.5 | 33.8 | 38.1 | 38.1 |
| 12 inches (2 plants) | 38.0 | 41.0 | 36.9 | 38.6 | 39.5 | 38.0 | 43.2 | 34.4 | 38.7 | 38.8 |
| 18 inches | 38.0 | 40.6 | 38.3 | 38.2 | 39.4 | 38.0 | 37.8 | 33.4 | 38.0 | 38.0 |
| 18 inches (2 plants) | 38.0 | 40.3 | 38.3 | 39.2 | 38.9 | 37.4 | 43.2 | 33.1 | 38.6 | 38.6 |
| | LENGTH OF STAPLE (SIXTEENTHS INCH) | | | | | | | | | |
| **44-inch rows** | | | | | | | | | | |
| 3 inches | | 17 | 17 | 17 | 17 | 15 | 11 | 13 | | 15 |
| 6 inches | 17 | 17 | 16 | 17 | 17 | 16 | 11 | 15 | 16 | 16 |
| 12 inches | 17 | 17 | 17 | 17 | 17 | 16 | 12 | 15 | 16 | 16 |
| 12 inches (2 plants) | 17 | 17 | 17 | 17 | 17 | 16 | 12 | 14 | 16 | 16 |
| 18 inches | 17 | 17 | 17 | 17 | 16 | 16 | 13 | 14 | 16 | 16 |
| 18 inches (2 plants) | | 17 | 16 | 17 | 16 | 16 | 13 | 15 | | 16 |
| 24 inches | 17 | 17 | 17 | 17 | 17 | 16 | 14 | 15 | 16 | 16 |
| 24 inches (2 plants) | | 17 | 16 | 16 | 17 | 16 | 13 | 13 | | 15 |
| **88-inch rows** | | | | | | | | | | |
| 3 inches | | 17 | 17 | 17 | 17 | 15 | 14 | 15 | | 16 |
| 6 inches | 17 | 17 | 17 | 16 | 17 | 16 | 13 | 16 | 16 | 16 |
| 12 inches | 17 | 17 | 17 | 17 | 17 | 16 | 14 | 15 | 16 | 16 |
| 12 inches (2 plants) | 17 | 17 | 17 | 17 | 17 | 16 | 13 | 16 | 16 | 16 |
| 18 inches | 17 | 17 | 17 | 16 | 17 | 16 | 13 | 14 | 16 | 16 |
| 18 inches (2 plants) | 17 | 17 | 17 | 16 | 17 | 16 | 13 | 15 | 16 | 16 |

As shown in Table X, the rate of spacing had but little influence on the average percentage of lint or the length of staple; but the yearly variations resulting from climatic differences were pronounced.

Three years' data on the number of bolls to the pound of cotton produced by the several spacing distances under trial are given in Table XI. There is some evidence that the size of boll is reduced by thick planting.

**TABLE XI.—Number of Bolls to the Pound of Cotton Grown in Spacing Tests at Lawton, Oklahoma, from 1927 to 1929.**

| Width of row and spacing of plants in the row | NUMBER OF BOLLS PER POUND | | | |
|---|---|---|---|---|
| | 1927 | 1928 | 1929 | Average |
| **44-inch rows** | | | | |
| 3 inches | 107 | 99 | 118 | 108 |
| 6 inches | 85 | 90 | 109 | 95 |
| 12 inches | 81 | 93 | 91 | 88 |
| 12 inches (2 plants) | 95 | 94 | 92 | 94 |
| 18 inches | 71 | 83 | 97 | 84 |
| 18 inches (2 plants) | 78 | 83 | 105 | 89 |
| 24 inches | 72 | 83 | 93 | 83 |
| 24 inches (2 plants) | 80 | 92 | 95 | 89 |
| **88-inch rows** | | | | |
| 3 inches | 85 | 77 | 101 | 88 |
| 6 inches | 78 | 80 | 101 | 86 |
| 12 inches | 68 | 78 | 105 | 84 |
| 12 inches (2 plants) | 72 | 87 | 99 | 86 |
| 18 inches | 69 | 83 | 95 | 82 |
| 18 inches (2 plants) | 71 | 87 | 95 | 84 |

## Summary

A group of 13 counties in southwestern Oklahoma produced 42 per cent of the total cotton crop in the State from 1916 to 1930.

Although new cotton acreage was developed in the northwestern part of the State from 1919 to 1925, the average acre yields of lint in the State of Oklahoma have gradually decreased since 1910.

The total seasonal precipitation was not so important as the seasonal distribution. Approximately 61 per cent of the annual rainfall was received from April to September, inclusive.

The short-staple, small-boll, early-maturing varieties of cotton produced slightly larger yields of lint than the medium early maturing varieties with a staple of 15/16 to 1 inch and the large boll, late-maturing type with a similar staple. The medium early maturing type proved more desirable when the yields, length of staple, storm-proof character, quality of fiber, lint percentage, and the size of boll were considered.

Thick seeding did not overcome the difficulty in obtaining a uniform stand in early plantings. Varietal and seasonal effects had greater influence on length of staple and lint percentage than did the time of planting. The largest average yields were produced on plantings made May 1 and 15.

Single plants spaced 18 inches apart in 44-inch rows produced the largest average yields of lint for a period of 7 years. Leaving two plants in a hill resulted in somewhat lower yields in this experiment, regardless of the space between plants or the width of row used. The use of wide rows did not increase the yield of lint. Thick spacing hastened the maturity of the crop. The rate of spacing had but little influence on the average percentage of lint or the length of staple.