3-1960

# The influence of date of flowering on certain seed and fiber properties of pope cotton

Gorur N. Alasingrachar

To the Graduate Council:

I am submitting herewith a thesis written by Gorur N. Alasingrachar entitled "The influence of date of flowering on certain seed and fiber properties of pope cotton." I have examined the final electronic 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 Agronomy.

L. N. Skold, Major Professor

We have read this thesis and recommend its acceptance:

J. B. Pate, L. H. Dickson

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

February 26, 1960

To the Graduate Council:

I am submitting herewith a thesis written by Gorur N. Alasingrachar entitled "The Influence of Date of Flowering on Certain Seed and Fiber Properties of Pope Cotton." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agronomy.

Laurence V Stold
Major Professor

We have read this thesis and recommend its acceptance:

James B. Pate

Lewis M. Dickson

Accepted for the Council:

Dale Wantling
Dean of the Graduate School

# THE INFLUENCE OF DATE OF FLOWERING ON CERTAIN SEED AND FIBER PROPERTIES OF POPE COTTON

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A Thesis

Presented to

the Graduate Council of

The University of Tennessee

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In Partial Fulfillment

of the Requirements for the Degree of

Master of Science

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by

Gorur N. Alasingrachar

March 1960

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## ACKNOWLEDGEMENTS

The author is under a deep debt of gratitude to Professor Laurence N. Skold, Professor and Head, Department of Agronomy, for his sympathy, advice and encouragement in completing the present work. He is grateful to Dr. James B. Pate for his invaluable help and guidance rendered during the course of the investigation, and to Dr. Lewis H. Dickson for reviewing the thesis and giving helpful advice.

Thanks are due to Dr. Smith Worley, Jr. and personnel of the U. S. D. A. Fiber Laboratory for making the fiber tests, and to Mr. Edward N. Duncan for his consistent help and kindness rendered during the several stages of the experiment. Appreciation is expressed to Mr. Marshall C. French and field personnel of the U. S. D. A. Cotton Field Station for the help rendered.

Last but not least, to Mrs. Frank Chambers, he is thankful for typing the thesis.

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# CHAPTER I

## INTRODUCTION

The value of a cotton crop is closely related to the grade or quality of the seed and fiber. Although variety is the dominant factor in determining fiber properties, environment plays a significant part in inducing differences in fiber properties which ultimately influence the spinning performance.

The process of fiber formation begins on the day the flower opens and goes on until the boll matures. Therefore, it follows that environmental factors which influence boll development and maturation also influence the seed and fiber. The properties depend upon the environmental conditions being favorable or unfavorable from the date of blooming through boll maturation.

This study was undertaken to investigate the effect of date of flowering with subsequent attendant environmental conditions on certain seed and fiber properties.

# CHAPTER II

## REVIEW OF LITERATURE

Very limited data are available about the effects of dates of flowering and measured environmental factors on seed and fiber properties, lint percentage and yield. Hanson et al. (10) stated that the indeterminate fruiting habit of the cotton plant exposes it to environmental changes within a single season. This makes the study of the several environmental effects on cotton more difficult than for those crop plants with terminal inflorescences.

In this study, eight characters namely, shedding percentage (following flowering), boll size, lint percent, seed index, lint index, lint length, strength and fineness were considered. Hence literature concerning the effects of dates of flowering and subsequent environmental conditions on these eight characters has been reviewed.

### Shedding

The dropping of fruit forms from the cotton plant is called shedding. These forms may consist of both squares and young bolls. The act of shedding does not occur in the flower stage nor to much extent with the larger bolls, according to Brown and Ware (4).

There are various causes affecting shedding. The usual cause found by Balls (2) is shortage of water. Shedding may also take place due to injury to the top portion or to the roots of a cotton plant. Insects, diseases or mechanical damage may serve as causes for these

injuries. Besides this, there is another form of shedding called natural, or normal shedding which may be a manifestation of physiological response. This type of shedding is slight early in the season, but generally increases during the season (4). The percentage of bolls shed is determined by the variety and other conditions affecting shedding. McNamara et al. (17) found that medium to large boll varieties retained a smaller percentage of their immature bolls than small boll varieties. The criterion of success in cotton production is the number of bolls set by the plant. Ewing (7) reported that in the final stage of the fruiting period, a great many of the young bolls or immature fruits, especially the later ones, are eliminated by abscission. This is a very characteristic function of the cotton plant. Kearney (13) stated that variations in the rate of shedding within a variety are determined chiefly by environmental factors including such external factors as insects and diseases.

## Boll Size

Boll size is expressed as the number of bolls required to make one pound of seed cotton. There is a great variation among varieties in the size and shape of the bolls. Forty to fifty bolls of the largest boll upland varieties are required to make a pound of seed cotton, compared with from 80 to 110 bolls of the smaller boll upland varieties (4). Several factors affect boll size and to some extent shape. Of these, mention may be made of soil, water relations, rate of stand of the plants, position on the plant and portion of the growing season in which

the bolls matured. Sturkie (24) has found that weight per boll was reduced by a lack of moisture. The critical period in determining this character extended from 1 to 42 days after blooming.

## Lint Percent

The percentage of lint, or lint percent, as it is generally termed, is the relation between the weight of the fiber and the weight of the seed cotton from which the fiber is obtained in the process of ginning and is expressed, Meloy (18), as a percentage of the unginned seed cotton.

Hanson et al. (10) found that lint percent was most closely associated with the average of climatic factors for July and August. Low lint percent was associated with high moisture conditions and likewise very dry weather during the period of boll development. The same workers have concluded that apparently lint percentage is a very complex quality made up of several components, each being influenced by different environmental factors. Sturkie (24) found that the percentage of lint was increased by a deficiency in soil moisture. The period during which the lint percentage was determined extended from 1 to 42 days after blooming. From the foregoing it is seen that this property is variable depending upon the environmental conditions after blooming.

## Seed Index

Seed index is defined as the weight in grams of 100 seeds. This property is a very important one in that it influences lint percentage.

Balls (2) stated that seed index is determined by the size of the seed and fluctuates with lint length. Hodson (12) found a significant correlation between length of lint and weight of seed for Trice cotton in 1911.

There is relationship between lint weight, lint percentage and seed index. So all factors influencing lint percentage also affect seed index.

## Lint Index

Meloy (18) stated that lint index may be considered a measure of the abundance of the fiber rather than a measure of the relation between the weight of the fiber and weight of the seed as is the percentage of lint. The numerical value of this character may indicate the merit or demerit of a variety.

Cook (5) emphasized the importance of using lint index as an additional standard for evaluation of cotton varieties.

This property is subject to variation due to the several factors which influence the other characters mentioned before. Sturkie (24) found that lint index was reduced by a deficiency of soil moisture.

## Lint Length

A study of lint length resolves itself into a study of cell nutrition which is complicated by numerous variable factors. It is recognized that environmental conditions during the period of fiber development influence the physical properties of cotton fiber.

The initiation of lint starts on the day or the day after flowering (4). Farr (8) considered the process of fiber formation as a cellular phenomenon covering mainly two phases of growth, lengthening and cell-wall thickening. Brown and Ware (4) indicate that the lengthening period is about 13 to 20 days depending upon variety and growth conditions. The thickening phase starts after elongation has stopped. This process continues until 3 or 4 days before the boll opens. Thickness of the cell wall may be altered by environmental conditions.

Reynolds and Killough (22) found a positive correlation between the length of fiber and amount of rainfall during the period of boll development in a three-year study at College Station, Texas, while there was no apparent correlation during one year of work at Troup, Texas. Kearney and Harrison (14) concluded that fiber from bolls borne on the lower fruiting branches was shorter than that from bolls situated higher on the plant. Porter (21) found that length tended to increase from early to late-season bolls. Armstrong and Bennett (1), while concluding that position of boll on the plant did not appear to be of great importance in determining length of lint, found a distinct tendency for shorter lint to be produced in late season bolls. Simpson and Hertel (23), stressing the importance of the effects of environmental factors on fiber properties, indicated that differences between samples in fiber properties may be due as much to the location or date of picking as to the variety. Sturkie (25) suggested soil moisture as the determining factor in the length of fibers produced by a given variety. Hanson et al. (10) have furnished data indicating that the range in

maximum and minimum temperatures and rainfall during the period of fiber elongation are the most important climatic factors affecting fiber length. Armstrong and Bennett (1) have shown that fiber from flowers opening on August 14 was shorter than that from flowers opening on August 21. That fiber length is affected by water stress during the early stages of boll development (10 to 16 days after flowering) has been indicated by Sturkie (24). In a study made by Hancock (9) it was found the fibers were longest for the first period bolls, those from flowers which opened July 1 to 18. Kearney and Harrison (14), while noting that generalization from limited data is unsafe, stated that the results "point to the conclusion that the fiber is affected less by the date of flowering than by the height on the plant of the fruiting branch on which the boll is borne." Harrison and Craig (11) thought that the period during which a boll develops and the location of the plant in the field influenced the character of the fiber.

## Strength

Like length, strength is significantly modified by environmental factors. Sturkie (24) found strength to vary with turgor during the period of boll maturation (16 to 40 days after flowering). Pope and Ware (20) stated that ecological conditions had a very important influence on fiber strength.

Pope (19) observed that relatively small environmental differences significantly affected strength of the fiber. Sturkie (25) found that breaking strength was increased by a deficiency in soil moisture.

Berkley et al. (3) concluded that the turgor of the plant during the period of deposition of the cellulose of the secondary thickening appeared to be the controlling factor in the environmentally induced strength and structure of the fiber. Hanson et al. (10), while studying the effects of environmental factors on fiber properties, observed that strength seemed to be affected most by environment and was found to be significantly correlated with measured climatic factors such as rainfall and percent possible sunshine but not with minimum temperature. King (15) concluded that fiber produced in areas where the plants suffered from water stress was usually weaker, less abundant, shorter and more uneven in length than that developed under favorable conditions.

## Fineness

This character is significantly modified by environmental factors. Berkeley et al. (3) indicated that water stress may affect the quantity of cellulose deposited, thus changing the fineness of the fiber (weight per unit length). Hancock (9) found that the time periods for growth of cotton gave significant differences in the fineness. He also suggested that if the spinner were interested in fineness, he would select bales from the third picking.

# CHAPTER III

# MATERIALS AND METHODS

## Location and Field Plot Design

The results reported herein are based on an experiment conducted at the United States Department of Agriculture Cotton Field Station at Knoxville in the year 1959.

The cotton selected for the investigation was the Pope variety, developed at the U. S. Cotton Field Station at Knoxville, Tennessee and released by the Tennessee Agricultural Experiment Station for commercial production in 1956. Twelve rows, each about 260 feet long, were selected for the investigation.

## Tagging of Flowers

Beginning on July 16, 1959, and at semi-weekly intervals thereafter until August 24, 100 flowers which had opened on the day indicated were tagged in each of the 12 rows. On a few dates in a few rows there were not 100 flowers open.

## Harvesting

Picking of cotton was started on September 16 and completed on November 2, 1959. All tagged bolls which had at least one lock were harvested. The bolls on a row maturing from the 100 flowers tagged on a given date comprised a sample of cotton for analysis. Thus, there were 144 samples representing 12 rows and 12 dates of flowering.

## Weighing and Ginning

The seed cotton of each sample was weighed to the nearest 1/100 pound, and then ginned on a 16 in. roller gin. After ginning, the seed and lint were weighed together and also separately and the weights recorded to the nearest 1/100 pound.

## Determination of Seed Index and Lint Index

One hundred seeds were counted from each sample and weighed to the nearest 1/100 gram. Lint index was calculated by the formula:

$$\text{Lint index} = \frac{\text{seed weight}}{\text{seed percentage}} \times 100 - \text{seed weight}$$

## Determination of Fiber Properties

Lint subsamples for fiber analysis were taken by spreading the lint sample on a table and taking eight pinches from each side of the spread. These subsamples were tested at the United States Department of Agriculture Fiber Laboratory, Knoxville, Tennessee. Length determinations were made using the Fibrograph. An average of two readings was taken. The Stelometer was used for determining strength and an average of four readings was recorded. Fineness was measured with the Micronaire and an average of two readings was noted.

## Analysis and Presentation of Data

The data were analyzed statistically and analyses of variance carried out in the usual manner. Duncan's multiple range test (6) was

used to determine the significance of differences at the 5% level of probability between results obtained with the different dates.

Statistical significance in the analysis of variance tables is indicated by the conventional use of asterisks as follows: Significance at the 5% level of probability is denoted by a single asterisk (*) and at the 1% level of probability by a double asterisk (**).

# CHAPTER IV

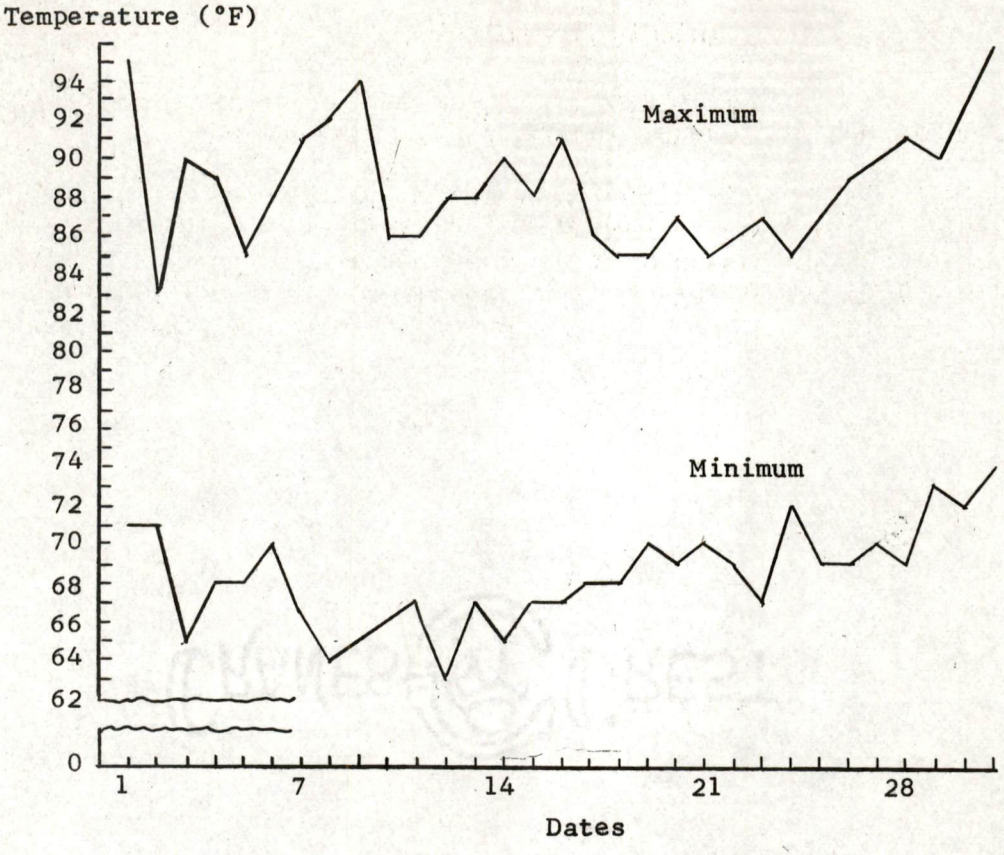
## RESULTS AND DISCUSSION

The daily rainfall and maximum and minimum temperatures during the months of July, August and September, 1959 are presented in figures 1 through 3. Since these environmental factors are known to strongly influence the various characters studied, it is possible that data presented in these graphs may help explain some of the results obtained.

### Shedding Percentage

The analysis of variance and multiple range groups for shedding percentages at various dates of flowering are presented in table 1. The differences between dates were highly significant. The lowest shedding percentage was observed from the flowers opening on July 23. Multiple range tests indicated that this was of the same order as that obtained from flowers opening on July 27. The highest shedding percentage was found from flowers opening on August 20 which was of the same order as that of August 17.

The general trend in variation in shedding percentage is presented in figure 4. The smallest amount of shedding and thus the greatest amount of boll set occurred during the period July 16 to August 3. The higher shedding percentage from flowers opening on July 16 in comparison with other dates during this period may have been due to the heavy rainfall on July 16. Excessive soil moisture conditions could



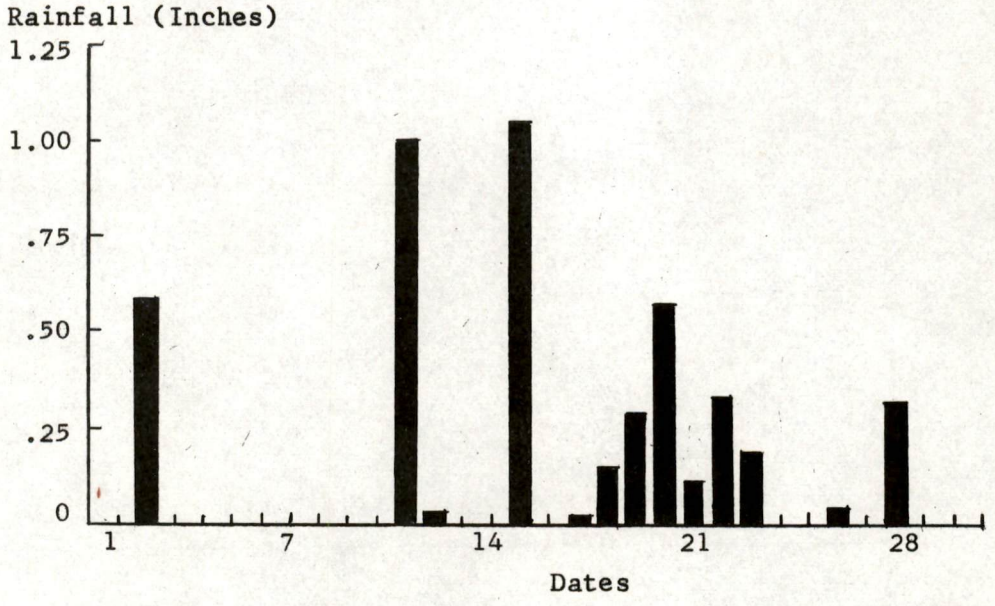
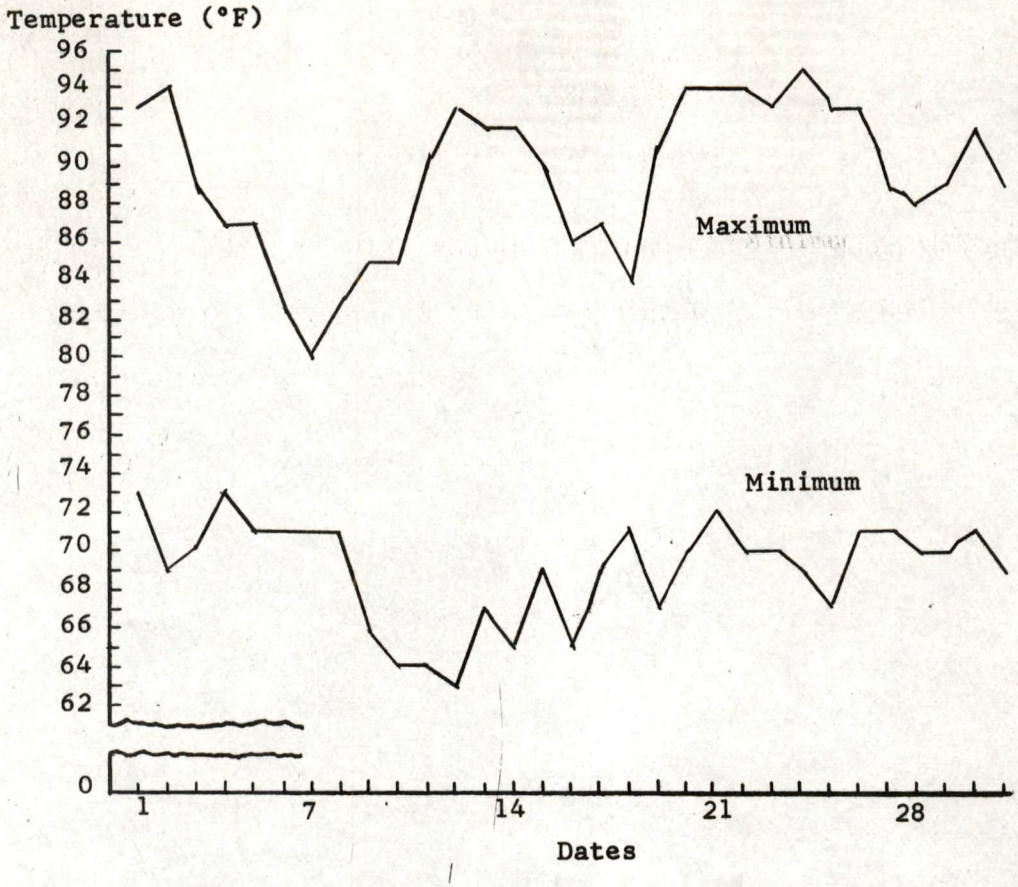




Figure 1-Inches of daily rainfall, U. S. Cotton Field Station, and daily maximum and minimum temperatures, U. S. Weather Bureau, Knoxville Airport, Knoxville, Tennessee, July 1959.



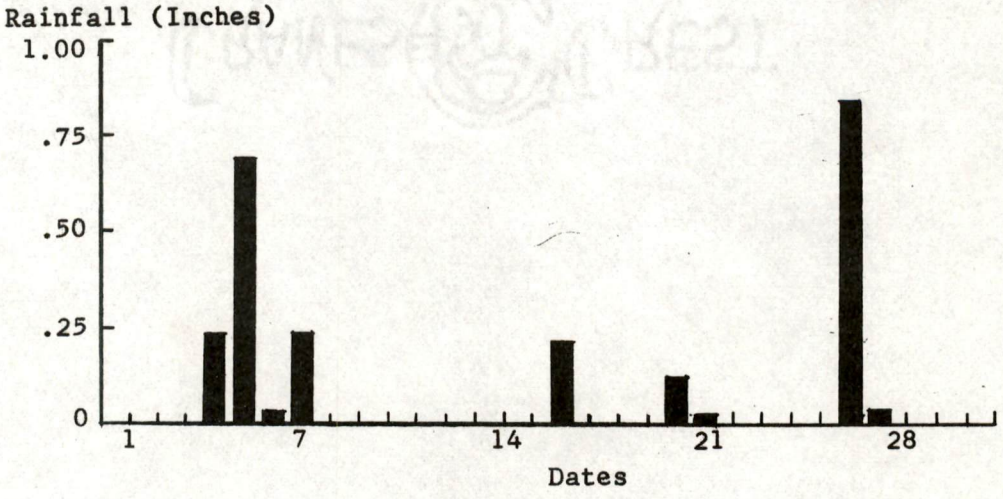
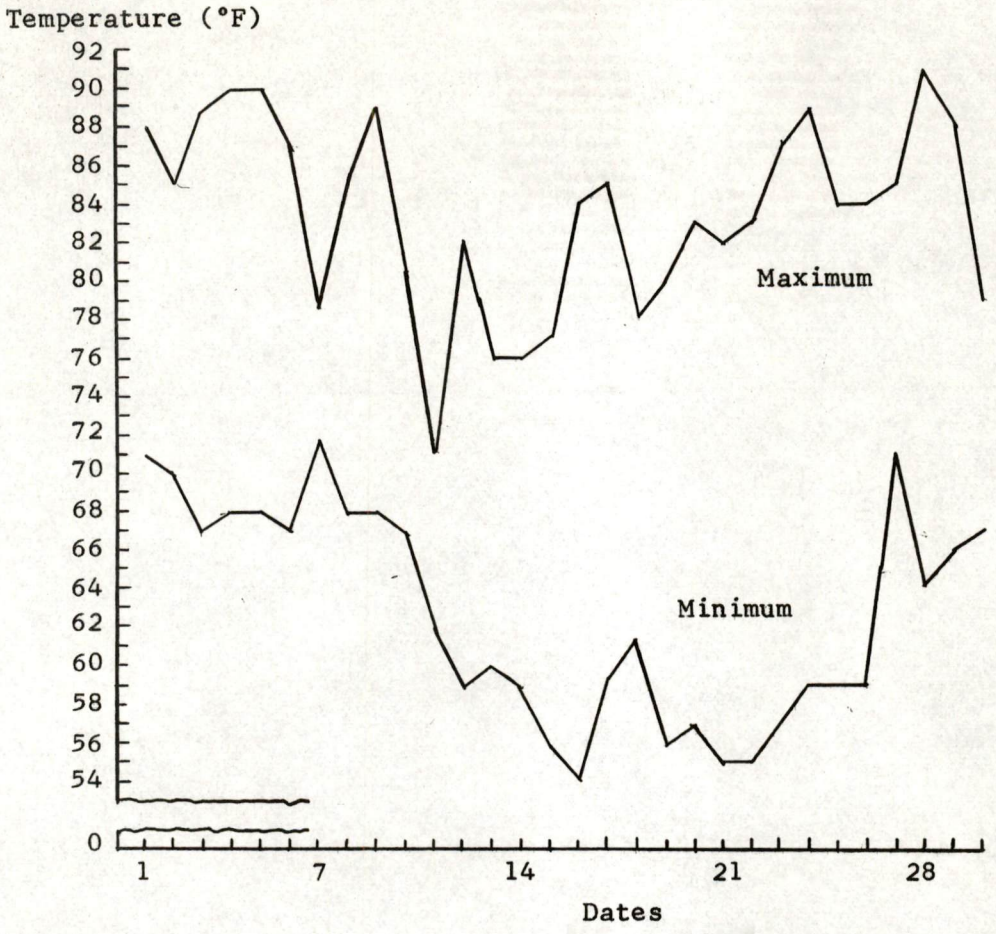




Figure 2-Inches of daily rainfall, U. S. Cotton Field Station, and daily maximum and minimum temperatures, U. S. Weather Bureau, Knoxville Airport, Knoxville, Tennessee, August 1959.



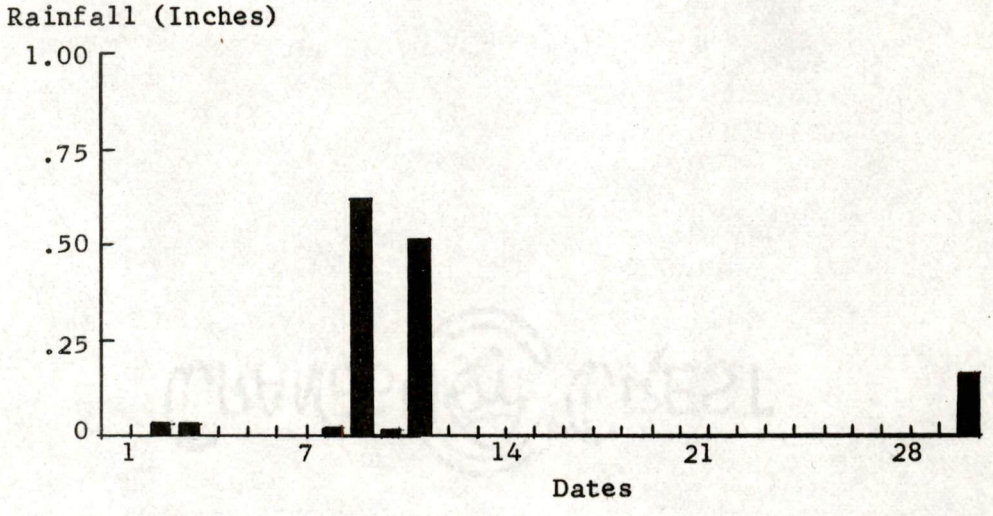




Figure 3-Inches of daily rainfall, U. S. Cotton Field Station, and daily maximum and minimum temperatures, U. S. Weather Bureau, Knoxville Airport, Knoxville, Tennessee, September 1959.

Table 1.--Analysis of variance and multiple range groups for shedding percentage at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 292.65 | 4.98** |
| Dates | 11 | 7146.18 | 121.47** |
| Error | 121 | 58.83 | |

Multiple range groups

| Dates of flowering | July 23 | July 27 | July 20 | Aug. 3 | July 30 | July 16 | Aug. 6 | Aug. 10 | Aug. 13 | Aug. 24 | Aug. 17 | Aug. 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shedding percentage | 13 | 16 | 22 | 23 | 25 | 27 | 40 | 53 | 64 | 65 | 76 | 81 |

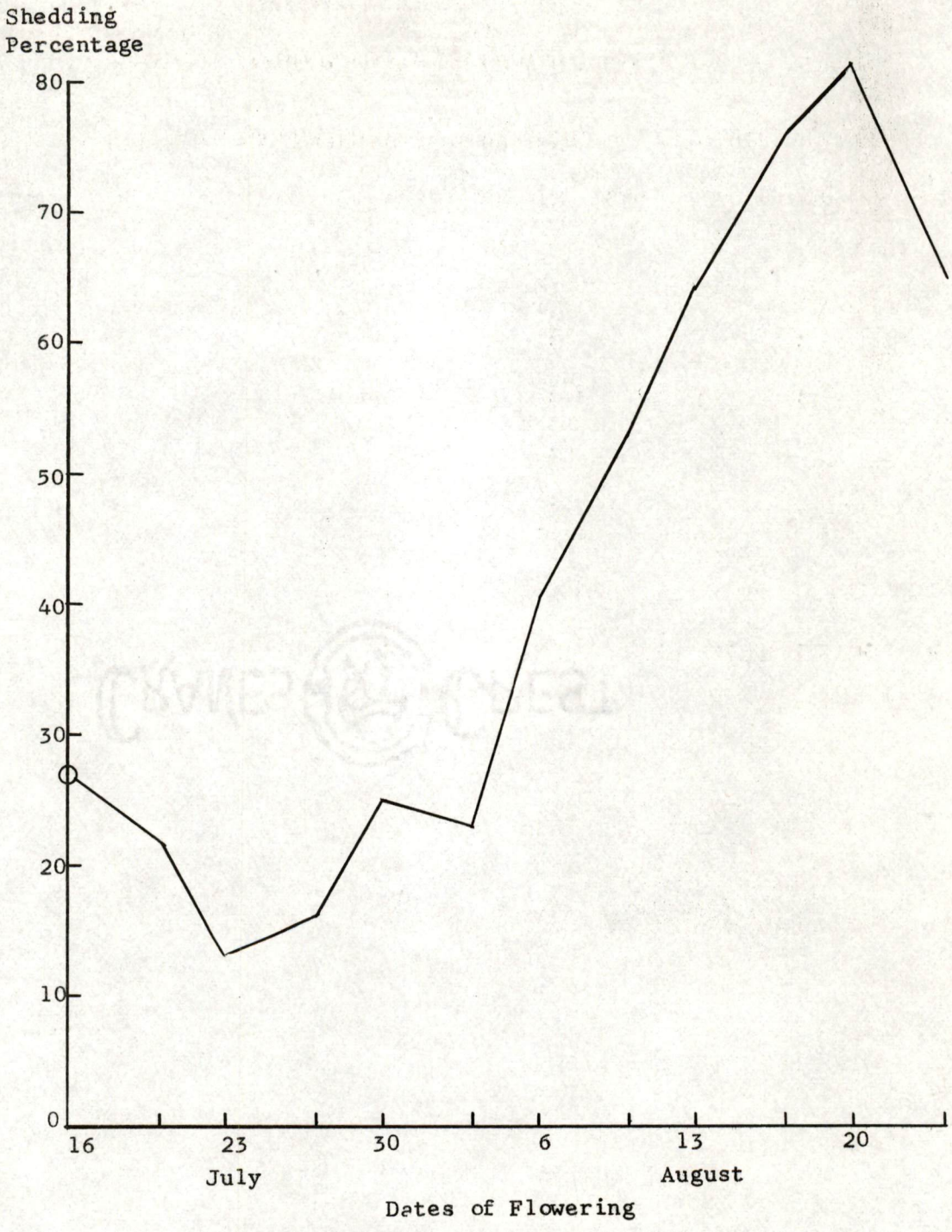



Figure 4-Shedding percentage observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

have disturbed water relations in the plant and caused an increase in shedding. After August 3 there is a linear rise in shedding percentage which is probably a manifestation of physiological responses to the heavy fruiting load set earlier.

## Boll Size

The analysis of variance and multiple range groups for boll size at various dates of flowering are presented in table 2. The differences between dates were highly significant. All bolls which had at least one lock were harvested which made the boll size appear smaller than is expected of the variety under study. Boll size was largest from flowers opening on July 27 which is of the same order as those on July 16, 20, 23 and 30 as indicated by the multiple range test. Boll size was smallest from flowers opening on August 24. Boll size from flowers opening on July 16 and 27 was significantly larger than that from flowers opening from August 3 through 24.

The general trend of variation in boll size is indicated in figure 5. Boll size from flowers opening during the period July 16 through 27 was larger than that from flowers opening during the period July 30 through August 17. This may be due to the fact that generally bolls set early in the season are larger and to the adequate rainfall and favorable temperature which prevailed during this period. From July 30 through August 17 boll size became smaller which may be partially due to inadequate rainfall during the period these bolls developed. Boll size is smallest from flowers opening from August 20

Table 2.--Analysis of variance and multiple range groups for boll size at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 350.42 | 5.14** |
| Dates | 11 | 2607.54 | 38.22** |
| Error | 121 | 68.23 | |

Multiple range groups

| | July | July | July | July | July | Aug. | Aug. | Aug. | Aug. | Aug. | Aug. | Aug. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dates of flowering | 27 | 16 | 23 | 20 | 30 | 17 | 3 | 10 | 6 | 13 | 20 | 24 |
| Boll size | 78 | 80 | 81 | 82 | 82 | 88 | 93 | 93 | 96 | 96 | 98 | 133 |

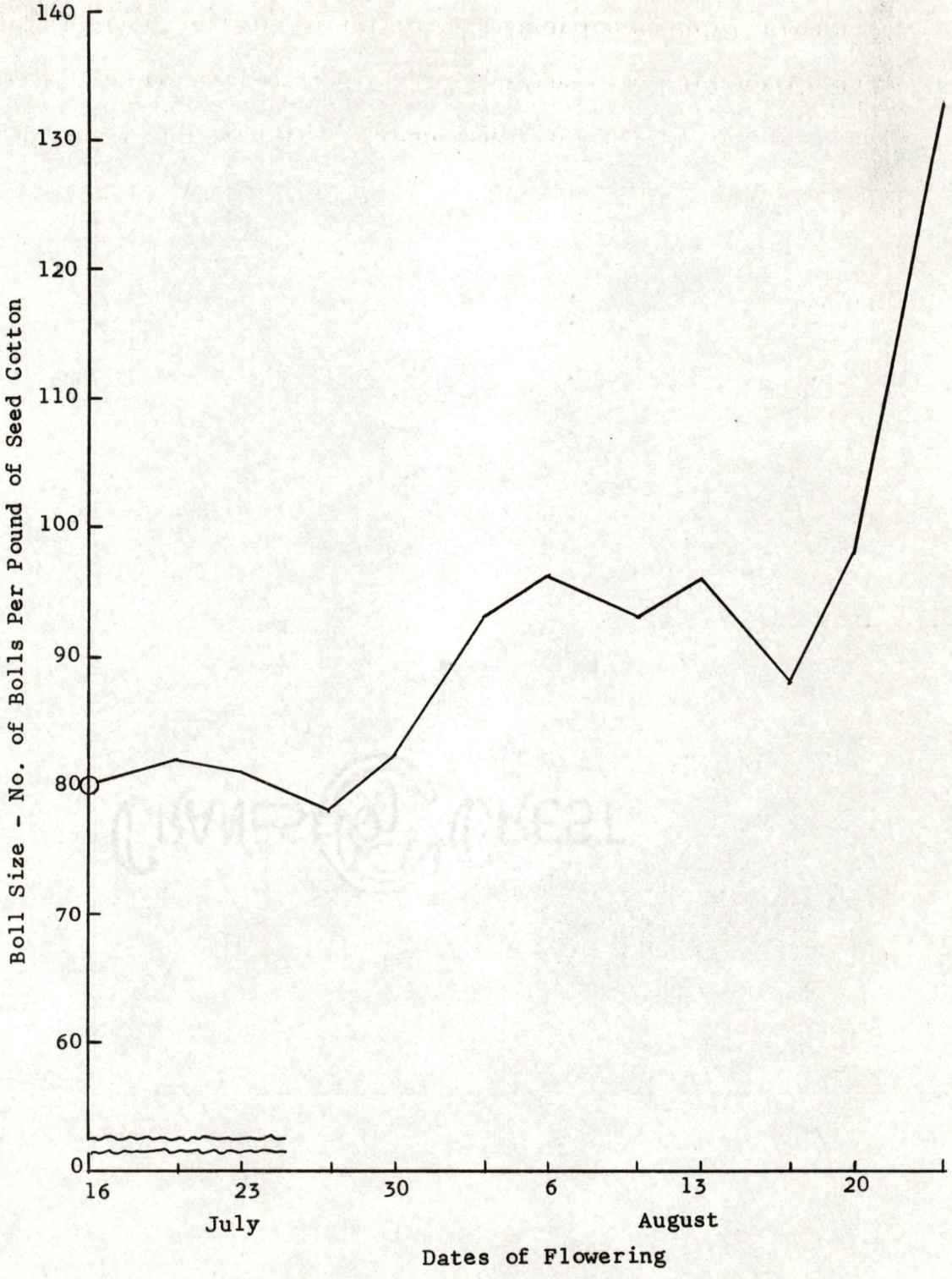



Figure 5-Boll size observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

and 24, perhaps due to lateness of the season when these bolls set. Also greater disease and insect damage late in the season may have given more bolls with a reduced lock number and consequently smaller boll size.

## Lint Percentage

The analysis of variance and multiple range groups for lint percentage are presented in table 3. Highly significant differences between dates were obtained. Bolls from flowers opening on August 6 and 10 gave significantly higher lint percentage than those opening on July 16, 20 and 23, and of the same order as the bolls from flowers opening on other dates, as indicated by multiple range tests.

Figure 6 shows that lint percentage was low in bolls from flowers opening from July 16 and increased with the advancement of the season up to August 10 and in general decreased thereafter. Favorable moisture and temperature conditions early in the fruiting season could have increased seed size and decreased lint percent. Less favorable environmental conditions later in the season may have decreased seed size and increased lint percent.

## Seed Index

Table 4 shows the analysis of variance and multiple range groups for seed index. Highly significant differences between dates were obtained. Highest seed index was obtained from flowers opening on July 16 and this is significantly higher than the rest. Next in order is the

Table 3.--Analysis of variance and multiple range groups for lint percentage of various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 5.31 | 0.31 |
| Dates | 11 | 51.49 | 3.03** |
| Error | 121 | 16.98 | |

Multiple range groups

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dates of flowering | July 16 | July 20 | July 23 | July 27 | July 30 | Aug. 20 | Aug. 24 | Aug. 13 | Aug. 17 | Aug. 3 | Aug. 10 | Aug. 6 |
| Lint percentage | 38.5 | 40.7 | 41.4 | 42.5 | 42.8 | 42.9 | 43.4 | 44.1 | 44.4 | 44.6 | 45.4 | 45.5 |

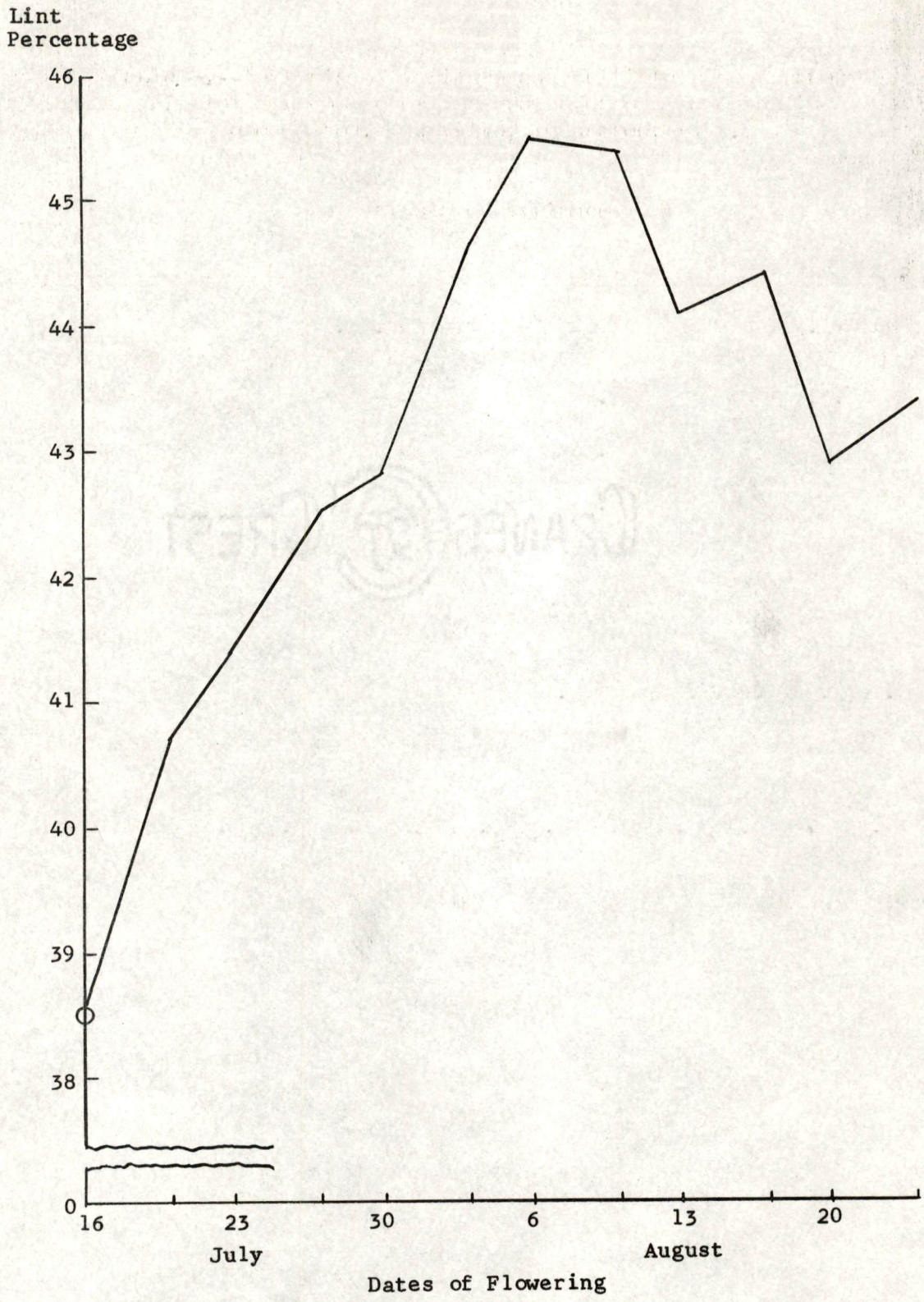



Figure 6-Lint percentage observed for observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

Table 4.--Analysis of variance and multiple range groups for seed index at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 2.11 | 10.55** |
| Dates | 11 | 31.18 | 155.90** |
| Error | 121 | 0.20 | |

Multiple range groups

| | Aug. 6 | Aug. 24 | Aug. 10 | Aug. 20 | Aug. 13 | Aug. 17 | Aug. 3 | July 30 | July 27 | July 23 | July 20 | July 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dates of flowering | | | | | | | | | | | | |
| Seed index | 8.6 | 8.6 | 9.1 | 9.2 | 9.3 | 9.4 | 10.1 | 10.9 | 11.3 | 12.1 | 12.4 | 13.4 |

seed index from flowers opening on July 20 and 23. Seed index was lowest from flowers opening on August 6 and 24.

Figure 7 shows the general trend in variation in the seed index. Seed index was high in bolls from flowers opening during the period July 16 through August 6 and then became low toward the end of the season. The favorable moisture conditions during the early part of the season and the relatively dry conditions during the later period might have caused this.

## Lint Index

The analysis of variance and multiple range groups for lint index at various dates of flowering are presented in table 5. Highly significant differences between dates were obtained. Lint index was highest from flowers opening on July 23. However multiple range tests indicated that this was of the same order as that obtained from flowers opening on July 16, 20, 27 and August 3. Lint index in bolls from flowers opening on the above dates was higher than that of July 30. The lint index was lowest from the flowers opening on August 24.

The general trend of variation in lint index for the various dates of flowering is shown in figure 8. The favorable soil moisture conditions during the period from July 16 through August 3 might have caused the lint index to be high from the flowers opening during this period. Flowers opening after August 6 gave lower lint index which could be due to fluctuations in soil moisture. In general lint index was found to be higher early in the season and decreased toward the end

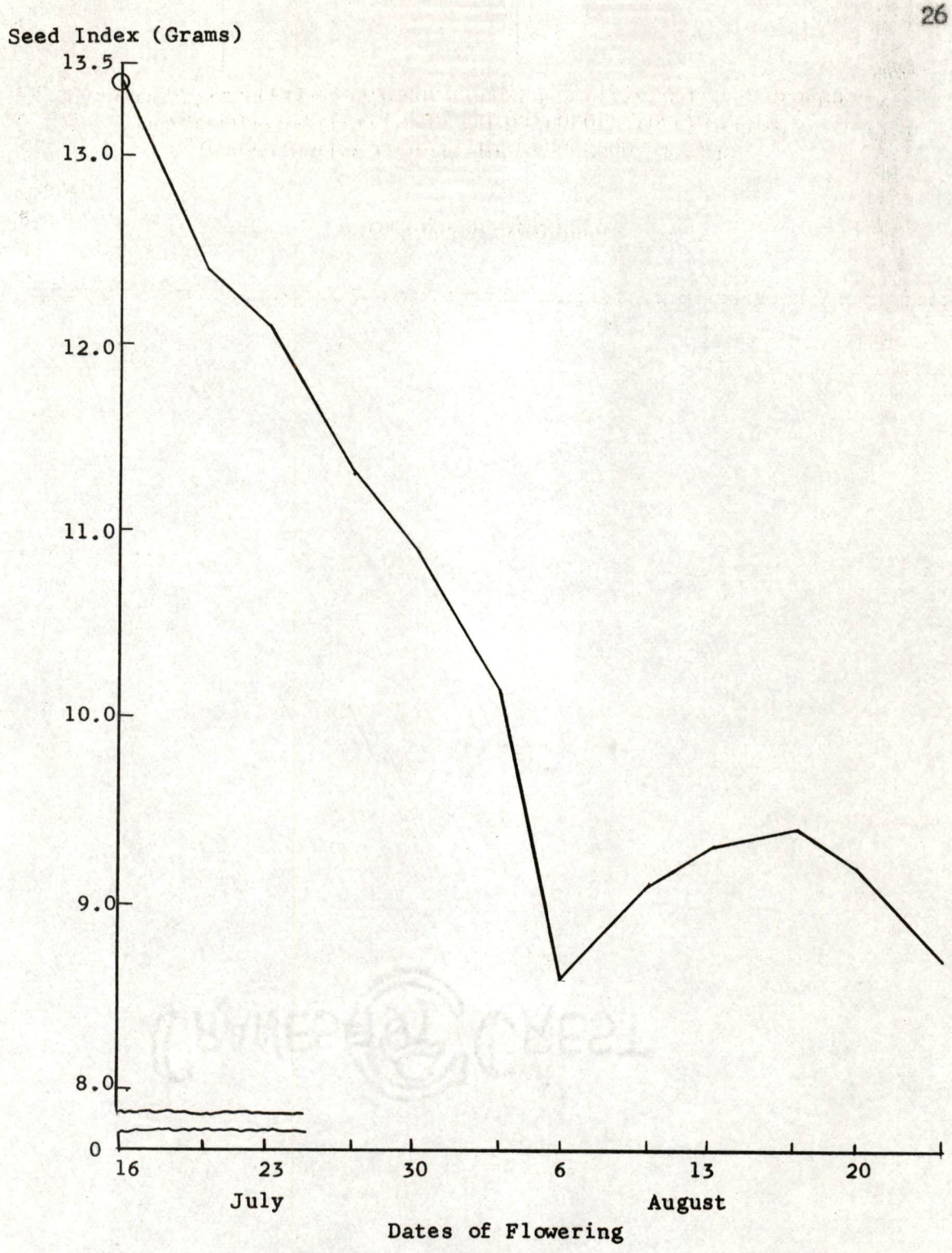



Figure 7-Seed index observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

Table 5.--Analysis of variance and multiple range groups for lint index at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 0.59 | 2.68** |
| Dates | 11 | 5.08 | 23.09** |
| Error | 121 | 0.22 | |

Multiple range groups

| Dates of flowering | Aug. 24 | Aug. 20 | Aug. 6 | Aug. 13 | Aug. 17 | Aug. 10 | July 30 | Aug. 3 | July 27 | July 16 | July 20 | July 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lint index | 6.68 | 6.96 | 7.19 | 7.32 | 7.55 | 7.56 | 8.15 | 8.16 | 8.35 | 8.38 | 8.49 | 8.57 |

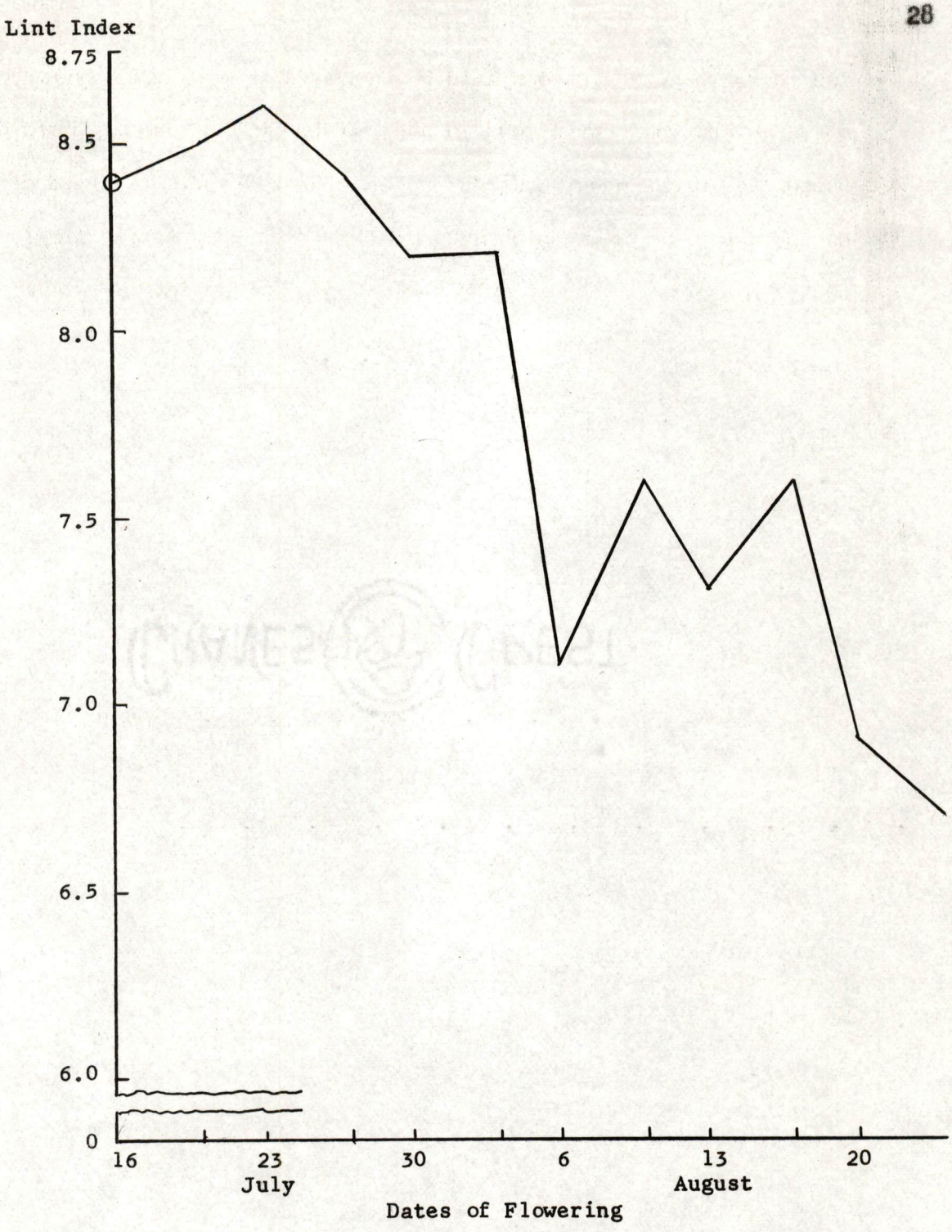



Figure 8-Lint index observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

of the season.

## Lint Length

The analysis of variance and multiple range groups for lint length at various dates of flowering are presented in table 6. Significant differences between the dates were obtained. Maximum lint length was obtained from flowers opening on July 23 and 27. However, these are of the same order as the lint length from flowers opening on July 16, 20 and August 17 as indicated by multiple range tests. Lowest lint length was obtained from flowers opening on August 6.

Figure 9 shows the general trend of variation in lint length from flowers opening on different dates. Lint was longer in bolls from flowers opening during the period July 16 through July 27. Favorable soil moisture conditions due to the rainfall during the two weeks from July 15 could have produced longer lint as compared with shorter lint from flowers opening on July 30 through August 6. Flowers opening on August 6 gave shortest lint which may perhaps be due to the break in rainfall and fluctuations in temperature disturbing the soil moisture conditions. Longer lint was obtained from flowers opening on August 17 and onwards which could be due to the adequate rainfall during the period August 16 through 27.

## Lint Strength

The analysis of variance and the multiple range groups for lint strength for various dates of flowering are presented in table 7.

Table 6.--Analysis of variance and multiple range groups for lint length at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 0.009 | 4.50** |
| Dates | 11 | 0.023 | 11.50** |
| Error | 121 | 0.002 | |

Multiple range groups

| Dates of flowering | Aug. 6 | Aug. 24 | Aug. 13 | Aug. 3 | Aug. 10 | Aug. 20 | July 30 | Aug. 17 | July 20 | July 16 | July 27 | July 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lint length (U.H.M.) | .88 | .91 | .91 | .91 | .92 | .93 | .96 | .97 | .98 | .98 | 1.01 | 1.01 |

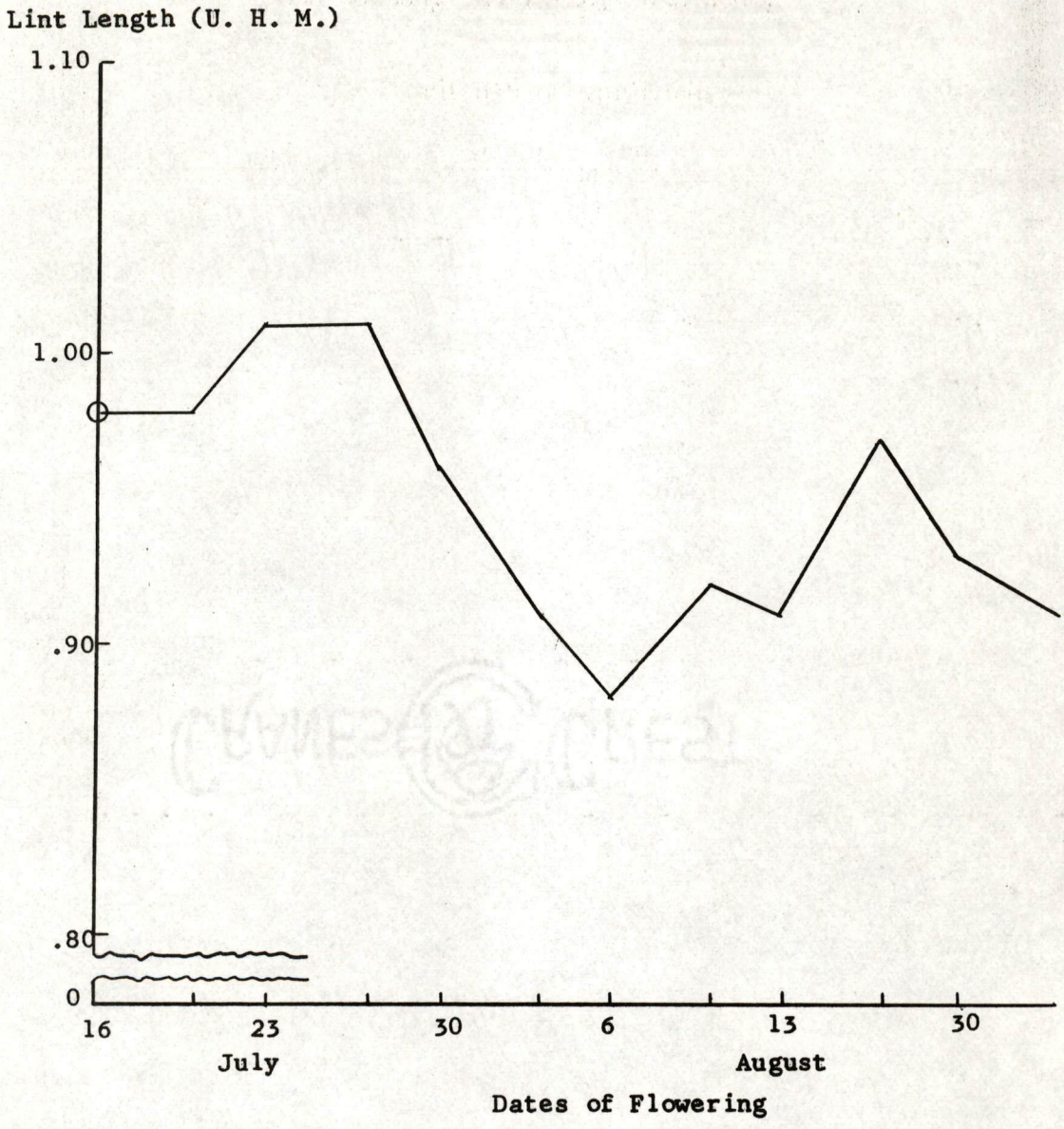



Figure 9-Lint length observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

Table 7.--Analysis of variance and multiple range groups for lint strength at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 0.051 | 10.20** |
| Dates | 11 | 0.123 | 24.60** |
| Error | 121 | 0.005 | |

Multiple range groups

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dates of flowering | Aug. 6 | Aug. 3 | July 16 | Aug. 24 | Aug. 20 | July 20 | Aug. 10 | Aug. 13 | July 30 | Aug. 17 | July 27 | July 23 |
| Lint strength | 1.56 | 1.59 | 1.61 | 1.66 | 1.66 | 1.67 | 1.69 | 1.75 | 1.75 | 1.78 | 1.84 | 1.89 |

Highly significant differences between dates were obtained. Fiber strength was highest from lint obtained from flowers opening on July 23 and 27 while it was lowest in lint from flowers opening on August 6 which was of the same order as that of August 3 and July 16 as indicated by multiple range tests.

Figure 10 shows the trend of variation in strength for various dates of flowering. Fiber from flowers opening during the period July 16 through 30 was stronger in comparison with that from flowers opening on August 3 and 6. Fluctuations in strength may be due to variable moisture conditions during the period in which cell wall development of the fiber occurred. Cell wall development in relatively dry environmental conditions would be expected to increase fiber strength.

## Lint Fineness

Table 8 shows the analysis of variance and multiple range groups for lint fineness for various dates of flowering. The differences between dates were highly significant. Multiple range tests indicated that finest lint was obtained from flowers opening on August 24 and this was of the same order as that of August 20. Coarsest fiber was obtained from flowers opening on July 16, 20, 23, 27 and 30.

The variation in fineness for various dates of flowering is shown in figure 11. Fiber from flowers opening during the period from July 16 through July 30 was coarser than that from flowers opening during the period from August 3 through 17. Perhaps this may be due to low available moisture and fluctuations in temperature during the period

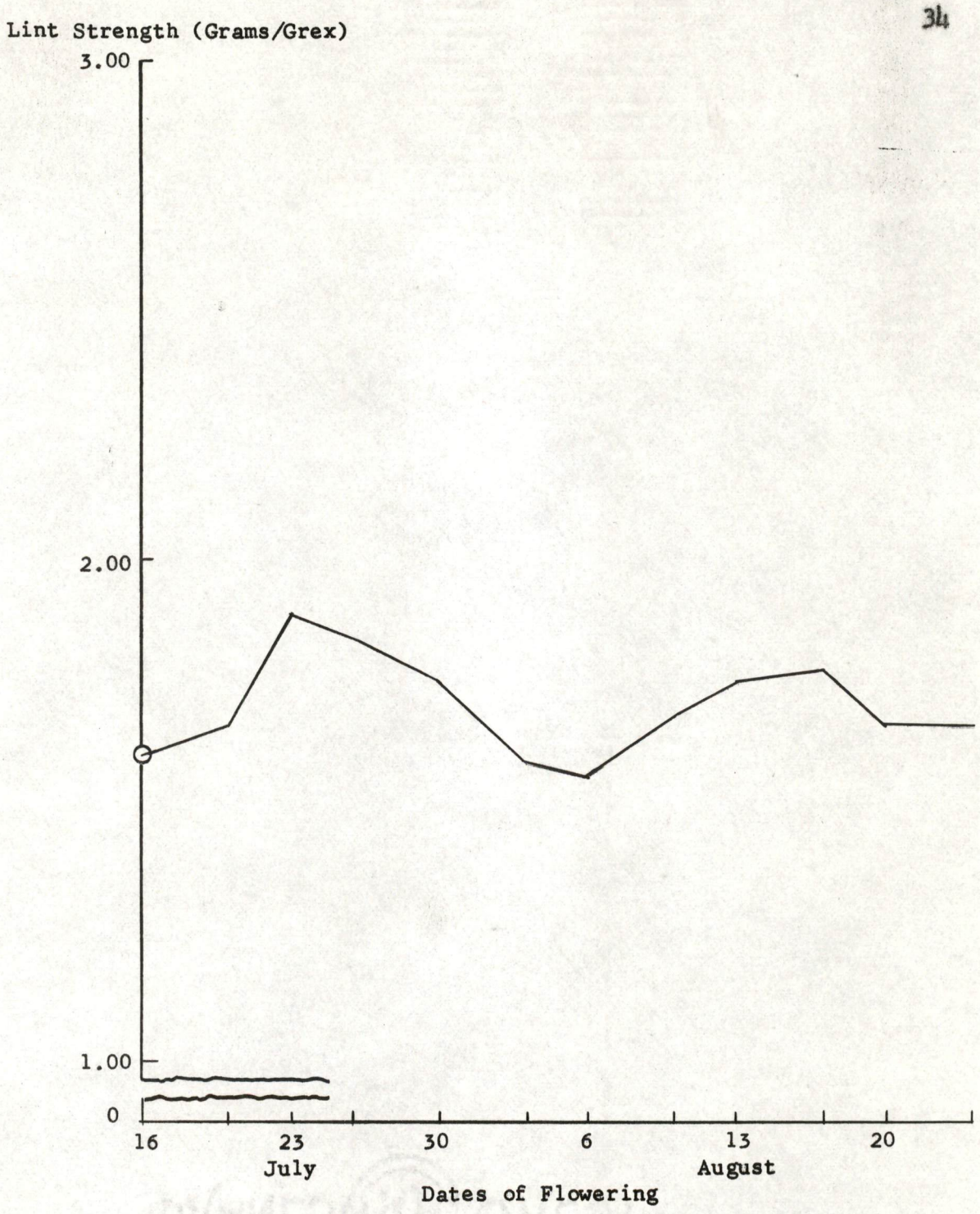



Figure 10-Lint strength observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

Table 8.--Analysis of variance and multiple range groups for lint fineness at various dates of flowering in Pope Cotton, Knoxville, Tennessee, 1959.

Analysis of variance

| Source of variation | D. F. | Estimate of variance | F. value |
|---|---|---|---|
| Replications | 11 | 0.46 | 5.48** |
| Dates | 11 | 0.73 | 8.69** |
| Error | 121 | 0.08 | |

Multiple range groups

| | Aug. 24 | Aug. 20 | Aug. 6 | Aug. 17 | Aug. 13 | Aug. 10 | Aug. 3 | July 16 | July 30 | July 20 | July 27 | July 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dates of flowering | | | | | | | | | | | | |
| Lint Fineness | 3.42 | 3.56 | 3.79 | 3.89 | 3.89 | 3.89 | 3.94 | 4.05 | 4.13 | 4.15 | 4.16 | 4.23 |

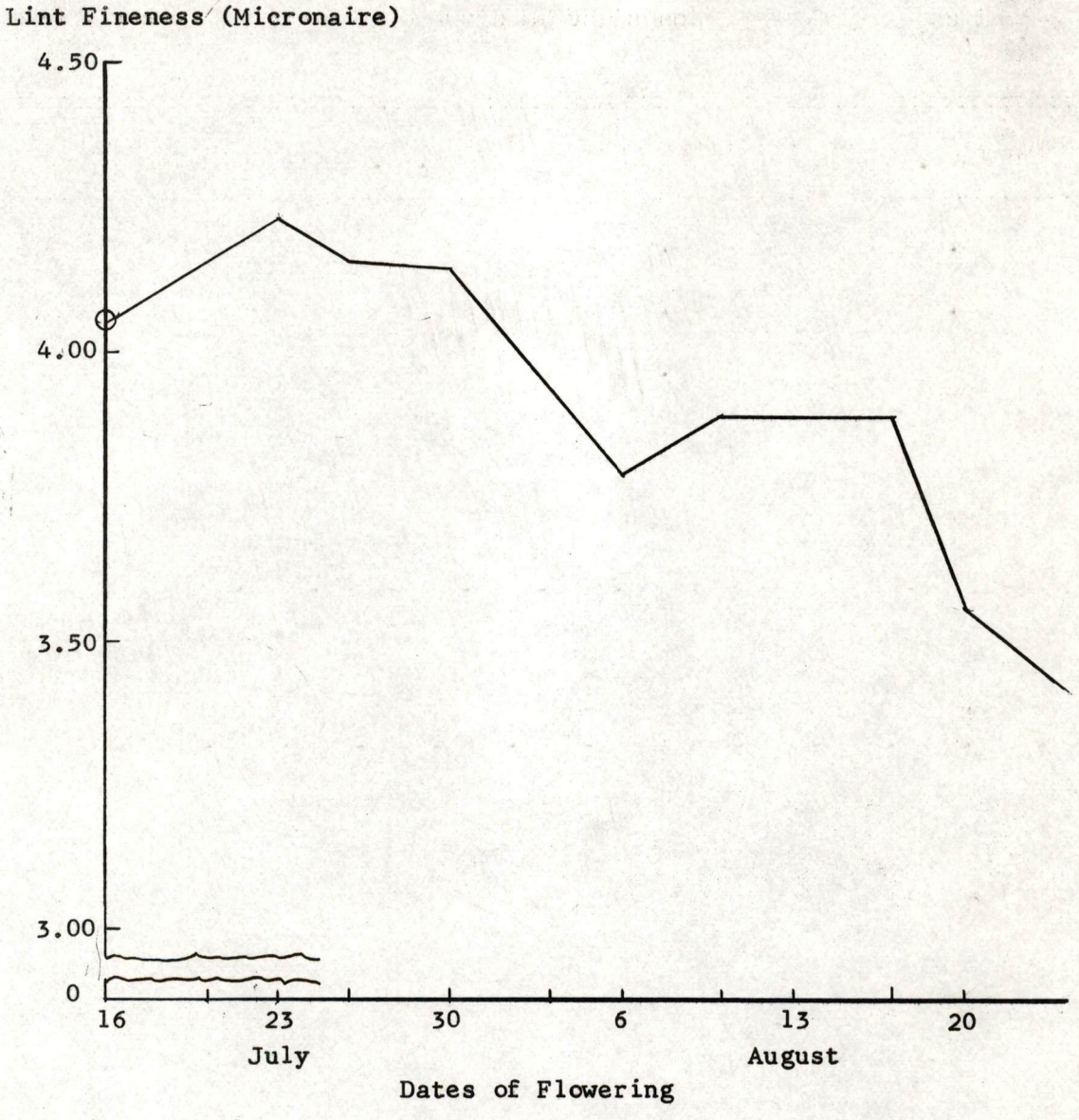



Figure 11-Lint fineness observed for various dates of flowering of Pope Cotton at U. S. Cotton Field Station, Knoxville, Tennessee, 1959.

of secondary deposition of cellulose in the fiber developing from flowers opening during the period August 3 through 17. Low available moisture causing stress conditions might have caused some immaturity and finer fiber from flowers opening on August 20 and 24.

# CHAPTER V

## SUMMARY

An experiment was conducted to study influence of dates of flowering on the shedding percentage, boll size, lint percentage, seed index, lint index, lint length, strength and fineness of Pope Cotton at the U. S. Cotton Field Station, Knoxville, Tennessee. Cotton from flowers opening on twelve dates beginning July 16, and at semi-weekly intervals thereafter up to August 24 were used for studying the several characters. Highly significant differences in effects due to the date of flower opening were obtained.

Early in the season shedding was low, but increased during the season. Bolls were large in the beginning of the season but became smaller with the advance of the season. Lint percentage increased with the advancement of the season but toward the end of the flowering season, there was a downward trend.

Seed index showed a gradual reduction with the progress of the season, which was the course followed by lint index also. Lint was longest during the beginning of the season but became shorter later on. Strength followed the same trend as length, the fibers being weaker from late-season cotton. Finest fiber was obtained toward the later periods of the season while coarse fiber was obtained during the beginning of the season.

These results indicate that there is a great deal of variation in relation to date of flowering and certain definite general trends

are established. However since all of these characters are under the influence of environment, these general trends may be changed slightly. These data also indicate that the best quality (longest lint and strongest fiber) cotton is obtained from bolls developed from flowers opening early in the season. Fiber from the first picking is more mature and therefore more desirable for spinning. In experimental work, in order to completely sample a variety, it is suggested that boll samples should be taken from all pickings.

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## LITERATURE CITED


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