TEXAS AGRICULTURAL EXPERIMENT STATION

B. YOUNGBLOOD, DIRECTOR

COLLEGE STATION, BRAZOS COUNTY, TEXAS

BULLETIN NO. 349 FEBRUARY, 1927

DIVISION OF AGRONOMY

VARIATION IN CERTAIN LINT CHARACTERS IN A COTTON PLANT AND ITS PROGENY

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

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†As of February 1, 1927.
*On leave of absence.
**Dean, School of Veterinary Medicine.
***In cooperation with U. S. Department of Agriculture.
****In cooperation with the School of Agriculture.

SYNOPSIS

This Bulletin reports the results of two years of study on the variation in the length of lint in an inbred plant of Mebane cotton and its progeny, and also reports on the variability in the percentage of lint in the progeny.

In these studies it was found that the length of lint varied in different bolls on the same plant, in the same boll, and on seed which were side by side in the same lock. These variations in the length of lint were found to exist in both the parent and its progeny. The percentage of lint was not as variable as the length of lint.

Under the particular conditions of growing the cotton, as reported in this Bulletin, there appeared to be no correlation in the length of lint between individual seeds of the parent plant and their progeny. The mean length of lint of the progeny, however, approached closely the mean length of lint of the parent.

The results reported here should prove of practical value to those interested in the improvement of cotton, since they indicate that, for the purpose of selection, there is no consistent difference in the length of lint and the percentage of lint between bolls taken from different parts of the plant. For this reason bolls taken from all parts of the plant are of equal value for breeding purposes, provided the seeds are viable. The average performance of the plant, therefore, should be considered as a unit in making selections for breeding purposes.

CONTENTS

BULLETIN No. 349 FEBRUARY, 1927

VARIATION IN CERTAIN LINT CHARACTERS IN A COTTON PLANT AND ITS PROGENY

E. P. Humbert[1] and J. S. Mogford.[2]

It is the general opinion of observing cotton growers that the lint fibers on different parts of the cotton plant, and sometimes in the same boll, vary in length. This Bulletin reports a study of these variations in an inbred plant of Mebane cotton. The plant was grown in 1916 in the open field, under average conditions and with the usual care. The plant selected apparently was typical of this strain of cotton. This particular strain of Mebane was known to compare favorably with the other strains of this variety. A plant of Mebane cotton was selected for this study because it is a very uniform variety and is one of the most widely grown varieties in Texas.

The results presented in this Bulletin cover a period of two years. The parent plant produced 13 bolls. The distance of each boll from the ground and from the main stem of the plant was noted. This was done to determine the effect which the position of the boll on the plant had on the variability of the length of lint of these bolls and their progeny.

The seeds from these 13 bolls of the parent plant were planted the following year (1917), those of each boll being planted to a row. At the end of the season each plant in these 13 progeny rows was harvested separately, and three combings of lint made from each plant prior to ginning. A total of 375 plants was grown in the progeny.

Weather conditions were favorable for cotton in 1916, the year the parent plant was grown. The hot dry summer of 1917, however, was unfavorable to the growth of the progeny plants. This may account in part for the fact that the average length of lint of the progeny was slightly shorter than that of the parent plant, since a lack of moisture is known to affect the length of lint.

WEATHER CONDITIONS DURING THE EXPERIMENT

The weather records of the Main Station Farm, College Station, for 1916, the year the parent plant was grown, show that there was sufficient rain in January to supply enough moisture to last throughout March and April. The rainfall was sufficient for normal growth of crops. July was warm and dry, but cotton was far enough advanced in growth that the lack of moisture apparently did not affect the plants adversely. The precipitation during August was .80 of an inch. All the bolls except one on the plant opened during August. The plant did not seem at any time to be suffering for moisture. The rainfall for 1916 was 28.05 inches, or 8.46 inches below normal.

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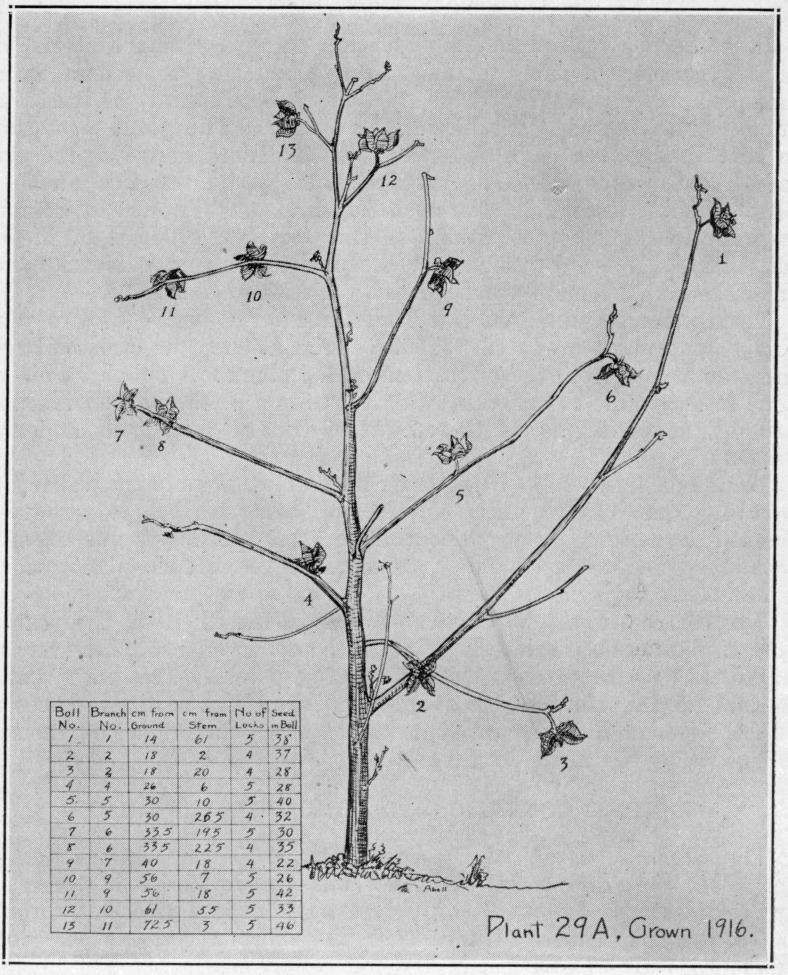
[1]Professor of Genetics, A. and M. College of Texas.
[2]Associate Professor of Agronomy, A. and M. College of Texas.



Boll No.	Branch No.	cm from Ground	cm from Stem	No of Locks	Seed in Boll
1	1	14	61	5	38
2	2	18	2	4	37
3	3	18	20	4	28
4	4	26	6	5	28
5	5	30	10	5	40
6	5	30	26.5	4	32
7	6	33.5	19.5	5	30
8	6	33.5	22.5	4	35
9	7	40	18	4	22
10	9	56	7	5	26
11	9	56	18	5	42
12	10	61	55	5	33
13	11	72.5	3	5	46

Figure 1.—Structure of parent plant.

The rainfall for 1917, the year the progeny plants were grown, was 15.50 inches, or 21.01 inches below normal. This departure from the normal increased progressively, month by month, throughout the year, although in February, August, and September the monthly precipitation was not greatly deficient. During August and September, the rainfall approached normal, but this was too late in the season to be of much benefit to the plants. Dry weather began to affect adversely the plants used in this study during the latter part of June. It appears that this lack of moisture was one of the factors which caused the lint of the progeny to be shorter than the lint of the parent plant. On many plants, squares and bolls were shed freely, indicating that lack of moisture reduced the yield.

The average annual rainfall for the 27 years, 1891 to 1917, inclusive was 36.51 inches.

DESCRIPTION OF PARENT PLANT

The plant selected was not exactly ideal in shape. One very large branch came off from the main stem near the ground, but otherwise its branches were well placed and of desirable length. The 13 bolls were so situated that seed could be obtained from nearly any distance desired from the ground and also nearly any distance from the main stem. For instance, boll No. 1 was 24 inches from the main stem but the branch bearing it came off from the main stem 5 inches from the ground. Boll No. 13 was in the very top of the plant and close to the main stem. All the plants of this strain were uniform in type. By referring to Figure 1, a fair idea of the structure of the plant may be obtained.

The parent plant was grown from self-fertilized seed, which came from a uniform strain of Mebane cotton. Cross fertilization in cotton, which is caused by insects carrying pollen from other plants, will vary from 2 to 20 per cent, and will not average over 15 per cent under normal conditions. Allard (1) in Georgia reports an average of 20 per cent cross fertilization; Balls (2) in Egypt reports 13.5 per cent; Kearney (3) in Arizona reports 12 to 28 per cent; Kottur (4) in India reports 6 per cent; and Stroman and Mahoney (5) in Texas report 2.5 per cent. Six bolls of the parent plant were self-fertilized and produced progeny as variable in length of lint as the progeny of the seven open-pollinated bolls of the same plant.

Table 1 gives dates of opening of bolls on the parent plant. In general, the first flowers to bloom on a plant set the first bolls to open, if no shedding occurs. Boll No. 1 was at the end of a long limb. It was late in blooming and consequently, late in opening. Where two bolls are on the same branch, the one nearest the main stem generally opens first. This is to be expected as the squares are set and bloom as the branch grows out. The location of the bolls on the plant can be seen by referring to Figure 1.

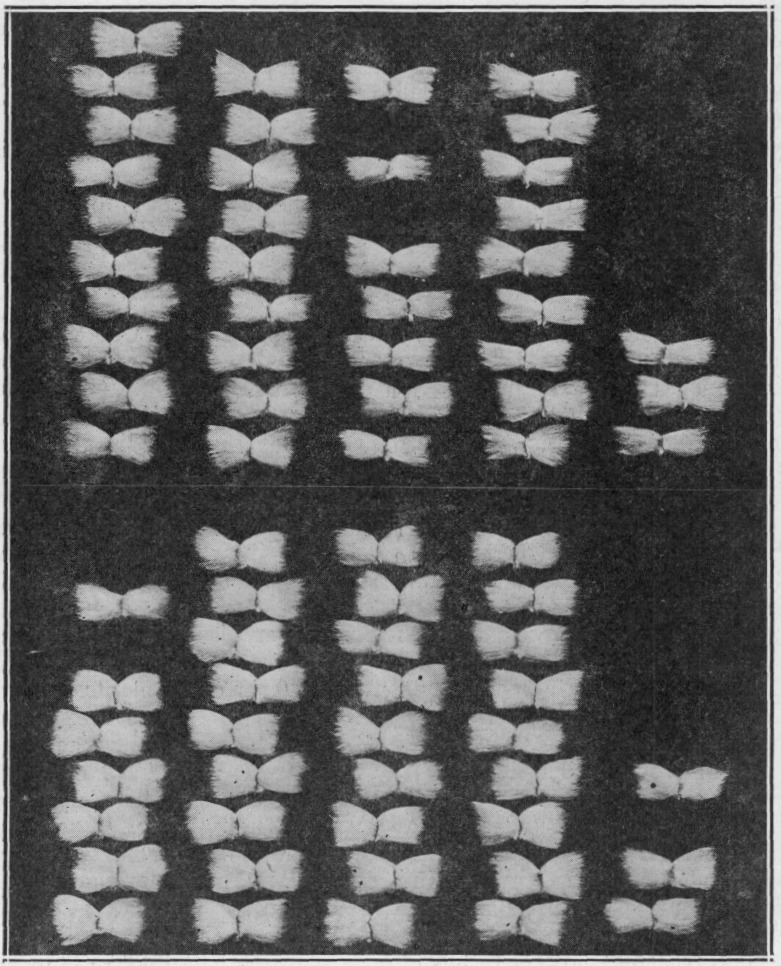


Figure 2.—Combed lint of Bolls Nos. 1 and 2 from the parent plant.

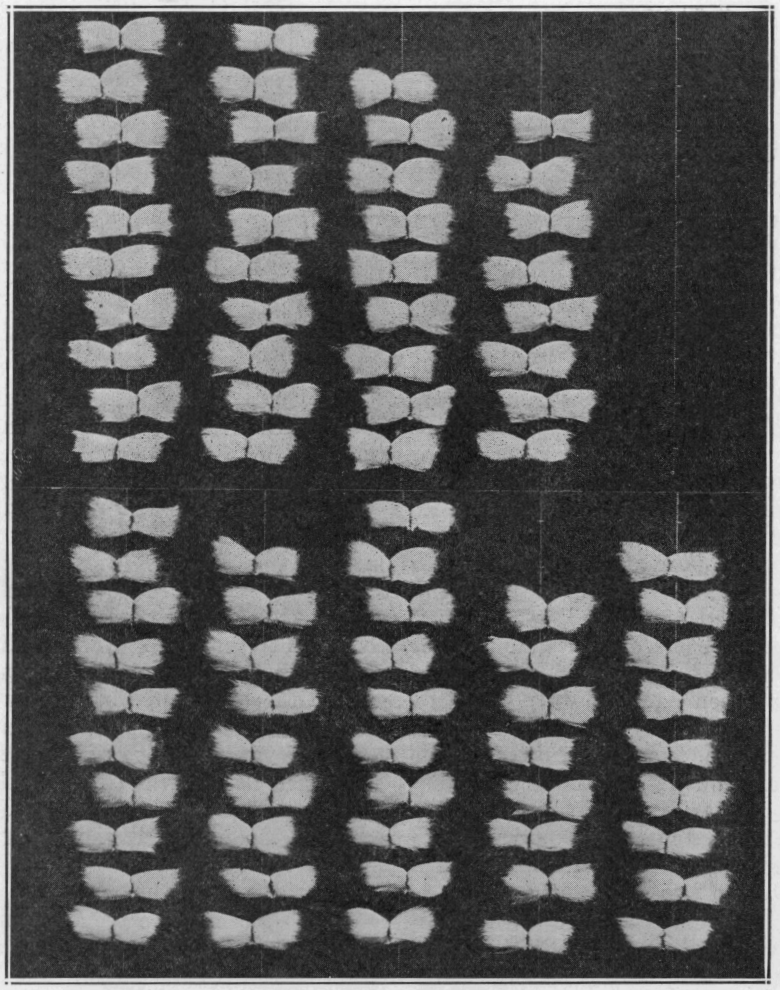


Figure 3.—Combed lint of Bolls Nos. 8 and 13 from the parent plant.

Table 1.—Opening dates of bolls of parent plant.

Boll Number	Date of Opening	
1	Sept. 7, 1916	
2	Aug. 5, 1916	
3	Aug. 7, 1916	Self-fertilized
4	Aug. 7, 1916	Self-fertilized
5	Aug. 7, 1916	
6	Aug. 21, 1916	
7	Aug. 8, 1916	Self-fertilized
8	Aug. 24, 1916	Self-fertilized
9	Aug. 20, 1916	
10	Aug. 18, 1916	Self-fertilized
11	Aug. 25, 1916	
12	Aug. 21, 1916	Self-fertilized
13	Aug. 25, 1916	

DATA ON PARENT MATERIAL

Length of Lint

To determine the length of lint, the fibers on every seed were combed out and then the fibers were pulled off and measured (Figures 2 and 3). Where the lint was not uniform in length, several measurements were made and the average of these measurements was used. Since there was considerable variation in the length of the fibers on the seed, it was not physically possible to measure the length of these fibers more accurately than in sixteenths of an inch. For this reason the data on the length of lint could only be divided into a relatively small number of classes in the population. This, of course, prevents too literal interpretation of the significance of the standard deviation and coefficient of variability for this character. It should be borne in mind that probable errors, standard deviations, and coefficients of variability given in this Bulletin are probably somewhat smaller than they would have been had it been possible to measure the length of fiber for each seed more accurately. Table 2 gives the mean length of lint, standard deviation, and coefficient of variability, of the various bolls of the parent plant and also the number of seeds from each boll. There was considerable variation in the mean length of lint in the various bolls. For instance, the lint in boll No. 1 was $26.24 \pm .05$ millimeters, while the length of lint in boll No. 6 was $22.68 \pm .07$ millimeters.

There was apparently no consistent difference in the mean length of lint from bolls that opened at different dates, as may be seen by comparing Tables 1 and 2.

Table 3 gives the average length of lint on each seed of each lock of every boll on the parent plant. The length of lint appears to be slightly more variable near the top of the plant, as may be seen by comparing Table 3 with the location of bolls on the parent plant as shown in Figure 1. For instance, the length of the lint in bolls 9, 10, 11, 12, and 13, which were produced near the top of the plant, was slightly more variable than the length of lint in the other bolls; but

the mean length of lint from these bolls did not differ greatly from the length of lint from bolls produced on other parts of the plant.

Table 2.—Statistical analysis of the length of lint from bolls of the parent plant.

Boll Number	Number of Seed Per Boll	Mean Length of Lint in Millimeters	Standard Deviation	Coefficient of Variability
1	38	26.24 ± .05	0.47 ± .04	1.79 ± .14
2	37	25.72 ± .12	1.06 ± .08	4.12 ± .32
3	28	23.04 ± .12	0.95 ± .08	4.12 ± .37
4	28	26.14 ± .17	1.31 ± .12	5.01 ± .45
5	40	24.00 ± .10	0.95 ± .07	3.96 ± .30
6	32	22.68 ± .07	0.58 ± .05	2.56 ± .22
7	30	24.33 ± .13	1.04 ± .09	4.27 ± .37
8	37	23.80 ± .00	0.00	0.00
9	22	24.23 ± .14	0.96 ± .10	3.96 ± .40
10	26	25.50 ± .15	1.11 ± .10	4.35 ± .41
11	42	24.55 ± .13	1.25 ± .09	5.09 ± .37
12	33	24.71 ± .12	0.98 ± .08	3.97 ± .33
13	46	24.67 ± .11	1.15 ± .08	4.66 ± .33
Average		24.58 ± .11	0.91 ± .08	3.68 ± .31

The seed occurred in the lock of each boll in the order given in Table 3. The figures given at the top of the two columns for each lock represent the length of lint from the seed produced at the top portion of these locks, and vice versa. It will be noted that in most of the bolls the lint was slightly more uniform on seed produced at the base of the lock, as represented by the figures on the last line for each boll. There was no consistent difference, however, in the length of lint from seed located in other parts of the lock.

DATA ON PROGENY

Seed from the parent plant were planted April 24, 1917. The seeds from each boll of the parent plant were planted in separate rows. Germination was practically 100 per cent, but cold weather prolonged it over a period of at least two weeks. Just after planting, a hard cold rain fell for several days, causing the soil to pack, and a few of the seedlings died, possibly on account of the fact that they were not strong enough to break through the baked surface caused by the drying-out.

The young plants grew off vigorously and were given the necessary cultivation to keep them in good growing condition throughout the season. All of the plants in the progeny showed a close resemblance to the parent plant. The effect of the drouth became serious about the middle of July, and many of the young squares and bolls were shed. Very little difference was noted in the dates of blooming of the different rows.

Table 3.—Length of lint in millimeters on each seed from every boll of the parent plant.

Boll Number	Lock Number										Mean Length of Lint in Millimeters	Standard Deviation
	1		2		3		4		5			
1	25.4 25.4 27.0 27.0 25.4	25.4 25.4 27.0 27.0 25.4	25.4 25.4 27.0 25.4 25.4	27.0 27.0 25.4 25.4	25.4 25.4 25.4 27.0 25.4	27.0 27.0	25.4 25.4 27.0 25.4 25.4	25.4 27.0 27.0 25.4	27.0 25.4	25.4	26.24 ± .05	0.47 ± .04
2	25.4 25.4 23.8	25.4 25.4 27.0 23.8	25.4 27.0 25.4 27.0 23.8	25.4 27.0 27.0 23.8	25.4 25.4 27.0 25.4 23.8	25.4 27.0 25.4 23.8	25.4 27.0 27.0 25.4 23.8	25.4 27.0 27.0 25.4	23.8	25.4 27.0	25.72 ± .12	1.06 ± .08
3	20.6 23.8 23.8 23.8	20.6 22.2 22.2 23.8	20.6 23.8 23.8 23.8	22.2 23.8 23.8	23.8 23.8 23.8 23.8	22.2 23.8 23.8 23.8	23.8 23.8 23.8 23.8	23.8 23.8	23.8		23.04 ± .12	0.95 ± .08
4	25.4 27.0 27.0	23.8 25.4 27.0	25.4 25.4 27.0 27.0	23.8 25.4 25.4 27.0	25.4 27.0 27.0	25.4 25.4 27.0	25.4 25.4 27.0 27.0	23.8 25.4 25.4 27.0			26.14 ± .17	1.31 ± .12
5	25.4 22.2 23.8 23.8	25.4 23.8 23.8 23.8	23.8 23.8 23.8 25.4	25.4 23.8 25.4 23.8	25.4 25.4 23.8 23.8	23.8 25.4 23.8 23.8	23.8 23.8 25.4 25.4	23.8 23.8 25.4	22.2 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8	24.00 ± .10	0.95 ± .07
6	20.6 22.2 22.2 22.2	22.2 23.8 22.2 22.2	22.2 23.8 22.2 22.2 22.2	22.2 22.2 23.8 22.2 22.2	22.2 22.2 23.8 22.2 23.8	22.2 22.2 22.2 22.2	22.2 23.8 22.2	23.8 23.8			22.68 ± .07	0.58 ± .05

7	23.8 23.8 23.8 23.8	22.2 23.8 25.4 23.8	23.8 23.8 23.8 25.4 25.4	23.8 23.8 23.8 25.4 25.4	25.4 25.4	23.8 25.4	23.8 25.4	23.8 25.4	25.4 25.4	23.8 25.4	24.33 ± .13	1.04 ± .09
8	23.8 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8			23.80 ± .00	0.00
9	23.8 23.8 25.4 25.4	23.8 23.8 25.4	23.8 25.4 25.4 25.4	23.8 23.8 23.8 25.4	23.8 23.8	25.4 25.4	23.8 23.8	23.8			24.23 ± .14	0.96 ± .10
10	25.4 27.0 27.0	27.0 27.0	25.4 25.4 25.4 25.4	25.4 25.4 25.4 25.4	25.4 25.4 25.4	25.4 25.4	23.8 25.4 23.8	23.8 23.8	25.4 25.4	25.4	25.50 ± .15	1.11 ± .10
11	25.4 27.0 25.4 23.8	25.4 27.0 25.4 23.8	23.8 25.4 25.4 25.4 23.8	25.4 27.0 25.4 23.8	23.8 25.4 25.4 25.4 23.8	23.8 23.8 25.4 23.8	23.8 23.8 23.8 23.8	23.8 23.8 23.8 23.8	23.8 25.4 25.4 23.8 23.8	23.8 25.4 25.4 23.8 23.8	24.55 ± .13	1.25 ± .09
12	23.8 23.8 23.8 25.4 25.4	23.8 23.8 23.8 23.8	23.8 25.4 25.4 25.4	23.8 25.4 25.4	23.8 25.4 25.4 25.4	23.8 25.4 25.4	23.8 25.4 25.4	23.8 25.4 25.4	25.4 25.4	25.4 25.4	24.71 ± .12	0.98 ± .08
13	23.8 23.8 23.8 25.4 23.8	25.4 27.0 25.4 25.4 23.8	25.4 25.4 25.4 23.8 23.8	27.0 25.4 25.4 23.8	25.4 23.8 23.8 23.8 23.8	25.4 23.8 23.8 23.8 23.8	25.4 23.8 25.4 23.8	25.4 25.4 25.4 25.4	25.4 25.4 23.8 25.4 23.8	25.4 25.4 23.8 25.4	24.67 ± .11	1.15 ± .08

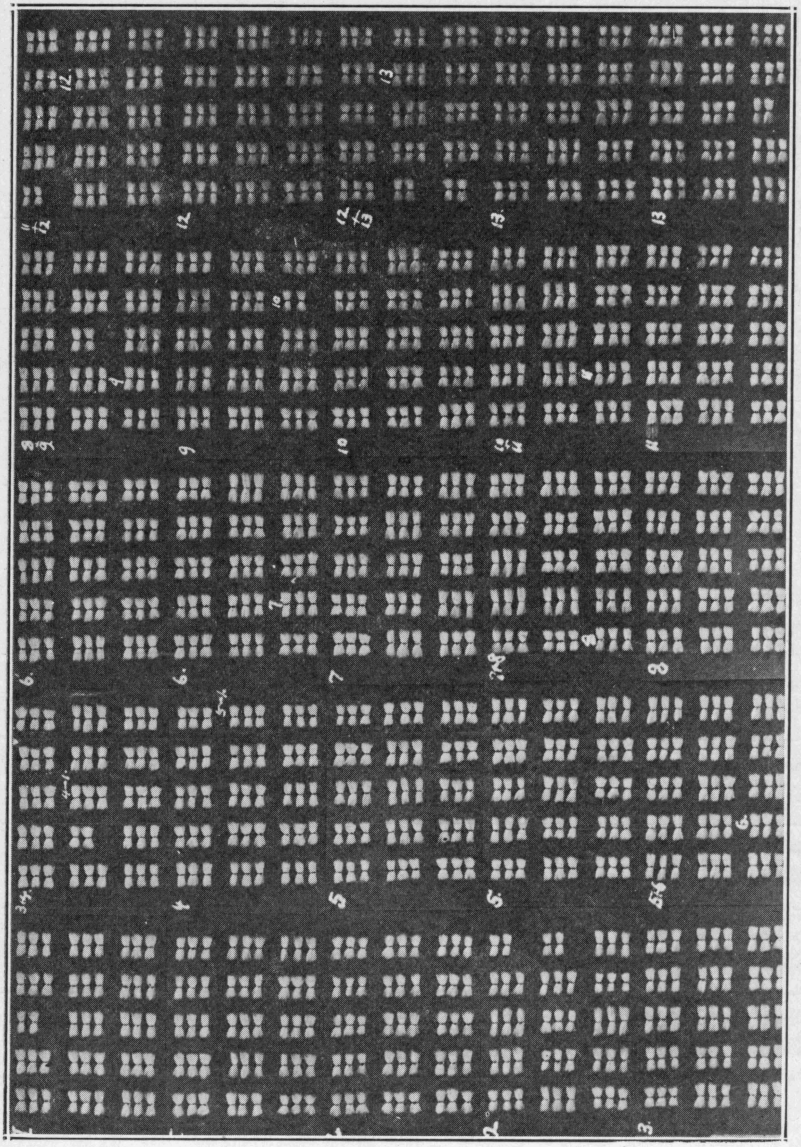


Figure 4.—The combed lint taken from plants of the progeny preparatory to measurement for length of lint.

Length of Lint

The length of lint was determined by combing out and measuring the lint on three seed from a boll taken at random from each plant in all of the progeny rows. (Figure 4.) Table 4 illustrates in detail the method used, by giving the results obtained from the progeny of boll No. 2 of the parent plant. Considerable variation is noted in the length of lint of individual plants in the progeny of boll No. 2.

Table 4.—Length of lint of each plant of progeny of Boll No. 2.

Plant No.	Length of Lint in Millimeters			
	First Combing	Second Combing	Third Combing	Average
2-1	23.8	23.8	23.8	23.8
2-2	23.8	20.6	22.2	22.2
2-3	23.8	25.4	23.8	24.3
2-4	23.8	23.8	22.2	23.2
2-5	25.4	23.8	23.8	24.3
2-8	25.4	25.4	23.8	24.8
2-9	23.8	23.8	17.4	21.6
2-10	23.8	23.8	25.4	24.3
2-11	23.8	22.2	23.8	23.2
2-12	22.2	19.1	20.6	20.6
2-16	22.2	23.8	23.8	23.2
2-17	23.8	25.4	23.8	24.3
2-18	22.2	20.6	20.6	21.1
2-19	23.8	22.2	23.8	23.2
2-20	20.6	23.8	20.6	21.6
2-21	20.6	19.1	22.2	20.6
2-22	27.0	25.4	25.4	25.9
2-24	22.2	23.8	20.6	22.2
2-25	25.4	25.4	25.4	25.4
2-28	19.0	22.2	20.6	20.6
2-29	23.8	25.4	25.4	24.8
2-30	25.4	27.0	27.0	26.4
2-31	22.2	22.2	22.2	22.2
2-34	28.5	28.5	28.5	28.5
2-35	23.8	23.8	22.2	23.2
2-36	23.8	22.2	23.8	23.2
2-37	19.0	19.0	19.0	19.0
2-38	20.6	20.6	20.6	20.6
Mean length of lint				23.25 ± .25

Table 5.—Statistical analysis of length of lint for the progeny.

Boll No.	Number of Plants Produced	Mean	Standard Deviation	Coefficient of Variability
1	29	23.53 ± .12	1.03 ± .09	4.38 ± .38
2	28	23.25 ± .25	2.01 ± .18	8.65 ± .77
3	22	23.18 ± .14	1.01 ± .10	4.38 ± .44
4	21	23.16 ± .03	0.25 ± .02	1.10 ± .11
5	37	23.33 ± .15	1.42 ± .11	6.09 ± .47
6	30	23.80 ± .03	0.30 ± .02	1.29 ± .11
7	27	24.42 ± .26	2.03 ± .18	8.33 ± .76
8	33	24.46 ± .15	1.33 ± .11	5.46 ± .45
9	21	24.73 ± .03	0.25 ± .02	1.03 ± .10
10	24	23.58 ± .24	1.80 ± .17	7.63 ± .79
11	35	24.50 ± .16	1.47 ± .11	6.01 ± .48
12	30	24.00 ± .19	1.58 ± .13	6.61 ± .57
13	38	24.13 ± .20	1.82 ± .14	7.57 ± .58
Average		23.85 ± .15	1.25 ± .11	5.31 ± .46

A statistical analysis of the data on length of lint of the progeny is given in Table 5. The data show that the lint from some plants is more variable than the lint from others. For example, plants of the progenies from bolls Nos. 2, 7, 10, and 13 have standard deviations of 2.01±.18, 2.03±.18, 1.80±.17, and 1.82±.14, respectively, while plants of the progenies from bolls Nos. 4, 6, and 9 have standard deviations of 0.25±.02, 0.30±.02, and 0.25±.02, respectively.

Percentage of Lint

The cotton from each plant was harvested separately. The seed cotton from each plant was weighed and ginned. The seed and lint were then weighed. The percentage of lint was calculated from these data. Table 6 gives the data obtained from the progeny of boll No. 4. This table illustrates the method used. The progeny of the other bolls were treated in a similar manner, but the details are not reported in this Bulletin.

Table 6.—Weight of seed cotton, of lint, and of seed, and percentage of lint from progeny of Boll No. 4.

Plant No.	Weight of Seed in Grams.	Weight of Lint in Grams	Weight of Seed Cotton in Grams	Percentage of Lint
4–1	26.7	19.0	45.7	41.57
4–2	20.0	12.8	32.8	39.02
4–4	20.7	13.6	34.3	39.65
4–6	10.1	7.0	17.1	40.94
4–7	19.5	13.5	33.0	40.91
4–8	8.6	6.0	14.6	41.09
4–9	16.9	11.8	28.7	41.11
4–10	15.5	12.5	28.0	44.64
4–11	26.2	16.5	42.7	38.64
4–14	11.6	7.5	19.1	39.27
4–16	8.0	5.7	13.7	41.61
4–17	17.5	12.5	30.0	41.66
4–18	10.5	7.0	17.5	40.00
4–19	12.6	8.5	21.1	40.28
4–20	18.5	12.5	31.0	40.32
4–21	17.6	12.0	29.6	40.54
4–22	30.0	21.0	51.0	41.18
4–24	14.5	12.0	26.5	45.28
4–25	15.7	8.2	23.9	34.31
4–26	13.2	10.2	23.4	43.59
4–27	15.7	12.5	28.2	44.33

	Weight of Seed Cotton in Grams	Percentage of Lint
Mean	27.98±1.50	41.09±.35
Standard deviation	10.20±1.07	2.42±.23
Coefficient of variability	36.45±3.81	5.91±.61

These data show that individual plants vary a great deal in percentage of lint. For instance, plant No. 4-24 produced seed cotton which had a percentage of 45.28 of lint, while plant No. 4-25 had 34.31. The

variation in percentage of lint, however, was much less than the variation in yield of seed cotton, which, of course, would be expected, since the yield is more easily influenced by variation in soil productiveness.

While the individual plants in a row showed considerable variation in the percentage of lint, as given in Table 6, only a slight variation in the percentage of lint was noted between the mean of the rows, as shown in Table 7.

A statistical analysis of the percentage of lint of all plants in the progeny is given in Table 7. These data show that there is very little variation between the rows in the mean percentage of lint. In only one case, the progeny of boll No. 3, does there seem to be any significant difference in the standard deviation, and in view of the small number of classes on which this was calculated, the significance of this difference is not established.

Table 7.—Statistical analysis of percentage of lint in progeny.

Boll No.	Number of Plants Produced	Mean Percentage of Lint	Standard Deviation	Coefficient of Variability
1	29	40.31±.33	2.64±.23	6.55±.58
2	28	40.35±.30	2.40±.21	5.96±.53
3	22	40.09±.24	1.67±.17	4.18±.42
4	21	41.09±.35	2.42±.23	5.91±.61
5	37	40.56±.29	2.62±.20	6.46±.50
6	30	40.66±.27	2.19±.19	5.40±.47
7	27	39.81±.39	2.99±.27	7.52±.69
8	33	41.42±.31	2.68±.22	6.43±.53
9	21	40.93±.36	2.48±.25	6.07±.82
10	24	40.50±.34	2.53±.24	6.25±.60
11	35	40.88±.31	2.74±.22	6.71±.54
12	30	40.66±.27	2.19±.19	5.40±.47
13	38	41.10±.27	2.49±.19	6.06±.46
Average	.....	40.64±.31	2.46±.22	6.07±.56

The progeny resulting from bolls which are produced on different parts of the plant do not appear to vary greatly in percentage of lint. The relative position of bolls on the parent plant may be seen by referring to Figure 1. The bolls of the parent plant which opened at different dates produced progeny which showed practically no difference in variation in percentage of lint. Data on the opening of bolls on the parent plant are reported in Table 1.

The coefficient of variability calculated for length of lint is greater than the coefficient of variability for percentage of lint. Tables 5 and 7 show that the coefficient of variability of the length of lint ranged from 1.03±.10 to 8.65±.77, while the coefficient of variability of the percentage of lint ranged from 4.18±.42 to 7.52±.69.

STATISTICAL COMPARISON OF PARENT AND PROGENY

Length of Lint

Table 8 compares the length of lint on each seed from boll No. 2 of the parent plant, with the length of lint on each plant in the progeny of boll No. 2.

Table 8—Comparison of the length of lint from each seed of boll No. 2 of the parent plant with the length of lint from each plant in the progeny.

Boll No. 2 of Parent Plant		Progeny from Boll No. 2				
			Length of Lint in Millimeters			
Seed Number	Length of Lint in Millimeters	Plant Number	First Combing	Second Combing	Third Combing	Average
1	25.4	2–1	23.8	23.8	23.8	23.8
2	23.8	2–2	23.8	20.6	22.2	22.2
3	25.4	2–3	23.8	25.4	23.8	24.3
4	27.0	2–4	23.8	23.8	22.2	23.2
5	23.8	2–5	25.4	23.8	23.8	24.3
8	25.4	2–8	25.4	25.4	23.8	24.8
9	27.0	2–9	23.8	23.8	17.4	21.6
10	25.4	2–10	23.8	23.8	25.4	24.3
11	27.0	2–11	23.8	22.2	23.8	23.2
12	23.8	2–12	22.2	19.1	20.6	20.6
16	25.4	2–16	22.2	23.8	23.8	23.2
17	27.0	2–17	23.8	25.4	23.8	24.3
18	23.8	2–18	22.2	20.6	20.6	21.1
19	25.4	2–19	23.8	22.2	23.8	23.2
20	25.4	2–20	20.6	23.8	20.6	21.6
21	27.0	2–21	20.6	19.1	22.2	20.6
22	23.8	2–22	27.0	25.4	25.4	25.9
24	25.4	2–24	22.2	23.8	20.6	22.2
25	27.0	2–25	25.4	25.4	25.4	25.4
28	25.4	2–28	19.0	22.2	20.6	20.6
29	23.8	2–29	23.8	25.4	25.4	24.8
30	25.4	2–30	25.4	27.0	27.0	26.4
31	27.0	2–31	22.2	22.2	22.2	22.2
34	25.4	2–34	28.5	28.5	28.5	28.5
35	23.8	2–35	23.8	23.8	22.2	23.2
36	27.0	2–36	23.8	22.2	23.8	23.2
37	23.8	2–37	19.0	19.0	19.0	19.0
38	25.4	2–38	20.6	20.6	20.6	20.6

	Boll No. 2 of Parent Plant	Progeny of Boll No. 2
Mean length of lint	25.72 ± .12	23.25 ± .25
Coefficient of variability	4.12 ± .32	8.65 ± .77

The mean length of lint of the progeny of boll No. 2 was approximately 2.5 millimeters shorter than the lint of boll No. 2 of the parent. This is perhaps not surprising, since the length of lint in boll No. 2 of the parent plant was distinctly greater than the average length of lint in the parent plant. This extra length of lint in boll No. 2 was doubtless caused by some environmental influence and, therefore, would not be expected to be transmitted to the progeny. The progeny exhibited greater variation than the parent plant. Some plants in the progeny had shorter lint than any of the parent seed; while others had longer lint than any of the parent seed, as shown in Table 8 with plant 2-37 and 2-34, respectively. The three combings were made on as many bolls taken at random from different parts of the plant. Considerable variation is noted in the length of lint between neighboring seed in boll No. 2 of the parent plant. This variation in length of lint ranges from 23.8 to 27.0 millimeters. In this respect it is interesting to compare the uniformity in the length of lint on nieghboring seed in boll No. 8 of the parent plant, as given in Table 9, with the lack of

uniformity exhibited by boll No. 2 of the parent plant, in Table 8. The length of lint on one seed in a boll from plant 2-9 was 17.4 millimeters. In the same boll on plant 2-9, the lint on two other seed measured 23.8 millimeters each. The average length of lint from this plant was 21.5 millimeters. However, the lint on the seed which produced plant 2-9 measured 27.0 millimeters.

Table 9 compares the length of lint of each seed in boll No. 8 of the parent plant with the length of lint of each plant in the progeny produced by this boll.

Table 9.—Comparison of the length of lint on each seed in boll No. 8 of the parent plant with the length of lint of each plant in the progeny.

Boll No. 8 of Parent Plant		Progeny of Boll No. 8				
			Length of Lint in Millimeters			
Seed Number	Length of Lint in Millimeters	Plant Number	First Combing	Second Combing	Third Combing	Average
1	23.8	8–1	25.4	23.8	23.8	24.3
2	23.8	8–2	27.0	27.0	27.0	27.0
3	23.8	8–3	28.5	28.5	28.5	28.5
4	23.8	8–4	25.4	25.4	25.4	25.4
5	23.8	8–5	27.0	28.5	27.0	27.5
6	23.8	8–6	22.2	23.8	22.2	22.7
7	23.8	8–7	25.4	23.8	23.8	24.3
9	23.8	8–9	25.4	23.8	25.4	24.8
10	23.8	8–10	23.8	23.8	22.2	23.2
12	23.8	8–12	23.8	23.8	23.8	23.8
13	23.8	8–13	23.8	23.8	23.8	23.8
14	23.8	8–14	25.4	25.4	25.4	25.4
15	23.8	8–15	23.8	23.8	22.2	23.2
16	23.8	8–16	25.4	23.8	23.8	24.3
17	23.8	8–17	25.4	25.4	25.4	25.4
18	23.8	8–18	25.4	25.4	23.8	24.8
19	23.8	8–19	23.8	23.8	25.4	24.3
20	23.8	8–20	25.4	23.8	23.8	24.3
21	23.8	8–21	25.4	22.2	23.8	23.8
22	23.8	8–22	25.4	25.4	23.8	24.8
23	23.8	8–23	23.8	25.4	23.8	24.3
24	23.8	8–24	20.6	23.8	23.8	22.7
25	23.8	8–25	25.4	23.8	25.4	24.8
26	23.8	8–26	23.8	23.8	23.8	23.8
27	23.8	8–27	23.8	25.4	25.4	24.8
28	23.8	8–28	23.8	23.8	22.2	23.2
29	23.8	8–29	25.4	25.4	23.8	24.8
30	23.8	8–30	23.8	23.8	23.8	23.8
31	23.8	8–31	22.2	25.4	25.4	24.3
32	23.8	8–32	23.8	23.8	23.8	23.8
33	23.8	8–33	22.2	22.2	22.2	22.2
36	23.8	8–36	25.4	25.4	23.8	24.8
37	23.8	8–37	25.4	25.4	27.0	25.9

	Boll No. 8 of Parent Plant	Progeny of Boll No. 8
Mean length of lint	23.8 ± .00	24.46 ± .15
Coefficient of variability	0.0	5.46 ± .45

The lint on every seed from boll No. 8 of the parent plant was of equal length, measuring 23.8 millimeters. Segregation in the progeny or environmental influences, or both, however, resulted in some plants

having longer lint than that on the parent seed; while other plants in the progeny produced shorter lint than that on the seed of their parent.

Five of the thirty-three plants, 8-12, 8-13, 8-26, 8-30, and 8-32, in the progeny from boll No. 8 produced a uniform length of lint for each combing, equal to that of the parent seed, which was 23.8 millimeters. The remaining plants of the progeny produced lint varying in length from 20.6 to 28.5 millimeters. Eleven of the thirty-three plants in the progeny from boll No. 8 produced a uniform length of lint for each of the three combings, and their lint was slightly longer than the lint of the parent. These combings were made from bolls taken from different parts of the plant and the showing is just the reverse of the results presented in Table 8 with boll No. 2.

Table No. 10 compares the mean length of lint and its coefficient of variability between each boll of the parent plant and the progeny from these bolls.

Table 10.—Comparison of the mean length of lint and coefficient of variability between parent and progeny.

Boll Number	Parent		Progeny	
	Mean Length of Lint in Millimeters	Coefficient of Variability	Mean Length of Lint in Millimeters	Coefficient of Variability
1	26.24±.05	1.79±.14	23.53±.12	4.38±.38
2	25.72±.12	4.12±.32	23.25±.25	8.65±.77
3	23.04±.12	4.12±.37	23.18±.14	4.38±.44
4	26.14±.17	5.01±.45	23.16±.03	1.10±.11
5	24.00±.10	3.96±.30	23.33±.15	6.09±.47
6	22.68±.07	2.56±.22	23.80±.03	1.29±.11
7	24.33±.13	4.27±.37	24.42±.26	8.33±.76
8	23.80±.00	0.00	24.46±.15	5.46±.45
9	24.23±.14	3.96±.40	24.73±.03	1.03±.10
10	25.50±.15	4.35±.41	23.58±.24	7.63±.79
11	24.55±.13	5.09±.37	24.50±.16	6.01±.48
12	24.71±.12	3.97±.33	24.00±.19	6.61±.57
13	24.67±.11	4.66±.33	24.13±.20	7.57±.58
Average	24.58±.11	3.68±.31	23.85±.15	5.31±.46

There was variation in the length of lint between all bolls of the parent plant and between the plants in the progeny. The lint from some bolls of the parent plant was very uniform, while other bolls showed variation in the length of lint. A comparison of the coefficient of variability of boll No. 8 with bolls No. 4 and No. 11 of the parent plant, brings out this point, although, of course, the small number of classes in the population on which the standard deviation was calculated prevents too literal an interpretation.

The plants in the progeny from some bolls showed more variation in the length of lint than the plants in the progeny from other bolls. The progeny from bolls No. 4 and No. 9 showed less variation in the length of lint, for example, than the progeny from bolls No. 2 and No. 7.

Boll No. 1 from the parent plant had longer lint which showed less variation in length than the lint of its progeny. The reverse of this condition is noted in boll No. 8.

It is evident from a study of Table 10 that seed from a boll of the parent plant may produce progeny which have longer or shorter lint and show a greater or lesser amount of variation in length of lint, but these variations are probably environmental in their origin and would not be transmitted to another generation.

All thirteen bolls of the parent plant, except 3, 7, 11, and 13, had lint which was different in length from the lint produced by the progeny. Bolls 1, 2, 4, 5, 10, and 12 of the parent had lint which was longer than the lint of the progeny; while bolls 6, 8, and 9 of the parent had lint which was shorter than the lint of the progeny. The individual plants in the progeny rows from bolls 3, 7, 11, and 13 showed variation in the length of lint; many plants being unlike the parent in this respect. However, the mean lengths of lint of these four rows resembled the mean lengths of lint of the parent bolls. Therefore, in regard to the length of lint, four bolls of the parent produced progeny which resembled the parent, six bolls of the parent produced progeny having lint longer than the parent, and three bolls of the parent produced progeny having lint shorter than the parent.

Correlation of Length of Lint

Table No. 11 gives the mean length of lint, the standard deviation, and coefficient of variability in the length of lint for the parent and progeny. It also gives the value of the correlation coefficient of the length of lint between parent and progeny. The population from which the correlation coefficient was calculated consisted of 375 individuals, which represented all of the seed from the parent plant and the plants in the progeny. These 375 individuals fell into only 5 classes in the parental generation and only 10 classes in the progeny, thus rendering the coefficient of correlation only approximately accurate in the second figure.

Table 11.—Correlation of the length of lint between parent and progeny.

Constant	Parent	Progeny
Mean length of lint in millimeters	24.50 ± .05	23.89 ± .06
Standard deviation	1.45 ± .04	1.58 ± .04
Coefficient of variability	5.93 ± .15	6.59 ± .16

Correlation coefficient $r = .02 \pm .03$

	Mean Length of Lint in Millimeters
Parent	24.50 ± .05
Progeny	23.89 ± .06
Difference and probable error	0.61 ± .08

There appears to be no consistent relationship between individual seeds of the parent and their progeny with respect to length of lint, although the mean length of lint of the progeny very closely resembled the mean length of lint of the parent. This is what was to have been expected because all of the parent seeds came from a single plant and the lint on them, being parental tissue, was presumably all of the same genetic constitution. Such variation as existed between the seeds of the parent plant in respect to lint characters was, therefore, probably due to environmental causes and hence would not be expected to be transmitted to the progeny of those seeds.

The difference in the length of lint between the mean of the parent and the mean of the progeny is only .61 of a millimeter, which is a relatively small difference. While the difference in length of lint is significant in view of the value of its calculated probable error, too much confidence should not be placed upon this point because of the small number of classes in the populations from which the probable errors were calculated.

SUMMARY

Bolls taken from different parts of the parent plant showed variation in the length of lint. These variations were also found to occur in the same boll, in the same lock, and on seed side by side in the same lock.

The position of the bolls on the parent plant, and also the date on which these bolls opened, apparently had no consistent influence on the length of lint in the parent plant or in the progeny. This indicates that the plant should be considered as a unit in making selections for breeding purposes.

Some bolls of the parent plant which were uniform with respect to length of lint produced progeny which were variable in the length of lint. Other bolls of the parent plant which were variable in the length of lint produced progeny which were less variable. These variations are probably environmental in their origin and would not be transmitted to another generation.

The percentage of lint in the progeny does not appear to have been as variable as the length of lint, when comparison is made between rows as a unit. Individual plants in some of these progeny rows, however, exhibited some variation in the percentage of lint. The mean percentage of lint of each of the progeny rows showed very little variation.

There appears to be no correlation in the length of lint between individual seeds of the parent and their progeny. Some of the plants in the progeny resembled the parent with respect to length of lint; while other plants in the progeny produced some lint which was longer and some which was shorter than the lint on the parent plant. The mean length of lint of the progeny, however, very closely approached the mean length of lint of the parent plant.

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