THE EFFECT OF PLANTING METHODS ON MECHANIZING COTTON PRODUCTION

By

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THESIS AND ABSTRACT APPROVED:

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PREFACE

The experimental work described in this thesis is a part of the research program of the Oklahoma Agricultural Experiment Station on cotton mechanization. This program is part of a belt-wide project with each state experiment station and the United States Department of Agriculture cooperating.

The purpose of the project described in this paper was to determine how method of planting, rate of planting, and spacing of plants affected mechanization of later cropping practices.

The author is gratefull for counsel and cooperation given during the process of this work by Professor E. W. Schroeder, who was the writer's advisor during the latter part of this work, and to Mr. W. J. Oates, who was the writer's advisor during the early part of the work. The assistance of Mr. Rex Humphreys, Agricultural Engineer at the Oklahoma Cotton Research Station, in assembling the data used in this thesis is also appreciated.

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I. INTRODUCTION

Harvesting is one of the most difficult problems of cotton mechanization. For many years the only work toward mechanization of cotton harvesting was in the mechanics of the machines with little thought toward variables affecting the machine.

In recent years factors other than mechanical have been found to affect the effectiveness and efficiency of the machine. A few of these factors are plant size, boll spacings, physical conditions of the land, and planting spacing. In 1949 the Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture inagurated an experiment to study the effect of some of these factors on the mechanical cotton harvester.

II. OBJECTIVE

The objective of the research herein reported was to study the effects of the number of seed planted per hill, the spacing of the hills and the method of planting on:

1. Emergence
2. Survival
3. Harvester losses
4. Yield
5. Preharvest losses
6. Grass and weed control

III. REVIEW OF LITERATURE AND PREVIOUS WORK

The experimental work described in this paper is a continuation of the project set up by Oates in 1949. The review of literature and previous work will cover the work done by Oates in 1949 and 1950 and related work done by others. In 1950 no data were taken because heavy insect damage reduced the cotton yields to almost zero. The experiment described was carried out at the Oklahoma Cotton Research Station at Chickasha, Oklahoma.

Limited work has been done on how plant spacings affect the efficiency of cotton harvesters. Smith[10], working with the Texas stripper, says,

> "plants left unthinned increased the amount of foliage and the number of stalks which gave somewhat the same effect as long limbs. The bolls were folded between the plants thus hindering their removal. Spacings of seven to twelve inches are satisfactory while plants spaced more widely apart usually grow large and have several long limbs."

In 1949 Oates found no difference in machine losses due to variation of spacing, method of planting, or rate of planting.

Many studies have been made on how spacing affects yield. The results of these studies vary with different experiment stations. After five years of experiments at five different locations the Alabama[4] Agricultural Experiment Station reached the conclusion that spacings giving more than 25000 plants per acre or less than 8000 plants per acre tended to reduce yields. A twelve year study of spacing of cotton on hill land at Holly Springs, Mississippi[2], gave no significant difference due to rate and spacing when varied from 4.17 stalks per foot of row to .62 stalks per foot of row. A fourteen year experiment which tested the effect of rate variation on yields of check planted cotton at Stoneville, Mississippi[2], gave little variation in yield due to spacing or rate. In 1949 Oates[8] found no difference in yield due to spacing or rate of planting. Spacings were varied from six to thirty-two inches and rates used were one to two seed per hill and three to five seed per hill. The foregoing information indicates that variation in rate of planting and spacing has little effect on yield when this variation is within reasonable limits.

Because variation in rate of planting and spacing does not effect yield, the combination of these variables giving the least preharvest losses and machine losses can be used.

In 1949 Oates found that there might be a correlation between preharvest losses and planting rate.

IV. METHOD OF PROCEDURE

Treatments Used

Variables studied in this experiment were spacing, method of planting, and rate of planting. In this thesis spacing refers to the distance the planter travels forward during the time between the passing of one seed cell over the seed tube of the planter and passing of the next seed cell over the seed tube of the planter. Planting rates used were 1-2 seed per plate cell and 3-5 seed per plate cell. Planting methods used were hill and drill. The hill method of planting used a valve in the lower part of the seed tube. Each time a seed cell passed over the seed tube this valve was tripped. This action placed the seed in a small group. In the drill method of planting the valve was fastened open and the rest of the planter mechanism was the same as for hill dropping. The seed dispersed because different amounts of time was required for them to pass through the seed tube.

Six spacings, two methods of planting, and two planting rates were used in this study. All possible combinations of these variables gave twenty-four different treatments. These treatments are shown in Table I.

Plot Selection

Plots uniform in soil type and previous treatment within each replication were selected.

Seedbed Preparation

The seedbeds of all plots were prepared by standard methods. The land was turned with a moldboard plow early in the spring. Later it was pulverized with a disk.

Seed Selection

Delinted and flotation graded seed of the Stormproof Number One variety were used. Although the seed were graded there was a great variation in

TABLE I

Treatments Used in this Experiment

Treatment Number	Method of Planting	Spacing in Inches	Planting Rate (Seed Per Hill)
1	drill	6	1-2
2	drill	8	1-2
3	drill	10	1-2
4	drill	12	1-2
5	drill	15	1-2
6	drill	19	1-2
7	hill	6	1-2
8	hill	8	1-2
9	hill	10	1-2
10	hill	12	1-2
11	hill	15	1-2
12	hill	19	1-2
13	drill	6	3-5
14	drill	8	3-5
15	drill	10	3-5
16	drill	12	3-5
17	drill	15	3-5
18	drill	19	3-5
19	hill	6	3-5
20	hill	8	3-5
21	hill	10	3-5
22	hill	12	3-5
23	hill	15	3-5
24	hill	19	3-5

seed size.

Planter Selection

The planter used was modified from a two row commercial planter. Boot valves were used for hill dropping. They were fastened open for drilling. Spacing was changed by changing gear ratios. Seed per hill was varied by changing plates.

Planting Procedure

The planter was calibrated in the shop. Each 3-5 seed hill averaged 3.6 seed per hill and each 1-2 seed hill averaged 1.4 seed per hill. The actual procedure of planting will be illustrated by an example. Adjustments on the planter were made to give the seeding rate and the spacing desired on treatment one. The center two rows of the treatment one plot were planted. Adjustments were made on the planter for the plot adjacent to plot one. The center two rows of this plot were planted. This procedure left two unplanted rows together. One of the rows belonged to the first plot and the other belonged to the second plot planted. These rows were planted by adjusting the right hopper of the planter like it was adjusted for planting the right plot and adjusting the left hopper like it was adjusted for the left plot. This procedure was used so that two row equipment could be used in harvesting the two center rows of the plot.

Cultural Practice

All plots were cultivated three times with a two row tractor cultivator. A few weeds were removed from the cotton late in August with hoes.

Insects were controlled with two applications of 3-5 liquid spray and three applications of 3-5-40 dust.

Machine Selection

The Oklahoma brush stripper was used in the harvesting test because it was available and convenient.

Statistical Analysis of Data

An analysis of variance was performed on the data by the Oklahoma Agricultural Experiment Station Statistical Laboratory.

Determination of Preharvest Losses

Preharvest losses were determined by picking the cotton from the ground before harvest. The cotton was taken from under one of the two center rows of the four row plots immediately before harvest. The length of row used was sixty-six feet. This sixty-six feet was measured with a steel tape. To remove any variation in sample weight due to trash and dirt content the samples were ginned on a roll type gin. This operation left the seed clean and the lint trashy. The weight of cotton lost per acre could be determined because the lint/seed ratio in cotton remains nearly constant.

Data pertaining to cotton yields are usually reported in pounds of lint cotton per acre. To convert grams of seed per sixty-six feet of row to pounds of lint per acre the following equation was used:

$$PL = \frac{DxRxS}{K} \qquad (1)$$

PL is preharvest losses in pounds of lint per acre, D is the number of sixty-six feet row lengths per acre, R is the weight of clean lint divided by the weight of clean seed from a given area, S is the weight of seed from sixty-six feet of row in grams, and K is the number of grams in a pound. R was determined by dividing the weight of lint from eight hand cleaned samples by the weight of clean seed from the same eight samples. R is equal to .662. The data used in determining R is in Table II. Substituting into equation (1) PL equals .291 S. As stated before this equation will give preharvest losses in pounds of lint per acre.

Preharvest loss samples were taken November 21, 1951.

TABLE II

The Samples Used in Determining the Lint Seed Ratio R

Treatment Number	Replication	S*	L*	S+L	R***	% Lint****
17	1	85	55	140.0	.648	39.3
17	3	97	60	157.0	.618	37.7
14	3	125	84.5	289.5	.675	40.4
14	1	99	68	167.0	.683	40.7
6	3	130	89	219.0	.684	40.6
6	1	150	98	248.0	.653	39.5
19	3	123	84	207.0	.683	40.6
19	1	128	82	210.0	.641	39.0

* S = Grams of seed per sixty-six feet of row
** L = Grams of lint per sixty-six feet of row
*** R = L/S
**** % Lint = L/S+L

Determination of Machine Losses

Machine losses were determined by removing the cotton from the ground and from the stalk after the harvesting machine had gone over the field. The machine loss samples were taken from the same sixty-six feet of row as preharvest losses. The same ginning procedure was used to eliminate trash and dirt in machine losses as was used in preharvest losses. The conversion factor that applies to preharvest losses also applies to machine losses. Machine loss samples were gathered November 21, 1951.

Determination of Total Yield

The total yield was determined from one of the two center rows in each plot. The sample rows were sixty-six feet long. The cotton on the stalk was snapped and preharvest losses picked up in one operation. This sample was weighed and recorded in pounds. This figure included the weight of burrs, seed, and lint. To convert this figure into pounds of lint cotton per acre this equation was used:

$$Y = F x W x L x D \qquad (2)$$

Y is the total yield in pounds of lint cotton per acre. F is a ratio of weight of seed plus lint to weight of seed plus lint plus burrs. W is the weight of the picked sample, it includes burrs, seed, and lint. L is a ratio of lint weight to seed cotton weight. L can be determined from the data in Table II. D is the number of plots required to make an acre. Evaluation of the equation gives $Y = .616\ W$.

The value of F is an over-all ratio for all treatments in replications one and three. F was found by dividing the seed plus lint weight for all treatments in replications one and three by the seed plus lint plus burr weights for replications one and three. As a check on variation this ratio was calculated for each treatment. There was very little variation. The data used for this calculation are in Table III.

Determination of Emergence

The emergence count was made July 3, 1951. The cotton was planted June 19, 1951. The cotton was planted shallow. Emergence was very uneven. When the emergence count was made the cotton ranged in size from just emerged to five leaved plants. Counts were made on a row sample ten feet long in each plot. The samples selected occupied the space between ten and twenty feet from the north end of the plot. The row on which the counts were made was selected at random.

Determination of Survival

Counts were made at harvest time to determine the number of plants that survived. The procedure used in making those counts was the same as that used in making emergence counts.

Grass and Weed Control

Observations of the amount of grass and weeds were made at various times. No numerical data were taken in the phase of the experiment.

TABLE III

Data Used in Calculating the Ratio F*
Weights are in Grams

Treatment	Replication 1 Burr Weight	Replication 1 Total Weight	Replication 1 Lint+Seed Weight	Replication 3 Burr Weight	Replication 3 Total Weight	Replication 3 Lint+Seed Weight	F* Replication 1	F* Replication 3
1	34.5	155.5	121.0	46.2	214.9	168.7	.779	.785
2	40.5	189.5	149.0	39.4	190.6	151.2	.788	.795
3	33.3	144.6	111.3	47.3	215.3	166.0	.782	.772
4	39.7	175.5	135.8	51.6	228.9	177.3	.774	.775
5	41.0	177.4	136.4	46.5	225.5	159.0	.770	.709
6	43.0	198.5	155.5	49.5	208.5	159.0	.784	.764
7	36.6	167.6	131.0	45.7	212.8	167.1	.782	.786
8	40.9	170.7	129.8	55.4	235.4	180.0	.762	.767
9	38.5	169.6	131.1	49.8	224.6	174.8	.774	.777
10	39.2	161.9	122.7	53.4	222.9	169.5	.760	.761
11	40.7	171.7	131.0	45.5	199.2	153.7	.764	.771
12	42.5	178.5	136.0	55.4	227.6	172.2	.764	.756
13	33.4	164.9	131.5	31.5	149.3	117.8	.798	.782
14	28.5	133.0	104.5	47.5	224.0	176.5	.785	.790
15	39.5	186.0	146.5	30.2	145.4	115.2	.788	.792
16	36.0	161.3	125.3	45.3	220.7	175.4	.779	.794
17	40.1	182.6	142.5	33.0	147.0	114.0	.781	.776
18	38.1	169.1	131.0	44.0	195.7	151.7	.775	.776
19	31.5	147.0	115.5	30.8	157.2	126.4	.785	.804
20	37.8	165.8	128.0	36.7	173.1	136.4	.762	.787
21	37.5	165.3	127.8	36.1	176.9	140.8	.774	.796
22	37.8	174.8	137.0	39.5	183.6	144.1	.785	.786
23	33.1	146.2	113.1	45.3	206.6	161.3	.775	.781
24	32.5	138.0	105.5	46.1	180.4	138.8	.764	.770

* $F = \frac{\text{Seed+Lint}}{\text{Seed Lint Burrs}}$

V. ANALYSIS OF RESULTS

Yield

The yield in pounds of lint per acre for each plot is given in Table IV. A statistical analysis of these data shows no significant difference in yields due to treatments.

Machine Losses

Table V shows machine losses in grams of seed per sixty-six feet of row. A statistical analysis of these data shows no significant difference in machine losses due to spacing. Table VI shows these losses converted into percent of total yield. A statistical analysis of these data reveals no significant difference due to treatment.

Preharvest Losses

Table VII presents preharvest losses in grams of seed per sixty-six feet of row. There was a highly significant difference due to treatment. There was no significant difference in preharvest losses due to planting method (hill or drill). Preharvest losses decreased with increased spacings, this difference was highly significant. These data are shown in Table VIII. The total preharvest losses from all 1-2 seed plots were 371 grams. The total from all plots of the 3-5 seed rate was 707 grams. The change in preharvest losses due to change in planting rate was highly significant. The variation in preharvest losses as planting rate was varied is presented in Table IX.

Table X presents preharvest losses as a percent of total yields. When these losses were converted to percent of plot yield and analyzed there was as before no significant difference due to method of planting. There were highly significant differences in preharvest losses due to spacing and rate as before. The data showing the variation of preharvest losses as spacing is varied are presented in Table XI. Table XII presents the variation of preharvest losses

TABLE IV

Yield of Each Plot in Pounds of

Lint Per Acre

Treatment	Replication 1	Replication 2	Replication 3
1	177	212	502
2	199	246	666
3	165	93	354
4	256	65	587
5	226	161	508
6	235	136	298
7	195	160	358
8	120	193	235
9	192	146	551
10	75.5	189	148
11	134	171	300
12	155	271	566
13	153	113	242
14	123	230	616
15	242	149	194
16	192	151	584
17	196	103	187
18	213	203	296
19	242	111	273
20	216	127	287
21	239	112	213
22	234	133	286
23	158	159	362
24	151	258	253

TABLE V

Machine Losses in Grams of Seed

Per Sixty-six Feet of Row

Treatment	Replication 1	2	3
1	41	45	101
2	38	43	71
3	55	missing	112
4	23	39	141
5	27	39	186
6	55	43	111
7	28	47	87
8	14	43	86
9	30	47	121
10	39	48	155
11	23	44	89
12	47	35	109
13	37	44	84
14	28	111	83
15	44	28	43
16	41	27	174
17	49	29	58
18	34	46	66
19	41	30	58
20	29	31	51
21	13	49	26
22	24	46	18
23	41	49	52
24	35	29	39

TABLE VI

Machine Losses in Percent of Yield

Treatment	Replication 1	Replication 2	Replication 3
1	7.01	6.39	5.90
2	5.70	5.20	3.12
3	10.00		9.25
4	2.65	17.70	7.04
5	3.54	7.20	5.00
6	6.86	9.27	11.00
7	4.24	6.95	7.12
8	2.56	6.79	10.70
9	4.62	7.47	6.35
10	5.80	7.48	32.40
11	5.28	7.56	8.74
12	8.95	3.83	5.62
13	8.45	12.60	10.50
14	7.18	14.50	3.95
15	5.29	5.82	6.75
16	6.35	5.34	8.80
17	7.59	8.65	9.45
18	4.78	6.80	8.68
19	5.00	8.55	6.18
20	4.01	7.27	5.38
21	1.62	13.30	3.69
22	3.10	10.20	1.87
23	7.73	9.25	4.31
24	7.50	5.40	4.56

TABLE VII

Preharvest Losses in Grams of Seed

Per Sixty-six Feet of Row

Treatment	Replication 1	2	3
1	9	24	2
2	15	20	7
3	21	18	6
4	10	3	14
5	14	7	10
6	6	6	15
7	9	16	6
8	14	22	0
9	9	4	10
10	12	8	3
11	16	5	14
12	4	12	0
13	45	37	32
14	25	20	16
15	0	30	28
16	15	12	19
17	27	19	32
18	19	2	20
19	11	31	39
20	15	9	34
21	17	16	26
22	7	8	14
23	12	15	25
24	14	6	10

TABLE VIII

A Summary Showing the Change in Preharvest Losses as Spacing and Method Were Varied

A Summary From Table VII

Spacing In Inches	Method Drill	Method Hill	Total
6	149	112	261
8	103	94	197
10	103	82	185
12	73	52	125
15	109	87	196
19	68	46	114
Total	605	473	1078

TABLE IX

A Summary Showing the Change in Preharvest Losses as Rate and Spacing Are Varied

A Summary From Table VII

Spacing In Inches	Rate 1-2	Rate 3-5	Total
6	66	195	261
8	78	119	197
10	68	117	185
12	50	75	125
15	66	130	196
19	43	71	114
Total	371	707	1078

TABLE X

Preharvest Losses in Percent of

Total Yield

Treatment	Replication 1	Replication 2	Replication 3
1	1.53	3.30	0.12
2	2.20	2.37	0.31
3	3.70	5.63	0.49
4	1.13	1.35	0.69
5	1.80	1.27	0.57
6	0.74	1.28	1.47
7	1.30	2.90	0.49
8	3.40	3.32	0.00
9	1.37	0.80	0.52
10	4.64	1.23	0.59
11	3.47	0.86	1.35
12	0.75	1.29	0.00
13	8.50	9.55	3.85
14	5.91	2.54	0.76
15	0.00	5.87	4.21
16	2.26	2.32	0.94
17	4.10	5.38	4.99
18	2.57	0.28	1.98
19	1.33	8.15	4.19
20	2.02	2.06	3.46
21	2.07	4.16	3.56
22	0.87	1.75	1.42
23	2.22	2.75	2.01
24	2.53	1.11	1.15

TABLE XI

A Summary of Preharvest Losses
Which Shows Differences Due to
Variation in Spacing and Method

This Summary is Prepared From Table X

Spacing	Method: Hill	Method: Drill	Total
6	26.85	18.36	45.21
8	14.09	14.26	28.35
10	19.95	12.48	32.43
12	8.69	10.50	19.19
15	18.11	12.66	30.77
19	8.32	6.83	15.15
Total	96.01	75.09	171.10

TABLE XII

A Summary of Preharvest Losses
Which Shows Differences Due to
Variation in Spacing and Rate

A Summary From Table X

Spacing	Rate: 1-2	Rate: 3-5	Total
6	9.64	35.57	45.21
8	11.60	16.75	28.35
10	12.56	19.87	32.43
12	9.63	9.56	19.19
15	9.32	21.45	30.77
19	5.53	9.62	15.15
Total	58.28	112.82	171.10

as seeding rate is varied.

Preharvest losses in this experiment were low. The average preharvest loss was 2.4 percent for replication one, 3.7 percent for replication two and 1.3 percent for replication three. From Table IV and Table VII it can be seen that although the yield of replication three increased considerably over the yields of the other replications, preharvest losses increased very little.

Emergence

Table XIII shows the emergence count from each sample and the number of seeds that should have been planted in each sample if the planter was planting at the calibrated rate. The average emergence for the 1-2 seed rate was approximately 80 percent. The average emergence for the 3-5 seed rate was approximately 67 percent. Percent emergence was calculated from the equation, $E = \frac{pe}{sp}$. In this formula pe is plants emerged and sp is seed planted. Seeds planted was found by multiplying the number of seeds per hill the planter was calibrated to plant by the number of hills per ten feet of row. Plants emerged was found by counting the number of plants in ten feet.

Table XIII shows the number of plants that had emerged after two weeks. A statistical analysis of these results shows a highly significant difference in the number of seed emerged as spacing and rate was varied. There was no significant difference in emergence due to planting method.

Survival

Table XIV gives the number of plants that survived in each sample. Emergence was probably not complete at the time the emergence count was taken; therefore, survival as a percent of emergence was not analyzed.

TABLE XIII

Plants Emerged After Two Weeks In a Sample of Ten Feet of Row

Treatment	Replication 1		Replication 2		Replication 3	
	Plants Emerged	Seed Planted	Plants Emerged	Seed Planted	Plants Emerged	Seed Planted
1	17	28	19	28	15	28
2	17	21	22	21	19	21
3	12	17	14	17	16	17
4	10	14	11	14	9	14
5	15	11	11	11	12	11
6	10	9	6	9	11	9
7	25	28	26	28	15	28
8	18	21	22	21	14	21
9	11	17	9	17	16	17
10	15	14	7	14	12	14
11	12	11	9	11	13	11
12	7	9	6	9	9	9
13	43	72	39	72	38	72
14	44	54	40	54	34	54
15	24	42	25	42	28	42
16	23	36	18	36	20	36
17	21	29	24	29	31	29
18	10	23	9	23	8	23
19	38	72	42	72	43	72
20	25	54	27	54	41	54
21	23	42	28	42	37	42
22	27	36	24	36	27	36
23	19	29	22	29	17	29
24	15	23	20	23	21	23

TABLE XIV

Plants on a Sample of Ten Feet of Row at Harvesttime

Treatment	Replication 1	Replication 2	Replication 3
1	19	15	15
2	16	16	15
3	16	17	19
4	10	7	14
5	13	12	13
6	10	8	8
7	23	24	17
8	25	16	12
9	12	12	17
10	16	11	11
11	13	13	13
12	13	8	6
13	33	44	38
14	29	27	18
15	33	30	26
16	22	23	20
17	23	22	24
18	16	17	18
19	30	43	43
20	37	37	32
21	30	31	25
22	22	21	22
23	24	27	26
24	19	21	15

VI. DISCUSSION OF RESULTS

The effect of method of planting, rate of planting, and spacing of plants on machine losses, stand, yield, preharvest losses, and grass and weed control are discussed below.

No significant difference in machine losses due to treatment was found.

Difference in yields due to treatment was not significant. This confirms the results obtained in 1949. The results from this experiment seem to indicate that cotton is adaptable to different planting rates and spacings.

Difference in stand due to treatment was significant when the emergence count was made and when the survival count was made. This difference was due to spacing and planting rate. More plants emerged as planting rate was increased from 1-2 seed per hill to 3-5 seed per hill and as spacing was decreased. Increasing the planting rate and decreasing spacing increases the number of seed planted per acre; therefore, a higher total emergence was expected. The theory that hill dropping would give better emergence than drilled seed did not hold true in this study. There was no statistical difference in emergence or survival due to method of planting.

From Table XIII it appears that a higher percentage of emergence is obtained at the lower planting rate. This result is directly opposed to the theory that more seed planted in a hill will give more push and allow more plants to break through the soil crust. These results are of doubtful value because the planter was not calibrated carefully enough. The planter was checked in the shop by turning the plates by hand and counting the seeds that were dropped. It is probable that the number of seeds dropped at the higher plate speeds in the field was less than the number dropped when the plate was turned slowly by hand.

It will be noted that in some of the 1-2 seed emergence counts more seed emerged than were planted according to calculations. Possibly this discrepancy was due to variation in seed size. Variation in seed size would allow more than two seed to enter the plate cell if a group of small seed happened to be in one place. Small seed possibly tended to collect in one section of the hopper as it moved over a rough field.

There were no significant differences in yields due to treatment. This result is as expected. Many studies have found that variation in the number of plants per acre and variation of arrangement of plants had no effect when these variations were within reasonable limits.

Preharvest losses may be the deciding factor against the mechanical cotton harvester. For this experiment these losses were rather low. Method of planting did not significantly affect the preharvest losses. Differences in preharvest losses due to rate of planting were highly significant. Preharvest losses were much greater at the higher planting rate. Preharvest losses were greater at closer spacing. In this experiment preharvest losses increase as the number of plants per acre increase.

There is a theory that thicker spacing of cotton plants causes them to mature earlier. If this theory is correct it might explain the greater preharvest losses at closer spacings and higher planting rates. This early maturity would allow more time for preharvest losses to occur between the boll opening and harvest.

The total preharvest loss on each replication varied but little. This was true even though the yield on replication three was much higher than the yield on replications one and two. All replications grew at about the same rate until a drought occurred in late summer. Replications one and two were damaged by the dry weather before replication three. Replication three continued to fruit after replications one and two had stopped. This condition caused the yield from replication three to be greater than the yields from the other replications.

If time elapsing between the opening of the boll and harvest determines the amount of cotton lost before harvest and if there was an equal amount of cotton on each replication from the first crop, preharvest losses would be the same on all replications until the late bolls in replication three started losing cotton.

The effect of treatment on grass and weed control was noted by observation. There was no perceptible difference in grass and weed control due to treatment. Grass and weeds presented no problem in this experiment; they were easily controlled by cultivation.

VII. SUMMARY AND CONCLUSIONS

1. Differences in machine losses due to treatment were not significant.
2. Difference in planting method (hill or drill) caused no difference in stand.
3. Differences in yield due to treatment were not significant.
4. Preharvest losses increased with closer spacings and higher planting rates. The increased preharvest losses in closer spacings and higher planting rates can possibly be explained by the earlier maturity of cotton plants when there are more plants per acre. This earlier maturity would allow more time for losses to occur.
5. Because of very little trouble from grass and weeds, no conclusions can be drawn as to the effect of treatment on grass and weed control.

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