THE FRUITING OF COTTON IN RELATION TO INSECT CONTROL: SECOND REPORT

F. A. FENTON, Oklahoma A&M College, Stillwater

The results of one year's records on cotton fruiting in relation to insect control have been previously reported (5). This study was continued in 1949 using the same methods of tagging and recording blooms. Each bloom count plot consisted of 10 consecutive plants. There were 4 replicates per each insecticide treatment and check. Each replicate in the insecticide treated plots was in a separate plot located in a randomized block of plots. This design tended to overcome any possible effect of different degrees of insect infestation and variable soil fertility and gave a record of the blooming of 40 plants for each treatment located in 4 separate parts of the field. Each series of 4 replicates was given identical treatments of insecticides as follows: Treatment number 1, six applications of a dust mixture containing 3 percent of the gamma isomer of benzene hexachloride, 5 percent DDT and 40 percent sulfur at an average rate of 13.3 pounds per acre; treatment number 2, five applications of the 3-5-40 mixture at an average rate of 10.6 pounds per acre; treatment number 3, four applications of a spray at the average rate of 1.8 pounds of toxaphene and 0.9 pound of DDT per acre, and lastly the check or non-treated plots. The variety studied was Stoneville 62B.

Several investigators have studied the fruiting of cotton. Martin (7) found an average of 6 days between the appearance of successive squares for all fruiting branch internodes of the plant. He determined that the first squares on successive fruiting branches appeared at 3-day intervals. He concluded that a more rapid setting of fruit can be expected if the number of plants is increased per acre because with a larger number of branches, resulting from more plants per acre, better advantage is taken of the more rapid production of squares on the first node of successive fruiting branches. There was also a tendency for the interval between the appearance of the squares to lengthen as the season advanced. The mean period between the appearance of the square until it bloomed was 23 days for upland cotton. The square period was shorter early in the season than later. Ewing (4) found that from 50 to 71 percent of the bolls shed according to the variety and that loss of 50 percent of bolls by shedding exclusive of weevil injury was not abnormal. Buie (1) stated that squares and young bolls were always the first to shed and only very adverse conditions caused a loss of older and more mature bolls. He noted that the percentage of bolls which matured was highest during the first week of blooming and lowest for the last, decreasing proportionately as the season advanced. He observed that slightly less than one-half of the total flowers produced bolls. He noted also that a variety which produced the greatest number of flowers very early in the season did not necessarily mature the most bolls per plant because of a higher shedding rate. Dunnam (3) caged weevils on bolls of known ages for three varieties. He noted that boll weevil injury decreased with age of the boll within a variety and that there was a varietal difference. The loss ranged from 79.3 percent to 100 percent for bolls one to five days old and from 0.5 percent to 1.9 percent for bolls 36 to 40 days old.

Hamner (6) found he could remove all the squares from cotton plants at various intervals early in the fruiting period without decreasing the number of bolls produced. There was a tendency for artificially defruited plants to produce more blooms than the check plants. There was also a tendency for defruited plants to mature a larger number of bolls than the checks. A complete loss of squares through the third week in July in Mississippi did not result in a loss in yield. However, removal delayed boll production thus inviting more boll weevil damage.

Dunlap (2) found the effects of light on fruiting and shedding to be more important than drouth or high temperatures. However, frequent wilting of cotton plants for a few days at a time caused excessive shedding.

The results of this study are summarized in Tables I and II below.

TABLE I

Duration of Blooming Period and Average Number of Blooms Produced in Treated and Check Plots. Canadian, Oklahoma, 1948-1949.

Year		Date First Bloom	No. Days to Reach Peak	Date Last Bloom	Total Days of Blooming	Average No. of Blooms Produced Per 10 Plants
1948	Treated plots	July 5	32	Aug. 23	50	113.4
	Check plots	July 6	34	Aug. 25	51	125.6
1949	Treated plots	July 1	15	Aug. 4	35	189.1
	Check plots	July 1	13	Aug. 3	34	173

Comparative Blooming Periods in 1948 and 1949. The blooming period covered a period of 50-51 days in 1948 with Rowden. The peak was reached 32 days after first bloom in the dusted plants and 34 days in the check plants. In 1949 with Stoneville 62B, the blooming period was shortened by drouth to 34 and 35 days for the treated plants and the checks respectively, and the peak was reached in 15 days in the treated plots and 13 days in the check.

Comparative Rates of Blooming. The check plants produced more blooms in 1948 than the dusted plants and less in 1949 than the sprayed or dusted plants. The differences in total bloom production were comparatively slight in both years and were not correlated with differences in yields between the checks and treated plants. During both years there was a period when the checks outbloomed the treated plants. Early in the blooming period there was no significant difference between the checks and dusted plants in 1948. In 1949, the period of greater bloom production in the checks started earlier than in the preceding year. Also blooming stopped earlier in the checks in 1949. Because of a sudden great increase in weevil infestation in the treated plots in 1949, bloom production sharply declined. Applications of insecticides increased bloom production for awhile.

TABLE II

Comparative Rates of Blooming and Bolls Set in Treated and Check Plots. Canadian, Oklahoma, 1948-1949.

Dates	Treated Plots: No. Blooms per 10 Plants (Average)		Treated Plots: No. Bolls per 10 Plants (Average)		Treated Plots: Percent Bolls Set (Average)		Check Plots: No. Blooms per 10 Plants (Average)		Check Plots: No. Bolls per 10 Plants (Average)		Check Plots: Percent Bolls Set (Average)	
	1948[1]	1949[2]	1948[1]	1949[2]	1948[1]	1949[2]	1948[1]	1949[3]	1948[1]	1949[3]	1948[1]	1949[3]
July 1- 5	0.2	7.7	0.2	6.8	100	89.1	0	7	0	6	0	85.7
6-10	2.6	26.8	1.4	20.4	53.8	76.3	2.2	22.3	2	19.5	90.9	87.6
11-15	4.6	49.8	3.8	29.4	82.6	59.1	4	46.5	3.8	21.8	95	46.8
16-20	4.8	28.4	2.4	8.6	50	30.2	3.8	42.8	2.8	8	73.7	18.7
21-25	6.6	33	5.2	5.1	78.8	15.4	4.4	38.5	2.6	5.5	59.1	14.3
26-31	9.6	37.2	8.3	5.4	85.4	14.6	10.4	15.3	3.4	0.8	32.7	4.9
Aug. 1- 5	20.2	6.3	6.6	0.6	32.7	11.8	18.8	0.8	6	0	31.9	0
6-10	19.6	0	7.8	0	41.8	0	29.2	0	5.8	0	19.9	0
11-15	22.4	0	4.6	0	20.5	0	25.2	0	6.8	0	26.9	0
16-20	17	0	5.3	0	30.6	0	20.6	0	4.2	0	20.4	0
21.25	2.6	0	1	0	38.4	0	6.8	0	0.8	0	11.8	0
26-31	0	0	0	0	0	0	0	0	0	0	0	0
Totals per 10 plants	113.4	189.1	46.6	76.5	42.1	40.5	125.6	173	38.2	61.5	30.5	35.5

Comparative Rates of Boll Production. In both years more bolls were produced in the treated plots than in the checks despite comparatively slight differences in bloom production. An average of 42.1 percent of the blooms in the treated plots produced bolls as compared to 30.5 percent in 1948. In 1949 the comparative percentages were 40.5 percent and 35.5 percent respectively. This was due to a greater number of bolls shed due to insect injury rather than to loss of squares. In 1948 the greater number of blooms produced in the check plots was more than offset by this greater rate of shedding. In 1949 there were not only fewer blooms in the checks, but fewer of them produced bolls, but the differences were not the same. It is evident that weevil injury to small bolls caused the greatest reduction in yield in both years.

Seasonal Rate of Shedding. The pattern of an increasingly lower percentage of the blooms which produced mature bolls as the season advanced was observed in both years. Greater fluctuations occurred in 1948 however. This is a natural phenomenon but was accelerated by the boll weevil.

Per Cent of Lock Damage. This was studied in both years by examining mature bolls shortly before or somewhat after first opening of the cotton. In 1948, bollworms caused the greatest loss by opening up the boll to damage by lint-destroying fungi or bacteria but some damage was also caused by boll weevils. In 1949 by far the greater damage was caused by boll weevils. Studies in 1949 showed a steady increase in lock damage as the season advanced and the damage was greater in the check plots than in those treated with insecticides. Bollworm damage did not always destroy the lint, which was picked, resulting in a lowering of the grade in 1948. Boll weevils usually completely destroyed the lint in 1949 thus further decreasing yields but not lowering the grade of picked cotton from both checks and treated plants.

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[1]Average for one plot.
[2]Average for 12 plots.
[3]Average for 4 plots.

CONCLUSIONS. In the two years this study was made, the evidence strongly suggests that the greatest benefit of applying insecticides to cotton is to protect young bolls from boll weevil damage, thereby increasing the number which mature on the plants. Heavy early season weevil infestation delays the crop, thereby causing greater weevil damage to bolls which have passed beyond the shedding stage. Since a much higher percentage of the first blooms produce bolls than late blooms, it is very important to control overwintered weevils which are the ones that destroy squares which would otherwise produce these early blooms. The heavy square infestation by first brood weevils in 1948 and 1949 was serious not so much because of loss of squares as to loss of the young bolls which they attacked causing shedding greater than would otherwise take place.

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