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EFFECT OF PLANTING DATE ON THE ECONOMICS OF EARLY SEASON SQUARE PROTECTION AS MONITORED BY COTMAN

Tommy Doederlein
Texas A&M Univ. System
Lamesa, TX
Brant Baugh, James F. Leser, and Randy Boman
Texas A&M Univ. System
Lubbock, TX

Abstract

West Texas in general has an aggressive management approach to early square feeding insects such as cotton fleahopper and lugus bug. It is thought that the area does not have enough time for the cotton plant to compensate for this early square loss. During the 2001 crop year, we conducted a study which did show that early square removal resulted in compensation, resulting in increased yields. The lint harvested from the 2001 study was ginned and the High Volume Instrumentation (HVI) fiber measures were used to calculate a loan rate and lint value per acre. In this study, lint weight and not fiber quality determined the economic value of compensation. Therefore, this data suggests that the current early season threshold for lygus and fleahoppers could be too aggressive.

Introduction

Cotton is the most economically feasible crop for much of west Texas, often planted on over 5 million acres. West Texas in general and the High Plains in particular are areas usually experiencing weather shortened growing seasons. This alone has lead to an aggressive management approach to early square feeding insects such as the cotton fleahopper and the western tarnished plant bug. How a cotton plant compensates from early insect induced loss of squares will vary with growing conditions and production practices. Planting date, row spacing, plant density, water management and variety planted are all possible complicating factors.

During the 2001 crop year, we conducted a study in which we set out to evaluate the cotton plant's capacity to compensate for pre-bloom square loss. This study did show that early square removal resulted in super compensation, resulting in increased yields. This compensation for early square removal was not by adding fruiting sites but rather by increasing boll retention. The highest percentage of compensation was due to an increased level of retention of second and third position bolls. The most extreme treatment, 0% retention, compensated with a higher percent retention of the bolls from the fourth and fifth positions, vegetative branches and nodes above fifteen. The lint weight per boll tended to be higher in the second and third position for most treatments when compared to the untreated check, 100% retention treatment. Although the cotton plant was able to compensate yield, this does not necessarily indicate that this is the best management practice. We need to first take a look at the lint value since the lint pounds came from positions where the fiber qualities are lacking. Crop advisors and growers need to know the economics of cotton's compensation capacity to make informed management decisions for square feeding insects. The objective of this study was to evaluate the economics of the cotton plant's capacity to compensate for pre-bloom square loss on the Texas High Plains for two planting dates.

Materials and Methods

The methods and materials can be found in the 2002 Beltwide Cotton Conferences Proceedings - *Plant Response to Different Levels of Pre-Bloom Square Removal and Its Relevance to Plant Bug Management*.

There were two planting dates, May 30, 2001, and June 18, 2001, in which this study was conducted.

After each treatment was harvested by position and placed in the corresponding paper sack, each individual sack was weighed and then was combined with the corresponding sacks from across each replication. This combining was to ensure that there was enough lint available for ginning. After the initial combining, small samples were further combined across adjacent nodes by position from the same sequence for an overall composite sample. For example, bolls from first position only samples were combined with bolls from adjacent first position only samples; first position bolls from a one-two-three sequence sample were combined with only first position bolls from adjacent one-two-three sequence samples.

The cotton was ginned at the Texas Agricultural Experiment Station in Lubbock, and grades were obtained at the Texas Tech University Textile Center in Lubbock. The percent lint turnout and the HVI fiber measures were applied back to each individual sample which made up a composite sample.

The HVI measures, with the exception of Mic, strength, length and uniformity, were averaged across all samples and the average was applied back to each individual sample to obtain a loan value for each individual position. The value per acre for each position was calculated by multiplying the loan rate for each position by the lint pounds produced per acre from each position.

Results

Early square removal resulted in super compensation, as the average lint weight per acre was significantly higher in all treatments when compared to the untreated check but did not differ from each other for the first planting date (Table 1). While the second planting date did not see the super compensation, however, all treatments did compensate resulting in no statistical differences between any of the treatments. The results of how the plants compensated can be found in the 2002 Beltwide Cotton Conferences Proceedings - *Plant Response to Different Levels of Pre-Bloom Square Removal and Its Relevance to Plant Bug Management*.

Since samples were combined across replications, there are no statistical analysis conducted on the HVI fiber measures. The average Mic measures were higher for the treatments in the first planting in relation to those of the second planting. These higher measures for Mic may be attributed to the fact that plants from the first planting date were watered later than the plants from the second planting date in relationship to development because of the irrigation schedule for the entire field we were working in. Also, these higher readings may be attributed to the fruit on the upper nodes of plants from the first planting developing in much higher temperatures in relationship to the temperatures in which the upper position fruit developed in the second planting (Table 2).

All treatments from both planting dates obtained a HVI measure for fiber strength which qualified them for a premium (Table 3), while the fiber length was over an inch long for all treatments from both planting dates (Table 4). Both of these fiber characteristics are largely determined by variety. Fiber length uniformity measures for all treatments from both planting dates also qualified for a premium (Table 5).

The average loan rate, based on the HVI fiber quality measures, ranged from 4894 to 5149 points per lint pound, a spread of 255 points per lint pound for the first planting date and the spread was even tighter (60 points per lint pound) for the second planting date, ranging from 5070 to 5130 (Table 6).

The lint value per acre for each treatment and by individual plant node by treatment for each planting date is provided in Tables 7 and 8.

Conclusions

When the graph of lint weight produced per acre is compared to the graph of value per acre, the graphs are almost identical for both planting dates (Figures 1 and 2). This indicates that lint weight and not fiber quality determined the economic value of compensation.

Based on a $10.00 to $12.00 treatment cost, the last nodes to be protected occur around nodes 13 to 16 (indicated by the dashed line in figure eight). As first position fruit loss increases, the upper nodes increase in value causing a delay in insecticide termination.

This data suggests that the current early season threshold for lygus and fleahoppers could be too aggressive.

Acknowledgments

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Table 1. Lint weight per acre in pounds.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	1514 a[1/]	1229 a
60%	1466 a	1486 a
70%	1446 a	1362 a
100%	1299 b	1508 a

1/ Means in a column followed by the same letter do not differ significantly (P=.10, LSD).

Table 2. Average micronaire measure from HVI.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	4.7	4.1 (+15)
60%	4.8	4.3
70%	5.0 (-395)[1/]	4.3
100%	4.8	4.1 (+15)

1/ Number in parenthesis represent the amount of discount/premium.

Table 3. Average fiber strength measure from HVI.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	30.8 (+60)[1/]	30.6 (+60)
60%	30.5 (+60)	30.3 (+35)
70%	30.0 (+35)	30.0 (+35)
100%	29.6 (+35)	30.5 (+60)

1/ Number in parenthesis represent the amount of discount/premium.

Table 4. Average fiber length (1/100ths inch) measure from HVI.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	1.05 (34)[1/]	1.07 (34)
60%	1.06 (34)	1.06 (34)
70%	10.4 (33)	1.06 (34)
100%	10.3 (33)	1.08 (35)

1/ Number in parenthesis represent the fiber length in 1/32nds of an inch.

Table 5. Average fiber uniformity measure from HVI.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	84.2 (+35)[1/]	83.7 (+35)
60%	84.0 (+35)	83.4 (+25)
70%	84.0 (+35)	83.3 (+25)
100%	83.4 (+25)	82.9 (+25)

1/ Number in parenthesis represent the amount of discount/premium.

Table 6. Average loan rate (points / lint pound) based on HVI fiber measures.

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	5133	5113
60%	5149	5072
70%	4894	5130
100%	4947	5070

Table 7. Average lint value per acre [1/].

Target Percent Retention	1st Planting Date	2nd Planting Date
0%	780.86	632.80
60%	766.22	760.56
70%	711.39	706.06
100%	636.98	777.04

1/ Average loan rate multiplied by the pounds of lint per acre.

Table 8. Lint value per acre by node[1/].

	1st planting - % retention				2nd planting - % retention			
Node #	100	70	60	0	100	70	60	0
17	0.73	1.76	2.36	4.28	1.05	0.00	0.30	1.61
16	1.00	3.77	7.34	10.74	1.71	0.93	2.33	6.96
15	2.84	6.96	13.43	21.29	4.09	2.59	3.11	16.52
14	8.61	12.76	22.95	30.37	11.43	9.32	10.19	23.92
13	17.78	10.96	16.04	28.93	25.44	8.89	9.91	24.23
12	31.25	14.33	20.50	34.62	29.51	22.31	21.59	26.85
11	45.45	37.56	46.21	49.34	50.28	41.37	44.23	39.65
10	59.98	32.14	42.45	65.30	53.91	39.93	37.05	49.94
9	72.80	48.35	45.94	56.62	64.87	60.11	49.63	58.63
8	64.08	63.30	43.68	60.22	69.44	71.60	47.11	67.95
7	63.23	69.75	50.79	65.97	67.99	79.77	70.81	69.63
6	61.65	60.64	59.93	49.29	75.84	77.87	69.30	62.56
5	48.67	48.69	43.79	30.86	52.10	65.80	54.11	46.76
4	12.38	14.68	11.94	5.57	9.43	13.12	9.47	5.06

1/ Lint value of positions 1 thru 3 for each node.

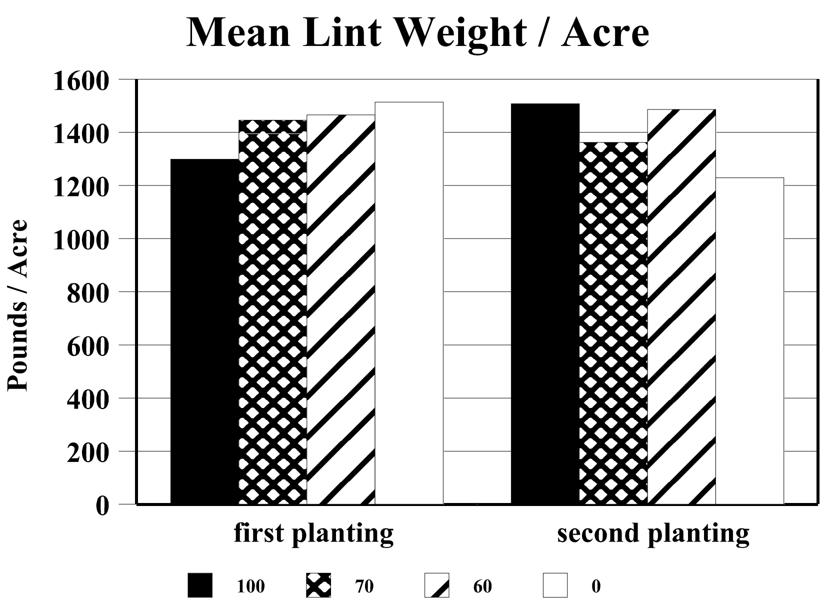

Figure 1. Mean lint weight per acre.

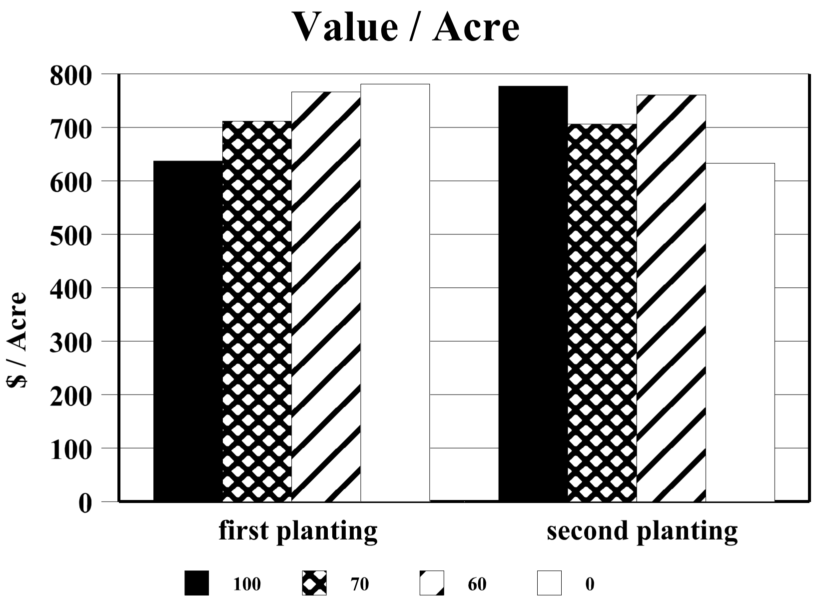

Figure 2. Lint value per acre.