1991 Cotton Replant Decisions
Safford Agricultural Center

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Abstract

Each planting season in the Safford valley there are fields that suffer stand reduction from adverse weather conditions. This study addresses some of the options and the economical effects from exercising these options on a field at the Safford Agricultural Center. References are made to work in California that have quantified the yield effect of stand reduction and chilling damage to cotton seedlings. This study shows that patience may pay better than rushing into the field to replant or rewater.

Introduction

According to a poll made by Gustafson Chemical Co. (1), 41,500 acres were replanted in Arizona in 1991. Weather, including crusting, wind and sand damage and below optimum temperatures, and disease were the main factors in the stand reduction. Hake, et.al. (2) have indicated that soil temperatures of 50°F or below can cause chilling injury if they occur during the first five days after planting. Hake (3) further indicated that the cotton seedling won't grow below 60°F, it just sits there and is consumed by soil fungi which grow well at that temperature. Johnson and Kerby (4) state that 15-20 heat units per day are adequate for stand development and that < 10 heat units per day is unfavorable.

In the Safford area there is normally a dip in the temperature sometime during the month of April when some fields suffer stand reductions and a decision must be made as to whether there is sufficient stand or if the field should be replanted. This dilemma was faced on one field at the Safford Agricultural Center in 1991 so an experiment was designed to evaluate the economics of several decisions that could be made.

Materials and Methods

The field was planted to Pima S-6 on the 8th of April and watered up. Figure 1 shows the soil temperature range at a depth of 2 inches for the ten days after planting. The heat units are also shown in the figure. By four days after planting, when the seedlings were in a very sensitive stage, the soil temperatures dropped to 50°F for several days and the heat units dropped to less than 10 per day. After waiting patiently for about a month, we finally decided that something needed to be done. The following treatments were applied: 1. More patience, the original stand was left. 2. These plots were irrigated to make something happen. 3,4,5. These plots were disced up, replanted to S-6, DP 90 and Stoneville 506, respectively, and watered up again. Figure 1 also shows the 2 inch soil temperature and heat units for 10 days after the replant date of May 17th.

The cotton was picked on the 11th of November and plant heights and populations were measured. Two weeks later the field was picked the second time and the field was shredded and plowed shortly thereafter.

Results and Discussion

The agronomic values of the crops from each of the treatments is shown in Table 1. It can be seen that the replanted shorter season cotton, Stoneville 506, produced the most seed cotton, with the replanted DP 90 and the original S-6 following closely behind. The replanted DP 90 and S-6 and the rewatered S-6 got quite tall, being over 40 inches in height. The replanted Stoneville 506 was the most open at harvest time and the replanted S-6 was the slowest at maturing. The plant populations are interesting, it appears that the original stand wasn't as bad as we had thought. It should be noted, however, that our measuring procedure avoids skips in a row and these plots may have had more skips than the other plots. The rewatered plots did not fare well. Recooling and rewetting the soil must have encouraged the fungi more than the cotton seedlings and the stand and yields were greatly reduced.

But there is more to the story. Table 2 shows the economics of the various treatments. Lint turnouts and values were taken from values commonly found in the Safford valley. From the last column in the table it is clear that we made a costly mistake in discing any portion of the field. Premiums for DP 90 quality over Stoneville 506 and premiums for S-6 over both of the short staple varieties made a big difference. Kerby (5) indicates that as long as the stand is uniform, acceptable yields can be obtained from very low plant populations because of the plants ability to compensate for space. He gives a table that shows a decline of only 3% in yield with a reduction from 40,000 to 20,000 plants per acre and a drop in another 5% in yield when dropping to 10,000 plants per acre. So careful calculations must be made before replanting to verify that increases in plant population will compensate for the loss in season length.

References

1. Gustafson. 1992. The replanting dilemma: ... Cotton Grower Magazine. January 1992, p. 71.

2. Hake, Kater, Will McCarty, Norman Hooper and Gay Jividen. 1990. Seed Quality and Germination. In Physiology Today, Technical Services, March 1990.

3. Hake, Kater and Knight Carter. 1989. Optimum Seed Environment for Healthy Stands. California Cotton Review, Volume 9, March 1989, pp. 4-5.

4. Johnson, Stephanie and Tom Kerby. 1989. Determining Optimum Planting Time. *Ibid.,* pp. 5-7.

5. Kerby, Tom, Stephanie Johnson and Kater Hake. 1989. When to Replant. *Ibid.,* pp. 7-8.

Table 1. Yields and other agronomic values by treatment in a replant decisions experiment, Safford Agricultural Center, 1991.

Treatment	Seed Ctn Yield	Percent 1st Pick	Plant Height	Plant Population
Repl STV 506 (17 May)	3294 a	95.8 a	29.5 c	51280 a
Repl DP 90 (17 May)	3024 a	93.9 ab	51.3 a	47195 a
Orig S-6 (8 Apr)	3018 a	93.8 ab	38.3 bc	31766 ab
Orig S-6 Rewatered	1756 b	92.5 b	42.1 ab	12026 b
Repl S-6 (17 May)	1692 b	84.2 c	44.3 ab	36304 a
Average	2556.8	92.1	41.1	35714
LSD(05)	301.9	1.81	11.0	21989
C.V.(%)	28.5	4.69	19.9	43.7

Values within a column followed by the same letter are not significantly different at the 5% level of probability, using Duncan's multiple range test.

Table 2. Yields and crop value per acre by treatment in a replant decisions experiment, Safford Agricultural Center, 1991.

Treatment	Lint Turnout	Lint Yield	Value per lb	Value per acre
Repl STV 506	33.5	1103.4	0.60	$662.04
Repl DP 90	35.5	1073.5	0.64	687.04
Orig S-6	33.8	1020.3	1.05	1071.32
Orig S-6 rewatered	33.8	593.5	1.05	623.18
Repl S-6	33.8	571.8	1.05	600.39

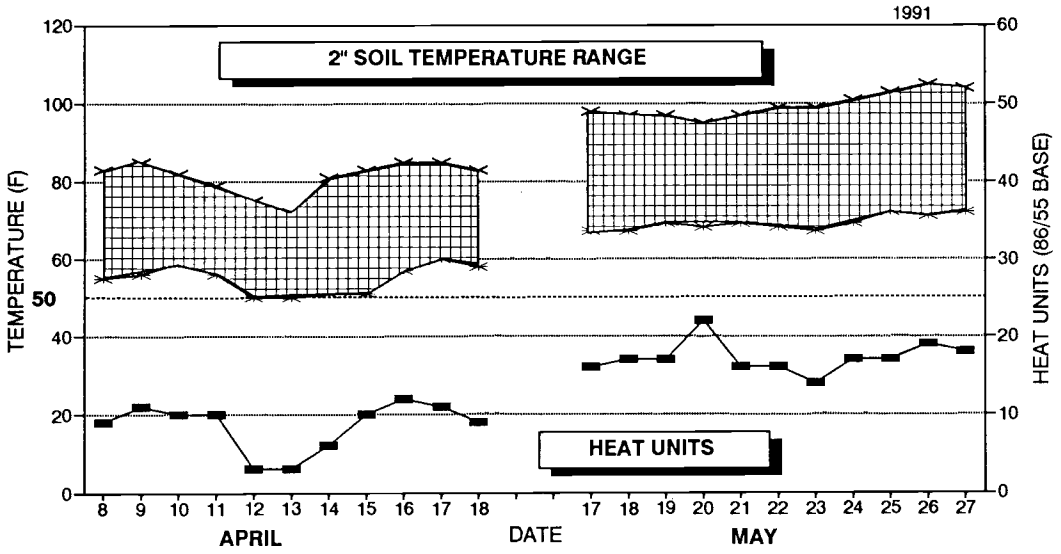

Figure 1. Soil temperatures at 2 inches and heat units received for ten days following planting and replanting at the Safford Agricultural Center, 1991.