W 073

MAKING THE COTTON REPLANT DECISION

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FIGURE 1: *Stressful conditions after planting can slow emergence. If severe enough, stresses may prevent emergence completely. If enough seedlings fail to emerge, a profitable stand will not be achieved and a replant may be warranted.*

Adverse conditions experienced during or after cotton planting can negatively impact cotton seedlings and result in seedling death (Fig. 1). If severe, stresses can reduce stands to unprofitable yield potentials. Determining whether to accept or replant a marginal stand of cotton is a particularly challenging decision since many factors must be considered. The purpose of this publication is to highlight a few of those factors.

FACTORS TO CONSIDER:

1. **Calendar date.** In Tennessee, the recommended cotton planting window falls between April 20 and May 10. While profitable yields may still be possible at later planting dates, they delay boll development into periods associated with greater insect pressure and less rainfall and increase the likelihood of exposing the later developing bolls to an early freeze (Table 1).

   Subsequently, the yield potential of a replant declines rapidly as we move later in the year. Recent evaluations of planting dates and populations clearly display this trend (Fig. 1); as planting date moves later in May, the relative yield potential of the stand declines at a rapid pace. Establishing a uniform stand prior to May 25 is crucial to ensure ample time is available to accumulate enough heat units to finish the crop.

TABLE 1: *Date and probability of a fall freeze by location. Data calculated from National Weather Service Summary of Annual Normals calculated from 1981-2010.*

	PERCENT PROBABILITY OF A FREEZE		
LOCATION	**10**	**50**	**90**
Bolivar	13-Oct	28-Oct	12-Nov
Covington	21-Oct	7-Nov	24-Nov
Fayetteville	11-Oct	28-Oct	11-Nov
Grand Junction	15-Oct	1-Nov	17-Nov
Jackson	15-Oct	30-Oct	15-Nov
Martin	12-Oct	27-Oct	12-Nov
Memphis	31-Oct	16-Nov	1-Dec
Selmer	13-Oct	28-Oct	11-Nov
Union City	11-Oct	27-Oct	12-Nov

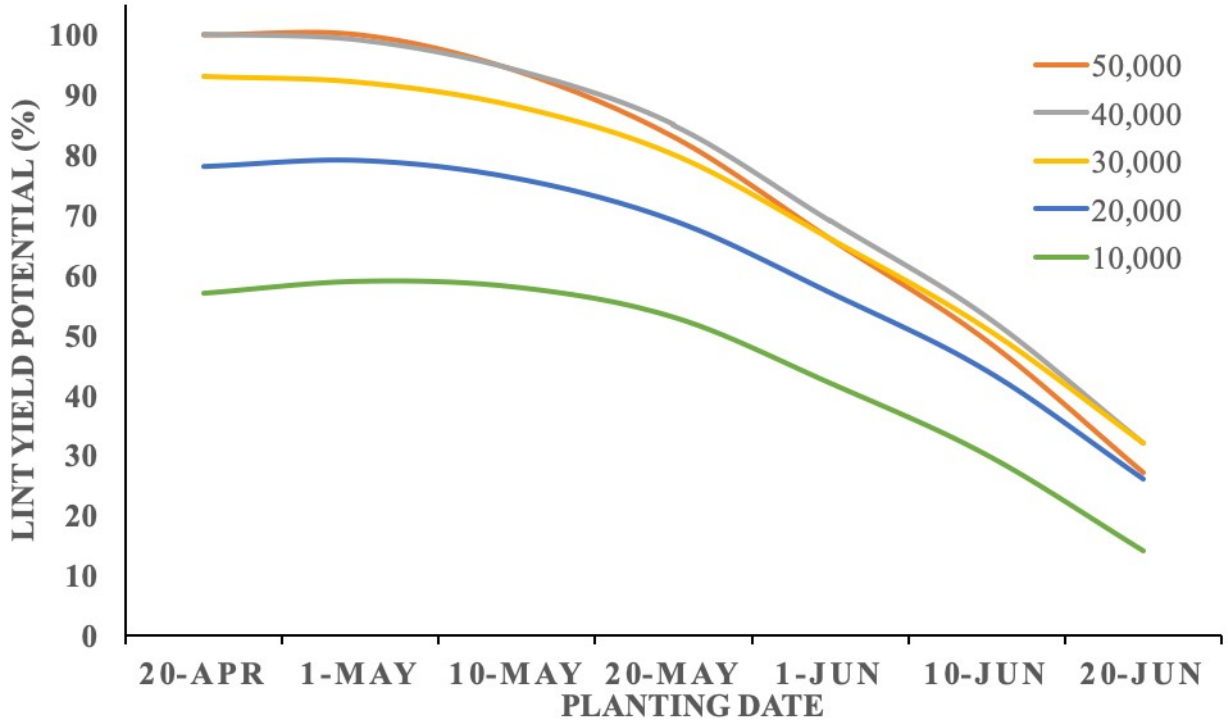

FIGURE 2: *Predicted potential yield (lint yield potential) based on planting date graphed by plant population. Model generated from five populations across seven planting dates in Mississippi, Missouri and Tennessee from 2016-2018. Populations are reported in plants per acre.*

FIGURE 3: *Distances shorter than 5 feet may not impact cotton yields due to the ability of the plant to branch vegetatively. However, if distances are greater than 5 feet, as pictured here, plants may not be able to compensate for the gap and yield penalties may be realized.*

2. **Plant population.** Research evaluating the influence of plant population on cotton yield consistently suggests uniform stands of as low as one plant per foot (Table 2) may produce a profitable crop. Final plant populations from 30,000 and 50,000 plant per acre generally yield similarly (Fig. 2). It is critical, however, that the stand is uniform. While cotton can compensate for low populations and variable distances between plants, skips greater than 3 row feet will negatively impact yields (Fig. 3). Fields that possess a large number of skips greater than 3 feet in length will likely warrant a replant.

TABLE 2: *Plant populations at various row spacings*

	ROW SPACING (INCHES)						
Plant per ft	**10**	**50**	**90**	**30**	**36**	**38**	**40**
1	69,696	52,272	34,848	17,424	14,520	13,756	13,068
1.5	104,544	78,408	52,272	26,136	21,780	20,634	19,602
2	139,392	104,544	69,696	34,848	29,040	27,512	26,136
2.5	174,240	130,680	87,120	43,560	36,300	34,389	32,670
3	209,088	156,816	104,544	52,272	43,560	41,267	39,204
3.5	243,936	182,952	121,968	60,984	50,820	48,145	45,738
4	278,784	209,088	139,392	69,696	58,080	55,023	52,272
4.5	313,632	235,224	156,816	78,408	65,340	61,901	58,806
5	348,480	261,360	174,240	87,120	72,600	68,779	65,340

TABLE 3: *Length of row needed for 1/1000th method*

ROW SPACING (INCHES)						
7.5	10	15	30	36	38	40
ROW LENGTH NEEDED FOR 1/1000TH ACRE						
69′8″	52′3″	34′10″	17′5″	14′6″	13′9″	13′8″

FIGURE 4: *It is important to understand why the stand failed prior to replanting. In this picture, a thiamethoxam seed treatment failed to control thrips and resulted in a severe stand loss. An imidicloprid seed treatment was used on end-rows.*

3. **Evaluating the existing stand.** The most common approach to assessing stands is the 1/1000th of an acre method, which consists of counting the number of plants within a certain distance of row based upon row spacing (Table 3). The number of plants in the corresponding distance is then multiplied by 1,000 to provide an estimate of the number of plants per acre. In order to account for field variability, this process must be repeated in a randomized pattern approximately 10 times. Other parameters should also be noted while evaluating plant population. Note the number and spatial density of skip lengths longer than 3 row feet. Also understanding the cause of poor emergence is important. Was the stress caused by soil crusting, herbicide damage, limited moisture or disease? Determining the cause will provide guidance to cultural practices that may save the existing stand and/or corrections that should be made prior to replanting (Fig. 4). Examine plant terminals to determine if new growth is emerging or if severe injury has occurred. Occasionally, only small areas of impacted fields require replanting. A partial replant will likely be less expensive but will result in different maturity ranges within the same field. If a spot-replant is selected, it will likely be best to replant an early maturing variety with a similar herbicide tolerance package.

4. **Costs, cultural practices and other points.** In some events, replanting cotton or planting to an alternate crop is not an option. Verify spray records to identify if products with long replant intervals to soybeans have been used, as these may force replanting to cotton. Also, contracts with the gin or landowner may require cotton to be produced on those acres. Has a crop-specific fertilizer been applied? What will seed or technology fees cost in a replant scenario? Will replanting cotton be more profitable than planting another crop or properly managing the currently emerged crop? The upcoming weather forecast must also be considered. Do the next five to seven days look more conducive to plant growth or rapid germination and emergence? Also consider the variety planted and availability of seed for the replant. Determinate whether early maturing varieties will likely be more affected by reduced numbers of plants.

MANAGING A REPLANT OR POOR STAND

The first step in managing a replant or marginal stand is to develop a realistic yield goal. Considering the financial aspects of each in-season input will be necessary to properly select timings and rates to increase the probability that a profit is realized at the end of the year. In both scenarios, managing for earliness and aggressively protecting first- and second-position fruiting bodies will be very important. For more information on managing for earliness refer to UT Extension publication ***"PB 1830 Guide to Earliness Management in Short-season Cotton Production."***

If replanting, the original stand should be killed through mechanical or chemical means. In Tennessee, it will almost always be necessary to select an early maturing variety for the replant. Particular attention should be placed on plant growth of the replant. Often, an aggressive mindset must be taken to eliminate the chance of delayed maturity from excessive plant growth (Refer to UT Extension publication ***"W 288 Cotton Production in Tennessee"***). Closely monitor internode elongation, especially in the event a mid-maturing variety is planted. Additionally, a slight reduction in nitrogen rate will reduce input costs and help manage earliness with a negligible impact on yield potential.

Keep in mind that later planting dates will delay boll development into periods associated with increased levels of insect pressure. Many of these pests will have to be managed later than in an earlier planted crop. An application of a late-season insecticide for bollworm control is more likely in late plantings, even if a Bt cotton technology is used.

Cotton is a good compensator and it should be noted that the general rule of thumb among most cotton Extension specialists is "If the decision to replant is difficult, then there are probably enough plants to keep the stand." Once you make this decision, stick to it, and if managed properly (refer to UT Extension publication ***"W 288 Cotton Production in Tennessee"***), you will likely be satisfied with your results.

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