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PROFITABILITY OF ALTERNATIVE COTTON DEFOLIATION AND HARVEST TIMING STRATEGIES

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Abstract

Farmers need information to help them determine the most profitable time to defoliate cotton (*Gossypium hirsutum* L.) in a short-season environment such as Tennessee. Research has shown that cotton defoliation and harvest can be scheduled on the basis of heat-unit accumulation after physiological cutout (five nodes above white flower). The COTMAN Expert System uses degree-day accumulation after cutout as a criterion to schedule cotton fields for defoliation. This system can help producers plan crop termination and harvest operations as early as mid-season. The objectives of this study were: (1) to evaluate the impact of scheduling defoliation at various degree-days after cutout on lint yields, fiber quality, lint prices adjusted for fiber quality, and net revenues; and (2) to determine if choice of harvest-aid material altered these responses.

'Stoneville 474' or 'Stoneville 4892 BR' was planted at the West Tennessee Experiment Station in May 1998, 1999, and 2000. Crop progress was monitored using the COTMAN Expert System. The crops reached cutout between 14 and 16 days before the last effective bloom date each year, so crop-oriented COTMAN termination rules were applied. Harvest-aid treatments were: (1) a tank mixture of thidiazuron (Dropp 50WP), tribufos (Folex 6EC), and ethephon (Prep 6); and (2) a prepared mixture of cyclanilide and ethephon (Finish 4 or 6). These two treatments were applied at equivalent ethephon rates at 650, 750, 850 and 950 DD60s (base 60ºF) after cutout each year. Cotton from each plot was spindle-picked 14 days after each treatment application and first harvest yields were determined. All of the plots were picked again 14 to 28 day later to determine total lint yield. Seed cotton from the plots was ginned and lint quality was evaluated by HVI and hand classing procedures. Lint price differences for fiber quality were calculated using fiber quality measured in the experiment and North Delta spot price quotations for the 2000/2001 marketing year. Net revenues were estimated using lint yields, lint prices adjusted for fiber quality, harvest-aid materials and application expenses, and picking costs.

Results consistently showed the harmful effects of premature crop termination and the beneficial effects of delaying cotton defoliation on fiber quality and lint yields. Incomplete defoliation of cotton at the early (650 degree-days) crop termination date caused significantly poorer fiber quality and leaf grades than from cotton defoliated at a later date. In addition, both first harvest and total lint yields at the early defoliation date were significantly lower than lint yields at the later 850 and 950 degree-day defoliation dates. Timing effects did not differ between harvest-aids, although some small response differences between materials were observed. Findings indicate that additional yield occurred by delaying crop termination and harvest. Improved fiber quality and enhanced yields from cotton harvested after defoliation at 950 degree-days produced the largest net revenues among the degree-day criteria evaluated, under either price scenario. Harvest-aid materials applied in this study produced similar net revenues.

Findings also indicate that delaying defoliation to 950 degree-days after cutout can facilitate a single harvest strategy. Single harvest net revenues for cotton defoliated at 950 degree-days produced comparable or larger returns than cotton terminated at an earlier date and harvested twice. However, results also indicate that the potential advantages of harvest after defoliation at 950 degree-days needs to be weighed against the potential risks of later harvest, especially along the northern edge of the U.S. Cotton Belt. Inclement weather becomes more probable as harvest is delayed, possibly leading to losses of fiber quality and harvest efficiency. In general, these results validate the nominal threshold of 850 degree-days to predict crop maturity using crop-oriented COTMAN rules.