IMPACTS OF ROW SPACING AND PLANTING PATTERN ON COTTON NET REVENUES UNDER ALTERNATIVE HERBICIDE-RESISTANT TECHNOLOGY FEE REGIMES

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Abstract

Tennessee cotton producers want information about alternative row spacing and planting configurations to try to lower production costs and increase net revenues. Skip-row planting has been advocated as one possible way to reduce seed, technology fee and other in-row costs. The objective of this study was to evaluate the impact of alternative row spacing and skip-row configurations on cotton net revenues.

Lint yield and fiber quality data from a 2003 to 2005 study produced in two contrasting field environments at the University of Tennessee Research and Education Center in Milan, TN, were used for the analysis. The environments consisted of adjacent, irrigated and non-irrigated upland fields with similar silt loam soils. Roundup Ready-Bollgard cotton was planted in 10-, 30- and 40-inch rows using either solid-row or "2x1" skip-row configurations. The 2x1 configuration refers to one unplanted row adjacent to two planted rows of the same width. Plots were arranged in a RCB factorial design.

Net revenues were estimated using lint yield, fiber quality, seed cost and technology fees based on the plant population density for each row spacing and configuration treatment in the experiment, and planting and harvesting labor and equipment costs for each treatment. Lint prices for each treatment were adjusted for fiber quality using 2006-07 season average spot price differences for the North Delta. Seed costs for each treatment were calculated using seed costs for the Deltapine cultivar 'DP 444 BG/RR' with a three-way fungicide and insecticide treatment. An expected plant population survival rate of 80 percent was used to calculate seeding rates for each treatment. Technology costs were applied using two alternative fee structures, with one assigning fees on a seed-count basis and the other assigning fees on a fixed per-acre basis. Labor and machinery costs for planting and harvest were calculated using ASAE Standards, machinery price information collected by the authors, and University of Tennessee Extension budget labor rates. A 20-foot Kinze precision planter was used to calculate planting costs for the 10-inch rows. The sizes of the row planters assumed for estimating planting costs for the 30- and 40-inch rows were 16 and 12 rows, respectively. Because the planters were assumed to be used for other crops, it was assumed that every third row unit was not filled with seed or was disengaged for planting the 2x1 skip-row configuration. Thus, planting costs were influenced by row-spacing but not row-configuration in the analysis. Harvest costs for the 10-inch rows were calculated for a John Deere 7460 cotton stripper retrofitted with a 20-foot finger stripper header. Because the header cannot be adjusted for different row configurations, the widths harvested for the solid and skip rows with the finger stripper were both assumed to be 20-feet for the purpose of calculating harvest costs. For the 30- and 40-inch rows, a John Deere 9996 6-row picker was assumed for calculating harvest costs. The primary factor influencing harvest costs for the spindle-picked 30- and 40-inch rows was the width of the header with the

different row-width and row-spacing configurations. The widths assumed harvested on a single pass for the 30- and 40-inch solid rows were 15 and 20 feet, respectively. For the skip-row configuration, the respective harvest widths for the 30- and 40-inch rows were 22.5 and 30 feet.

The key findings from this research are as follows. First, lint yields for cotton planted in the solid row and skip-row configurations were not significantly different from each other in the 10- and 30-inch rows. However, in 40-inch rows, there was a yield reduction associated with skip-row versus solid row cotton. Second, the interactions between solid row and skip-row configurations for the various fiber quality attributes were not significant or small relative to the row spacing effects. Lint prices adjusted for fiber quality were significantly lower for irrigated cotton produced in 10-inch rows relative to irrigated cotton produced in 30- and 40-inch rows. Third, seed costs for skip row patterns were an average of 37% lower than solid row patterns, across all treatments. The greatest reduction in seed costs with the skip-row versus solid row configurations was in the 10-inch row spacing. Seed savings from the skip-row configuration were less in the 30- and 40-inch row spacings. Fourth, because of the cap on technology fees for narrow row cotton, technology fee cost was the same for the solid-planted and skip-row configurations for the 10-inch row spacing. However, in the wide-row 30- and 40-inch row spacings, technology fee costs were reduced about 32 percent for non-irrigated cotton and about 38 percent for irrigated cotton. Fifth, average net revenues were higher for skip-row versus solid row configurations for 10- and 30-inch row spacings with and without irrigation. For 40-inch rows, the situation was reversed with average net revenues for solid rows higher than for skip-rows. In this case, additional in-row savings from other inputs not varied in the experiment would be needed to make skip-row cotton more profitable than solid planted cotton. Finally, the current seed-count technology fee structure provides farmers with increased incentive to plant skip-row configurations for 30-inch cotton when compared to the previous per-acre technology fee structure. Under the per-acre fee regime, switching from 30-inch solid to skip-row configurations increased net revenues by 4% for non-irrigated and decreased net revenues by 3% for irrigated cotton. Under the seed-count fee regime, the same switch increased net revenues by 10% for non-irrigated and by 3% for irrigated cotton. Technology fee structure did not impact optimal row configuration for 10- or 40-inch cotton. Fee caps used in 10-inch cotton under the current regime resulted in no variation in technology fees. In 40-inch cotton, solid row configurations remained optimal under both technology fee structures.