Effect of SDI Design on Cotton Lint Yield (Field 3)
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Objective: Evaluate the effect of water distribution by three SDI designs having field variations (FV's) of 0.71, 0.85, and 0.94 over 1300-ft. lengths in terms of available soil water, emitter flow rates, and cotton lint yields.

Methodology: SDI designers and irrigators need to know the magnitude of cotton yield losses if average emitter flow variances drop well below current design standards. A SDI system was installed on a 16-acre area with drip lines located in alternate furrows on 30-inch rows. The field was divided into four blocks with six sub-zones per block. Within each block, sub-zones were irrigated by 0.630-in., 0.875-in., or 0.990-in. diameter drip tape, representing poor (**POOR**), very good (**VGOOD**), and acceptable (**ACC**) water distribution designs having estimated field FV's of 0.71, 0.94, and 0.85 at operating pressures of approximately 10, 12, and 6.5 psi, respectively.

Fig. 1. Harvesting plots in SDI design study.

Results: Total cotton lint yield within a zone was not affected by water distribution designs having FV's between 0.71 and 0.94. During the test period, conditions other than SDI design had a greater impact on the spatial yield variability than did the design treatments. Fig. 1 shows average cotton yields and emitter flow rates as a function of the distance from the SDI supply manifold in the 0.6 BI irrigation treatments. The POOR treatment was irrigated with small diameter drip tape, and resulted in reduced emitter flows away from the supply manifold as friction losses reduce pressures at the emitters (18% decrease in flow rate along lateral). Yields tended to follow the water, generally decreasing away from the supply manifold, but increasing at the distal location. The VGOOD treatment was irrigated with an optimum size drip tape that compensated for friction losses in the tape with the change in elevation along the length of the plot (2% increase in emitter flow along lateral). The ACC treatment used large diameter drip tape and low operating pressure resulting in larger emitter flows at locations farther from the supply manifold (15% increase along lateral). Yields, were fairly level along the length of the plots showing only slight increases with distance away from the supply line in 2003 and 2004. In some instances, SDI installation costs could be reduced by relaxing design specifications.

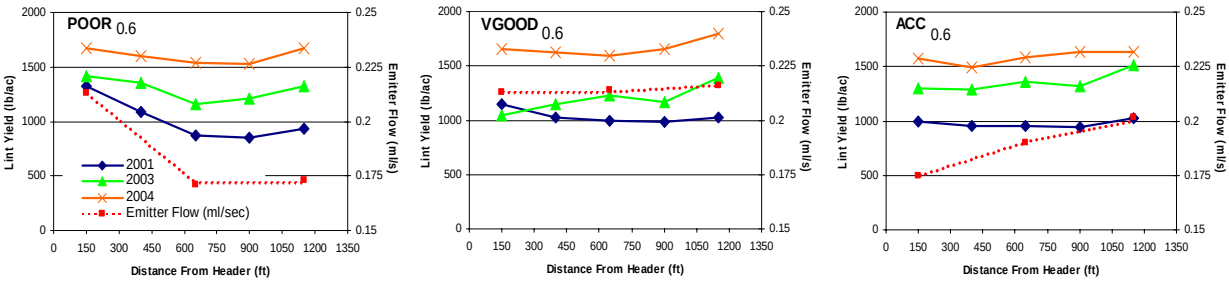

Fig. 1. Comparison of 2001, 2003, and 2004 cotton lint yields to SDI emitter flow rates at multiple locations along drip laterals of three drip uniformity designs.