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. Also, frequent cycling of SDI systems on sloping fields may cause less uniform water distribution than a poor SDI design. 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 estimated field FV's of 0.71, 0.94, and 0.85 at operating pressures of approximately 10, 12, and 6.5 psi, respectively.

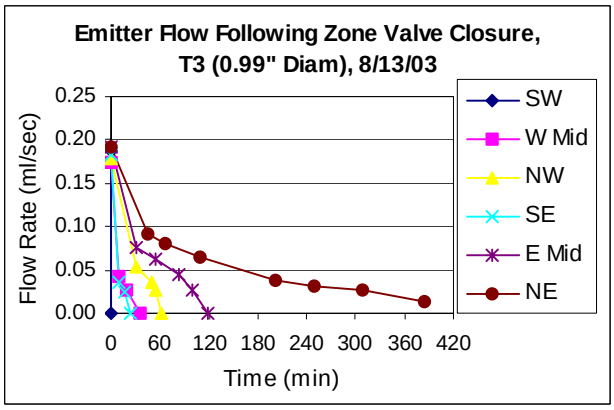

Figure 1. Measured emitter flow rates at six locations in the field following zone valve closure of the large (0.99") diameter drip tape zones, Helms Farm, 2003.

Results: In 2003, measured emitter flows operating at design pressures were more uniform than those predicted by the manufacturer. This implies field installations may be better than the original designs would suggest. Non-uniform water discharge following zone valve closure was very significant (Fig. 1). Water continued to flow from low elevation emitters for over 6 hours following the end of an irrigation cycle. Yield uniformity and average cotton yields were higher for the low irrigation quantity treatments (0.6BI) than the high irrigation treatments (1.0BI), Table 1. The lowest average yield and poorest yield uniformity generally occurred in the treatments having the best SDI design. These unusual results are attributed to late planting, poor early season weather conditions, and the cotton variety used in this experiment. Continued evaluations will determine if the initial cost of SDI can be reduced without sacrificing yield by relaxing SDI design standards.

Table 1. Treatments, design criteria, water distribution uniformity coefficients, yield uniformity, and average lint yield from SDI irrigation design experiment, Helms Farm, 2003.

Irrigation Treat.	Treat. No.	Irrigation Uniformity	Tape Diam. (in.)	Design Pressure (psi)	Design FV	Measured FV	CU of Yield	Yield Variation	Average Lint Yield* (lb/ac)
100% BI	T1	Poor	0.650	10.0	.71	.80	88	1.31	1090 c
	T2	Very Good	0.875	12.0	.94	.92	88	2.91	1100 c
	T3	Acceptable	0.990	6.5	.85	.94	88	1.84	1175 c
60% BI	T4	Poor	0.650	10.0	.71	.80	92	0.65	1293 ab
	T5	Very Good	0.875	12.0	.94	.92	89	1.60	1197 bc
	T6	Acceptable	0.990	6.5	.85	.94	91	0.58	1356 a

* Means in this column followed by the same letter are not significantly different (P<0.05, LSD).