

*Excerpt from the Helms Farm Research Report, 2001*

### **Drip Irrigation Design and Management (Field 3)**

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**Objective:** The objective is to evaluate SDI designs in terms of spatial water application and yield uniformity.

**Methodology:** The available soil water, emitter flow rates, and cotton lint yields caused by the water distributions of three installed SDI designs having planned field flow variations of 0.71, 0.85, and 0.94 over 1300-ft. lengths will be evaluated. Drip tape having three different diameters 0.65, 0.875, and 0.990 inches was installed in 8-row plots (1300 feet long) in the spring of 2000. An additional experimental factor is irrigation quantity with separate plots capable of being irrigated at two levels of evaporative demand. Each of the six treatments was replicated in four blocks.

**Results:** A summary of cotton lint yield and uniformity statistics resulting from two irrigation levels and drip irrigation designs is given in Table 1. The drip design with the highest flow variation (0.94) resulted in the highest yields and best uniformity parameters, however, reductions in flow variations did not greatly reduce yield in 2001.

**Expectations:** This SDI installation will provide a direct, replicated comparison of cotton yields resulting from drip systems with three preplanned water distribution uniformities. Future work will allow comparisons of actual emitter flow rates to manufacturers theoretical flow rates. These data will give SDI designers and users a relationship between standard uniformity coefficients and actual cotton lint yields and provide a basis for more cost effective initial designs and management of SDI systems as pumping capacities decline.

Table 1. Cotton lint yield and uniformity statistics resulting from subsurface drip irrigation at two levels of irrigation with three tape designs, TAES, Helms,2001.

Irrigation Quantity (% of Base Irrigation)	Tape Diameter (in.)	Estimated Flow Variation	Yield (lb./ac.)	CU <sup>1</sup>	SD	Yield Variation
60	0.650	0.71	1011	84	228	1.39
	0.875	0.94	1035	92	106	0.45
	0.990	0.85	975	92	106	0.45
100	0.630	0.71	1285	77	222	1.02
	0.875	0.94	1334	75	133	0.51
	0.990	0.85	1300	75	207	1.09

CU<sup>1</sup> = Christiansen's uniformity coefficient, S.D. = standard deviation, Yield Variation = ((max. yield - min. yield) / min. yield)



Figure 1. Cotton irrigated by SDI using three drip tape designs and irrigated at two levels. The filter station and drip valve controls are located in the building on the right, TAES Helms Farm July 2001