TITLE:

Summary of cotton yield response to LEPA irrigation quantity at AG-CARES, 1990-2002.

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METHODS AND MATERIALS:

Irrigation demonstrations were begun in 1990 to document cotton yield response to various quantities of deficit irrigation using LEPA systems on a loamy sand soil at AG-CARES. Since 1990, three experiments have been conducted where different irrigation levels were a primary factor. These tests were conducted from 1990 to 1994, from 1995 to 1997, and in 2002. This report summarizes these results.

RESULTS AND DISCUSSION:

Irrigation amounts, lint yields, and seasonal irrigation water use efficiency are reported as a function of evapotranspiration (ET) in Table 1. Eight-year yield averages were 802, 959, and 997 lbs lint/A using average seasonal irrigation quantities of 6.1, 9.4, and 11.8 inches, respectively. Dryland yields over the same period averaged 283 lbs lint/A. Seasonal irrigation water use efficiencies (IWUE) over the test period were highest at 85 lbs lint/A-in when irrigations provided ET replacement of 50 to 65%. IWUE declined to 60 lbs lint/A-in with 85 to 100% ET.

From a water use efficiency viewpoint, spreading available water on a larger area has been more productive than attempting to fully irrigate a small portion of this field. Based on Table 1, average seasonal irrigations of 6.0 inches increased lint yields over dryland by 519 lbs lint/A. An irrigation increase of an additional 6 inches, to a total of 12 inches, elevated lint yield by only 195 lbs lint/A. In extremely “dry” growing seasons, IWUE’s using larger irrigation quantities may be higher than those given in Table 1. The lint yield averages at low ET replacement (<65% ET) should not be expected when irrigating with any “spray” system.

In summary, cotton responds extremely well to high frequency (3.5 days or less) alternate furrow, deficit LEPA irrigations.

Table 1. Average lint yield response to irrigation quantity with LEPA irrigation at Ag-Cares, 1990-2002.

ET%	Average Seasonal Irrigation Quantities by Test (in.)				Average Cotton Lint Yield by Test (lb/acre)				Irrigation Water Use Efficiency[2] by Test (lb/acre-inch)			
	1990-94[1]	1995-97	2002	8 year average	1990-94[1]	1995-97	2002	8 year average	1990-94[1]	1995-97	2002	8 year average
Dry	0.00	0.00	0.00	0.00	282	330	142	283				
25-30	3.80				708				112			
50-65	6.00	5.80	7.30	6.09	769	841	820	802	81	88	93	85
75	9.30	8.70	11.70	9.38	959	974	912	959	73	74	66	72
85-100	11.30	11.60	14.60	11.83	1012	952	1071	997	65	54	64	60
120-125	16.80				1312				61			

[1]1992 crop year not included due to hail

[2]IWUE = (Irrigated - Dry Yield)/Seasonal Irrigation