Variable Rate Cotton Irrigation with LEPA (Field 5CDE)
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Objective: To correlate cotton lint yield to soil electrical conductivity at three levels of LEPA irrigation to establish irrigation management zone criteria and the potential value of site-specific irrigation on the High Plains.

Fig. 1. Variable-rate irrigation system used in cotton and corn site-specific irrigation experiments, Helms Farm, 2004.

Methodology: A field experiment was conducted to document cotton lint yield as a function of soil EC, irrigation level, cropping history, and cotton variety. Soil EC was measured using the Veris technique (Veris Technologies, Salina KS) on a 60-acre area of the distal four spans of a pivot constructed for variable rate irrigation. Cotton was grown on 45 acres of this area with two varieties, FM989BR and PM2326RR planted in ever other 8-row pass. Seasonal irrigations totaled 6.66, 8.06, and 9.42 inches in areas irrigated at the 0.8BI, 1.0BI, and 1.2BI levels, respectively. Cotton lint yields were determined from samples harvested at 318 geo-referenced sites from ~260 ft^2 areas using a JD 7450 stripper. Soil EC will be determined by averaging EC data acquired on 28 Feb. 2003 within a ~10ft radius of each harvest location.

Results: Due to late harvest and the massive amounts of yield data obtained in 2004, the correlation of cotton yield to soil EC has not been completed. However, lint yield and loan prices as a function of cotton variety, irrigation level, and crop history are contained in Table 1. Past data tended to support the strategy of redistributing irrigation water to high EC areas when restricted by irrigation capacity and applying uniform irrigations when irrigation capacity can more closely meet the needs of a cotton crop.

Table 1. Cotton yield and loan prices as a function of variety, cropping history, and irrigation level, 2004.

	Variety	Crop Yr Following Corn	0.0BI	0.8 BI	1.0BI	1.2 BI
Yield (lb/ac)	FM989BR	1 st		1114	998	995
		2 nd	811	1082	939	849
Avg.				1098	968.5	922
	PM 2326BR	1 st		1118	1106	1107
		2 nd	704	1118	1127	1112
Avg.				1118	1116.5	1109.5
Loan Value ($/lb)	FM989BR	1 st		0.4909	0.4492	0.3992
		2 nd	0.4840	0.4808	0.4427	0.4217
Avg.				0.4859	0.4460	0.4105
	PM 2326BR	1 st		0.5104	0.4926	0.4677
		2 nd	0.4975	0.5140	0.4999	0.4851
Avg.				0.5122	0.4963	0.4764