ADOPTION OF SUBSURFACE DRIP IRRIGATION FOR COTTON IN WEST TEXAS

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Abstract

Subsurface drip irrigated cotton acreage in West Texas has increased from 3,300 acres reported by Henggler (1995) to currently 8,000 acres and is projected to be 13,000 acres in 1997 (Figure 1).

Introduction

Three years of drought and declining water tables have increased grower interest in subsurface drip irrigation for cotton production in West Texas. There are several factors behind the rising rate of drip adoption.

Discussion

The factors influencing the increasing rate of subsurface drip irrigation adoption in West Texas are: 1) ability to pre-irrigate off-season; 2) irrigate odd-shaped pieces of arable land; 3) increased water use efficiency; and; 4) the ability to irrigate contoured, terraced, and/or sloping land. One drawback has been the seasonal delay to purchase drip systems combined with the extended system installation time preventing farmers from utilizing the full growing season. Agronomic support, on the other hand, has been key in helping farmers use drip effectively, thereby encouraging adoption.

A comparison between subsurface drip irrigated and low energy precision application (LEPA) pivot irrigated cotton was performed in 1995 on two adjacent quarter sections of land near LaMesa, Texas. Each irrigation systems had approximately four gpm/acre system capacity. Although the LEPA system was planted two before the drip system, the drip system was ready for harvest two weeks earlier and had one-half bale more yield than the LEPA system (Table 1.). Cotton petiole nitrate levels were higher under drip irrigation than LEPA (Figure 2.). Drip showed a net per acre net return of $64 compared with LEPA when the system costs were annualized over five years (Table 2).

Twelve farmers were assisted in 1996 by an Israeli Cotton Specialist on 810 acres of subsurface drip irrigated cotton in the Southern High Plains of West Texas. Recommendations for the application of fertilizers, growth regulators and irrigation were made by the specialist throughout the growing season. The resulting lint yields are presented in Table 3. The second year of the subsurface drip - LEPA comparison resulted in 439 lbs. more lint/acre under drip compared with LEPA irrigation. The two farmers with more than one year old drip systems had an average lint yield of 1,242 lbs/acre compared with 1,002 lbs/acre for the ten growers who were first time drip users. The discrepancy was caused by untimely installation of new drip systems shortening the growing season. Farmers with pre-existing drip systems were able to pre-irrigate and germinate cotton around mid-May taking advantage of the substantial early season heat units present in 1996 (Figure 3).

Three factors will insure continued adoption of subsurface drip irrigation for cotton in West Texas: 1) encouraging farmers to purchase drip systems earlier in the year; 2) increasing the number of persons qualified to install drip systems and; 3) providing agronomic support to growers to reduce the chance of failure and subsequent discouragement with drip technology.

Summary

A survey of first time users of subsurface drip irrigation for cotton production showed their lint yields were nearly double the 1996 West Texas Southern High Plains average lint yield of 543 lbs/acre (Texas Agricultural Statistics Service, 1996). More timely system installation and continued agronomic support will result in rapid increase in the number of acres of cotton under subsurface drip irrigation in West Texas.

References

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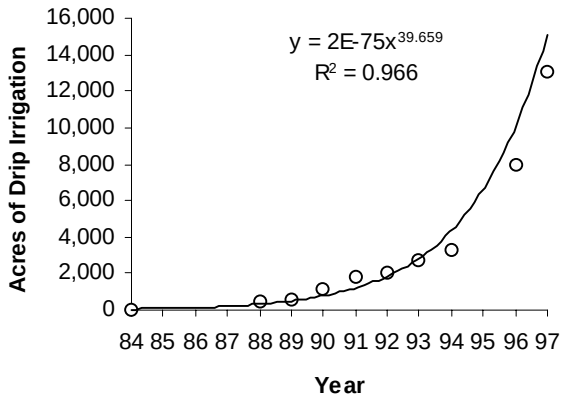

Figure 1. West Texas drip irrigated cotton acres over time with 1997 acres projected (after Henggeler, 1995)

Table 1. Results of drip versus LEPA irrigation comparison, 1995.

	Drip	LEPA
Planted	May 29	May 15
Emerged	June 3	May 22
Harvest	October 23	November 2
PIX	6 oz/acre	None
Uniformity	Excellent	Fair
Yield lbs lint/ac	1205	985

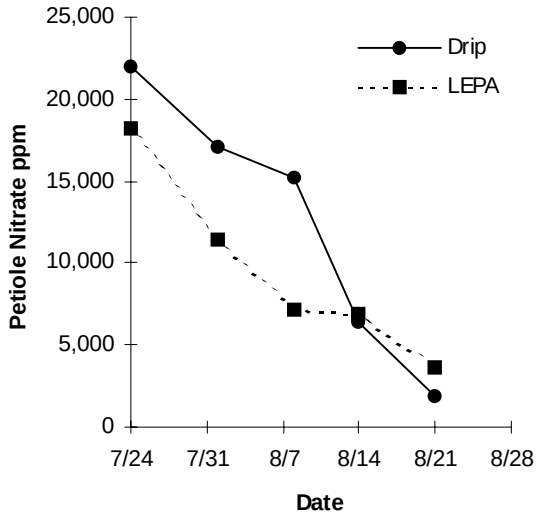

Figure 2. Cotton petiole nitrate levels from drip versus LEPA comparison, 1995.

Table 2. Costs, return, and net benefit from drip versus LEPA comparison, 1995.

		Drip	LEPA
		$/acre	
Costs	System/5yrs	141	52
	Labor	10	10
	Spraying	8	0
	Energy	30	25
	Fertilizer	100	85
	Total	**289**	**172**
Return	Gross	988	808
	Net	699	635
	Benefit	**64**	

Table 3. Cooperating farmers, years with drip, acres of drip and resulting cotton lint yield, 1996.

Farmer	years with drip	acres	yield (lbs lint/acre)
1	2	110	1,419
2	4	218	1,117
3	1	40	1,101
4	1	123	800
5	1	80	1,200
6	1	26	1,292
7	1	90	956
8	1	120	984
9	1	15	933
10	1	8	908
11	1	20	947
12	1	50	900
	Total	810	
	Average		1,046

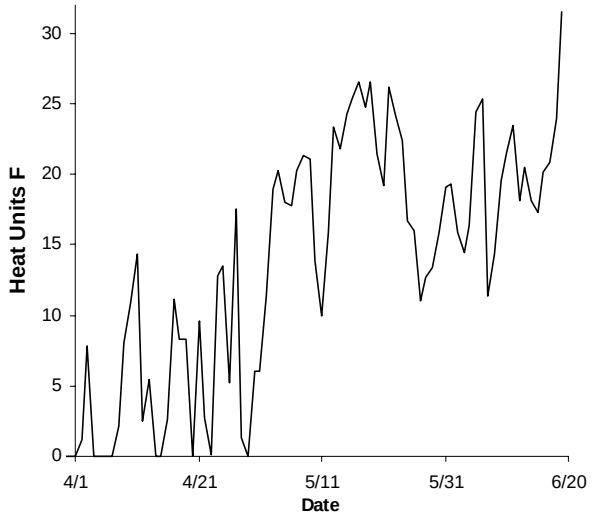

Figure 3. Early spring daily heat units, LaMesa, Texas, 1996 (Texas Agricultural Extension Service, 1996).