ON-FARM CONSERVATION TILLAGE PROGRAMS TO INCREASE DRYLAND COTTON PROFITABILTY

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Abstract

Conservation tillage is of particular interest to growers throughout the Southwest as a way to decrease production cost and increase net returns. Experiments were established in the Rolling and High Plains to evaluate various conservation tillage programs in cotton. Cotton lint yields were reduced in the Rolling Plains when a cover crop was used in combination with no-till cotton, when compared to conventional tillage and no-till without a cover crop. Lint yields were similar between the conventional tillage and no-till without a cover crop. Paymaster 2280 BG/RR had a higher yield than Stoneville 2448R when combined over tillage treatments in the Rolling Plains. Cotton lint yields were similar between conventional tillage, no-tillage, and a cotton-wheat-fallow system in the High Plains.

Introduction

Cotton production totals almost 4 million acres in the High and Rolling Plains each year. One-half of those 4 million acres of production is dryland. Therefore, finding ways to increase the profitability of dryland cotton production is important to this region of Texas. In addition, with the concerns over the possibilities of a shrinking water supply, the need to concentrate irrigation could lead to an increase in dryland acres and subsequently to the need to increase the profitability of a dryland system. Cotton provides the best cropping option in this region and alternative crops are limited and do not provide the profit potential that cotton does. Much of the cotton produced in this region is grown using conventional tillage. Producers must deal with issues involving blowing sand each year across the area. Injury from blowing sand may result in one or all of the following: stand loss, replanting, delayed maturity, lower yields, and possibly complete loss of a cotton crop. The use of a cover crop (traditionally wheat or rye) has helped reduce these problems in many areas of the Cotton Belt (Keeling, 1995). However, these systems have been most successful in higher rainfall areas or under irrigation. The concern with cover crops in semi-arid, dryland cotton production areas is the loss of soil moisture from the soil profile during the winter and spring fallow period. In dryland production systems, cotton is highly dependent on deep soil moisture (stored moisture) that is accumulated during the fallow period. Lint yields were reduced by approximately 50 lbs/A during one growing season at a dryland test site in the Rolling Plains where a complete wheat cover crop was used (Clark, 1995). Weed control was one of the limiting factors in this research. With the introduction of new weed control technology, there are new opportunities for conservation tillage practices in dryland cotton production. In three years of research, cotton yields were not affected by a cover

crop at Chillicothe, Texas (Baughman et al., 2003). Cotton yields were affected in two of three years by a cover crop at Lubbock in this same study; however, yields were below the long term average in each year that the study was conducted. This research would indicate that there is an opportunity for producers to adopt conservation tillage techniques that might increase long-term profitability of dryland cotton production in the High and Rolling Plains. Therefore, the objectives of this research is to investigate conservation tillage techniques that have the potential to increase dryland cotton profitability; conduct on–farm trials within the region to better develop local information on conservation tillage options; demonstrate these conservation tillage programs to producers through local on-site field days and develop additional educational materials.

Materials and Methods

Experiments were established in the Rolling Plains near Electra and on the High Plains near Lubbock to investigate the utilization of various forms of conservation tillage in cotton. The Rolling Plains location consisted of conventional tillage (disk – twice, listed, rod-weed), no-till without a cover crop, no-till with a cover crop, wheat-fallow-cotton, and cotton-wheat-fallow. The wheat-fallow-cotton did not have any cotton planted in 2005, while the cotton-wheat-fallow was similar to the no-till with a cover crop in 2005. The High Plains location consisted of conventional tillage (chisel, spring tooth, listed, cultivated - twice), no-till, and cotton-wheat-fallow. In addition to tillage treatments, the Rolling Plains plots were split with half of the plot planted (June 16, 2005) to Paymaster 2280 BG/RR and half of the plot planted to Stoneville 2448R. In 2006, half the plot was planted to Stoneville 4554B2RF and 4664RF (June 2, 2006) while the High Plains location was all planted (May 18, 2005) to Fibermax 960 B2R. Typical dryland production practices were used at each location.

RESULTS AND DISCUSSION

Cotton yields were affected by the cover crop at the Rolling Plains location in 2005 (Table 1). Both the no-till with a cover crop and the cotton-wheat-fallow (which was similar to the no-till with a cover crop this year) had lower yields than the conventional tillage and the no-till without a cover crop system. Yields were similar between conventional tillage and the no-till without a cover crop. The cover crop was solid planted and minimal rainfall occurred during the spring and early summer at this location which may have led to the resulting decrease in yields with the cover crop systems. Paymaster 2280 BG/RR had higher lint yields than Stoneville 2448R when combined across tillage treatments (Table 2). Cotton yields were not affected by any of the tillage treatments at the High Plains Location in 2005 (Table 1).

In 2006, the Rolling Plains location was completely lost to drought. The cotton never developed to stand during the growing season. Yields were less than 70 lb/A with all tillage treatments at the High Plains location (Table 3). The no-tillage was less than the conventional tillage and the wheat-fallow treatment. There was no difference in yield between the wheat-fallow and conventional tillage treatment. However, very few conclusions can be drawn from this trial due to the low yield level.

Table 1. Tillage effects on cotton yields in Rolling and High Plains, 2005.

	Lint Yields	
Treatment	Rolling Plains	High Plains
	(lbs/A)	
Conventional Tillage	514	592
No-Till w/o Cover	511	
No-Till w/ Cover	317	534
Cotton-Wheat-Fallow	392	620
LSD[a] (P=0.10)	94	NS[a]

[a]LSD = least significant difference, NS = not significant

Table 2. Variety effects on cotton yields in Rolling Plains, 2005.

Treatment	Lint Yields
	(lbs/A)
Paymaster 2280 BG/RR	517
Stoneville 2448R	350
LSD[a] (P=0.10)	66

[a]LSD = least significant difference

Table 3. Tillage effects on cotton yields in the High Plains, 2006.

	Lint Yields
Treatment	High Plains
	(lbs/A)
Conventional Tillage	61
No-Till w/ Cover	28
Cotton-Wheat-Fallow	51
LSD[a] (P=0.10)	19[a]

[a]LSD = least significant difference

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