The Effects of Reduced Tillage Practices on Peanut Production and Pest Management

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- No consistent differences were observed with insect populations in 2008 when comparing tillage treatments.
- Peanut yields and grades were similar among no-till, strip-till, and conventional tillage treatments.

Introduction

In 2008, the long-term tillage study at the Ft. Cobb Research Station was continued. The objectives were to assist Oklahoma growers in developing management strategies for conventional and conservation tillage practices in peanut production. Originally, plots were 76 feet wide by 130 feet long, to be representative of what growers would experience in adopting reduced tillage practices. Changes were made for the 2007 growing season. Large plots, which measured 76 feet by 130 feet, were split to evaluate three different rotations, while maintaining the objectives of the original study. Each tillage plot was split into three sub-plots, which measured 40 feet by 50 feet. Main plots were tillage and sub-plots became crop rotation. Crop rotations evaluated were a three-year corn, corn, then peanut rotation; and a three-year switchgrass, switchgrass, then peanut rotation. Including crop rotation as a variable in this study will provide beneficial data of how crop rotation affects weeds, diseases, and insects in reduced and conventional tillage systems. Most importantly, we will be able to evaluate the economic profitability of these rotations.

Materials and Methods

An outline of field operations is presented in Table 1.

Arthropod monitoring and weed populations

Once damage became apparent, thrips populations were monitored on three separate occasions. Ten quadrifoliate leaves were pulled from each plot and placed in 70% ethyl alcohol, or ETOH, for transportation to the laboratory. Leaves were carefully separated and rinsed in an ETOH solution, then the liquid was strained for larvae and adults.

Peanut volunteer plants and weed counts were taken shortly after planting. Volunteer counts were taken on two separate occasions throughout the trial,

Table 1. Summary of field operations in 2008.

Date	*Description*
March 10	Tilled conventional corn plots.
March 14	Triple K® on conventional corn plots.
March 25	Applied 220 lbs 34-0-0 on the switchgrass and corn plots. Applied 100 lbs 18-46-0 on the peanut plots.
March 26	Triple K® on conventional corn plots and then planted all corn plot.
March 27	Applied 100 lbs 18-46-0 on corn plots.
April 14	Tilled conventional peanut plots; sprayed glyphosate at 1 qt. on no-till and strip-tilled corn and peanut plots.
May 5	Tilled conventional peanut plots.
May 13	Spayed Prowl® 3.3 on conventional peanut plots and incorporated with Triple K®.
May 16	Ran strip-till and then planted all peanut plots with Tamrun OL02; Sprayed Prowl® H_20 at 1 qt. + glyphosate at 1 qt. on the no-till and strip-tilled peanut plots.
May 16	Sprayed 1.5pt. 2,4,D on the Switchgrass plots and Glyphosate at 1qt on corn plots.
May 30	Applied 300 lbs 34-0-0 on corn plots.
June 16	Sprayed Cobra at 12.5 oz. + Poast Plus at 1.5 pt. + Basagran at 2 pt. + Butyrac® 200 at 8 oz. on peanut plots
July 9	Sprayed Cobra at 12.5 oz. + Outlook at 20 oz. + Poast Plus at 1.5 pt. + Butyrac® 200 at 1 pt. + Dynamic at 6 oz. on peanut plots.
Aug. 29	Harvested corn plots.
Oct. 17	Swathed switchgrass.
Oct. 29	Dug peanut plots.
Oct. 21	Baled switchgrass lots.
Oct. 24	Thrashed peanut plots.
Fungicide Applications	
July 2	Bravo® 1.5 pt/A
July 30	Abound® 18.5 oz/A
Aug. 25	Bravo® 1.5 pt/A

once before a field implement with sweeps was run through the plots and once afterward by taking an average of five quadrates per plot. Weed counts also were taken twice. Weed assessments were made by taking the total number of weeds found in a 90-square-foot area within each replication. Weed assessments were made before and after herbicide application.

Plot design and analysis

The plot design was a randomized, complete block with four replications of each treatment. An analysis of variance was conducted on the data and a least significant difference, or LSD, (P=0.05) test was generated to compare differences among the three tillage treatments in reference to insect and disease pressure, as well as yield and grade.

Results and Discussion

The information found in Table 2 presents results from monitoring insect populations encountered in the tillage test at Ft. Cobb. Thrips were the main problem noticed throughout the season. No insecticides were applied throughout this test. A large number of larvae were present at the first sampling. A significantly higher number of thrips larvae were found in conventional till plots. This trend of higher larvae and adult thrips in conventional till plots was observed during all three sampling dates (Table 2).

Table 2. Mean number of thrips/10 quadrifoliate leaves.

Treatment	1st Sample Date 6-13-2008*			2nd Sample Date 6-22-2008*			3rd Sample Date 7-2-2008*		
	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total
Strip-till	20.0 b	10.0 a	30.0 b	2.0 a	6.8 b	8.8 b	.5 b	2.5 a	3.0 b
No-till	27.3 b	7.8 a	35.0 b	4.0 a	7.0 b	11.0 b	1.0 b	3.5 a	4.5 b
Conventional till	85.7 a	11.5 a	97.2 a	7.0 a	14.3 a	21.3 a	5.3 a	6.0 a	11.3 a

*Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

No significant differences in peanut yields or grades were identified among tillage treatments (Table 3). This follows previous years' data. Tillage does not appear to have an effect on peanut yield or peanut grade after four years. Corn grain yields were determined for each plot. Average corn-grain yield was 123 bu/A (Table 4). Switchgrass was swathed and harvested after dormancy and the estimated yield was 5.8 tons/A. Corn and switchgrass plots will be planted to peanuts in 2009.

While certain trends appear to be evident from year to year that may relate to tillage effects on arthropods, weeds, and diseases, no consistent differences seem to indicate minor impacts from reduced tillage practices in peanuts.

Table 3. Peanut yield and grade from the Long-term tillage study, Ft. Cobb, 2008.

Tillage	Yield (lbs/A)	Grade (% TSMK)[1]
No-till	2989 a	72 a
Strip-till	3095 a	69 a
Conventional till	3641 a	70 a

[1] TSMK = Total sound mature kernels.
* Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 4. Corn grain yields, 2008.

Treatment	Average (bu/A)
Strip-till	122.7
No-till	120.5
Conventional till	126.5