NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH INITIATIVE


NPB Project # 376
GPC Budget # 4-982-653-5
UGA Account #25-21-RF328-881

INSTITUTION: University of Georgia

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EXPIRATION DATE: 31 December 2013

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Final Report:

An experiment to determine the effect of three different strip-tillage implements into either a rye cover crop or bare soil, followed by single or twin row peanut planting took place in 2012. Four reps with a 3 factor factorial randomized complete block experiment was planted in Tifton, GA. Rye was planted on November 16, 2011 into appropriate plots. Strip-tillage using either a KMC, Orthman, or Unverferth strip-till implement occurred into appropriate plots on May 3, 2012, followed by planting of ‘Georgia-06G’ peanut on May 9 in either single or twin-row pattern according to randomization. Penetrometer readings were taken shortly after planting, and again late in the season. Transect biomass readings were also made shortly after planting.

Peanuts were dug on October 11 and picked on October 15, 2012. Grade data has been received and is being organized by test. All data needs to be compiled and analyzed for statistical significance.

At 28 days after planting, the plant stand was counted and there were no stand differences regardless of whether a cover crop was there, or which strip-till implement was used to create the planting strip (Table 1). This was a primary objective of this project – to determine if residue interference might cause stand problems and if any of the tested strip-till implements might provide a better prepared area for planting seed, especially for twin row peanuts because of their spacing compared to the width of the tilled strip for seed furrow preparation. There was a stand difference between single and twin row pattern, which is common due to the nature of the spacing creating less intra-row competition of plants, and from machinery operation since seed plates spin more rapidly.
when planting single rows than when planting twin rows contributing to more skips and hence reduced seed placement accuracy.

Inclusion of the cover crop did not interfere with yield, grade, or influence TSWV (Table 1). Similar for the strip-till implement used, where there was no impact on these variables (Table 1). Yield was increased when planted in twin rows compared to single row pattern (Table 1), yet there was not an interaction with either cover crop or strip-till implement used, so this yield difference was not attributed to any improved conditions provided by an implement or advantages/disadvantages that can occur from having a cover crop in the field.

Table 1. Plant stand, yield, grade (% Total sound mature kernels [TSMK]), and Tomato spotted wilt virus (TSWV) data for cover crop, tillage implement, and row pattern variables, Tift County, GA, 2012.

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Emerged Stand Count (plant/ft)</th>
<th>Pod Yield (Lb/Ac)</th>
<th>Grade % TSMK</th>
<th>% TSWV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye</td>
<td>4.4 A</td>
<td>6140 A</td>
<td>74.7 A</td>
<td>13.0 A</td>
</tr>
<tr>
<td>None</td>
<td>4.7 A</td>
<td>5844 A</td>
<td>74.9 A</td>
<td>15.5 A</td>
</tr>
<tr>
<td>Tillage Implement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KMC</td>
<td>4.5 A</td>
<td>6042 A</td>
<td>74.7 A</td>
<td>12.6 A</td>
</tr>
<tr>
<td>Orthman</td>
<td>4.6 A</td>
<td>6129 A</td>
<td>74.8 A</td>
<td>16.8 A</td>
</tr>
<tr>
<td>Unverferth</td>
<td>4.4 A</td>
<td>5804 A</td>
<td>74.9 A</td>
<td>13.3 A</td>
</tr>
<tr>
<td>Row Pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>4.1 B</td>
<td>5615 B</td>
<td>74.6 A</td>
<td>13.5 A</td>
</tr>
<tr>
<td>Twin</td>
<td>5.0 A</td>
<td>6368 A</td>
<td>75.0 A</td>
<td>14.9 A</td>
</tr>
</tbody>
</table>

*Means followed by the same letter within a column are not significantly different according to pairwise t-tests.

In summary, there were no indications from the agronomic data associated with this trial than any of the three strip-till implements provided better planting conditions for either single or twin row peanuts regardless of whether there was a cover crop or not. Cover crops have the potential to have residue interference at planting time, and the width of the stripped area is often only 8-10 inches wide while twin row peanuts are usually spaced 7-9 inches apart. This leaves very little room for error when planting such that the planter has a greater chance of encountering residue interference in twin rows.

**Penetrometer Data**

Penetrometer readings to evaluate soil compaction were taken at initial cover crop burndown (April 23, 2012), at-planting (May 9, 2012), and prior to harvest (September 6, 2012). It is noted that soil moisture in plots where there was a rye cover crop growing had less soil moisture at the time of initial burndown (Table 2). This is one of the largest concerns with using cover crops for the grower – the potential to deplete soil moisture
just prior to planting the crop when soil moisture is needed for the seed to germinate and establish a satisfactory plant stand. In this trial, soil moisture was replenished by planting a few weeks later (Table 2), but there did appear to be some lingering soil compaction issues associated with the cover crop over the course of the season.

Table 2. Soil moisture summary for the initial, at planting, and harvest sampling times across cover crops at the 0-6 and 6-12 inch depths for Tifton during the 2012 growing season.

<table>
<thead>
<tr>
<th>Cover</th>
<th>Burndown Depth (in)</th>
<th>At-Planting Depth (in)</th>
<th>Harvest Depth (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop</td>
<td>0-6</td>
<td>6-12</td>
<td>0-6</td>
</tr>
<tr>
<td>No</td>
<td>7.03</td>
<td>7.77</td>
<td>7.18</td>
</tr>
<tr>
<td>Yes</td>
<td>5.82</td>
<td>5.40</td>
<td>7.23</td>
</tr>
</tbody>
</table>

In plots where there was no cover crop grown, the initial compaction levels at burndown did not exceed a cone index of 4 MPa pressure in order to penetrate with the penetrometer (Fig. 1). However, because of the root system removing moisture, it was much drier in the subsoil levels (Table 2), leading to much more resistance with values approaching 10 MPa (Fig. 2).

Fig. 1. Tifton – Initial Plots at burndown, April 23 2012; No Cover Crop

Cone index, MPa
At planting, plots had received some rainfall and irrigation, replenishing the soil moisture. After the strip-till implements were run through the plots, the cone index values within about 5 inches (12.5 cm) on either side of the implement’s shank (point 0 on the x-axis of the graphs below) rarely went above 3 MPa below the 12 inch (30 cm) depth in the soil profile in plots where no cover was grown (Figs. 3-8). However, in plots where there was a cover crop (Figs. 9-14), there were consistently zone index values above 4 MPa, and in some cases greater than 5 MPa. Getting further away from the subsoil shank in the zone from about 9 to 18 inches (22.5 to 45 cm on x-axis), values ranged from a maximum of 4 to 5 MPa in plots with no cover (Figs. 3-8), but from 5 to as much as 7 MPa in plots including rye (Figs. 9-14).

By harvest time, there were few differences observed between plots without cover (Figs. 15-20) and plots that did have a cover crop (Figs. 21-26). There did appear to be less resistance within the tilled zone when the Orthman implement was used compared to the other implements by the end of the season. However, these graphs do not represent any type of statistical comparisons so there are no true conclusions that can be drawn from this data at this time. Compilation with data from this project’s sister location in Headland, AL and an additional year of sampling will be included for analyses prior to publication.
Fig. 3. Tifton – At Planting, KMC, May 9 2012, No Cover, Single Rows

Fig. 4. Tifton – At Planting, Orthman, May 9 2012, No Cover, Single Rows

Fig. 5. Tifton – At Planting, Unverferth, May 9 2012, No Cover, Single Rows
Fig. 6. Tifton – At Planting, KMC, May 9 2012, No Cover, Twin Rows

Fig. 7. Tifton – At Planting, Orthman, May 9 2012, No Cover, Twin Rows

Fig. 8. Tifton – At Planting, Unverferth, May 9 2012, No Cover, Twin Rows
Fig. 9. Tifton – At Planting, KMC, May 9 2012, Cover, Single Rows

Fig. 10. Tifton – At Planting, Orthman, May 9 2012, Cover, Single Rows

Fig. 11. Tifton – At Planting, Unverferth, May 9 2012, Cover, Single Rows
Fig. 15. Tifton – Harvest, KMC, Sept. 6 2012, No Cover, Single Rows

Fig. 16. Tifton – Harvest, Orthman, Sept. 6 2012 No Cover, Single Rows

Fig. 17. Tifton – Harvest, Unverferth, Sept. 6 2012 No Cover, Single Rows
Fig. 24. Tifton – Harvest, KMC, Sept. 6 2012 Cover, Twin Rows

Fig. 25. Tifton – Harvest, Orthman, Sept. 6 2012 Cover, Twin Rows

Fig. 26. Tifton – Harvest, Unverferth, Sept. 6 2012 Cover, Twin Rows