406/1316
2014

National Peanut Board / Southeast Peanut Research Initiative

EXECUTIVE SUMMARY for 2014 NPB Project # 406, entitled "Evaluation of Different Tillage Systems for Peanut Production" – Univ. of Georgia, by R. Scott Tubbs.

Modern agriculture is being asked to increase crop productivity while promoting environmental quality and sustainability. Peanut production in the Southeast is no different despite being grown on soils that are naturally low in productivity, which can be worsened by tillage. The results of this experiment will help identify the most effective type of strip tillage operation that facilitates planting peanut in single and twin-rows, while maintaining beneficial residue on the soil surface. This is very important to promote soil quality within peanut production and not destroy conservation benefits associated with crops grown in rotation with peanut that use conservation systems. Previous research have shown that tillage responses for peanut are variable although there have been greater yields in conventional tillage with newer cultivars in recent years.

A cover crop of rye was planted on November 14, 2013 in appropriate plots, randomized with fallow check plots. Strip-tillage using a KMC, Orthman, or Unverferth strip-till implement occurred into appropriate plots on May 14, 2014, followed by planting of 'Georgia-06G' peanut on May 14 in either single or twin-row pattern according to randomization. The concern of residue interference causing stand problems and whether 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) is a consideration in this project. During the 2014 iteration of this project, this did prove to be true, with decreased plant stands in plots where rye was grown compared to the fallow areas (there were no differences in the 2012 or 2013 projects). However, this did not cause any difference in yield, and grade was actually better following the rye. Yield was increased when planted in twin rows compared to single row pattern in all three years, but there were no yield differences between the cover crop vs fallow or for the three strip-till implements used in any of the three years, so the yield difference for row pattern 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. White mold was a factor in this trial for the second consecutive year, and there was heavier incidence and spread in single row plots compared to twin rows. This is usually attributed to the pathogen spreading from plant to plant down the row, and the intra-row plant spacing is further apart in twin row than it is in single row, even with a higher plant stand in twin rows, since there are roughly half as many plants in each furrow and the furrows are planted about 8 inches apart in twins. The white mold incidence may have been a contributing factor to decreased yields with single rows, along with plant stand differences since plant stands were below optimum in the test in 2014.

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 for residue interference at planting time as evidenced by the reduced plant stands where rye was planted, and since the width of the stripped area is often only 8-10 inches wide while twin row peanuts are usually spaced 7-9 inches apart leaving little room for error.

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NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH INITIATIVE

FINAL REPORT - 2014 funding cycle for work done under project agreement entitled: "Evaluation of Different Tillage Systems for Peanut Production".

NPB Project # 406
BID # 1316
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INSTITUTION: University of Georgia

Principle Investigator: Dr. R. Scott Tubbs

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Final Report:
Modern agriculture is being asked to increase crop productivity while promoting environmental quality and sustainability. Peanut production in the Southeast is no different despite being grown on soils that are naturally low in productivity, which can be worsened by tillage. The results of this experiment will help identify the most effective type of strip tillage operation that facilitates planting peanut in single and twin-rows, while maintaining beneficial residue on the soil surface. This is very important to promote soil quality within peanut production and not destroy conservation benefits associated with crops grown in rotation with peanut that use conservation systems. Previous research have shown that tillage responses for peanut have been quite variable although there have been greater yields in conventional tillage with newer cultivars in recent years.

Three different tillage implements were evaluated for their performance in strip tillage peanut production across single and twin rows with and without a cover crop (KMC, Orthman, and Unverferth). A rye ('Wrens abruzzi') cover crop was planted on November 14, 2013 in appropriate plots. Tillage operations were performed just prior to peanut planting (GA-06G) on May 14, 2014. Residue was sampled on June 2, 2014 by removing all aboveground material from a sample location (~ 2.67 ft^2 each) within each plot. Peanuts were dug on October 3 and harvested on October 10, 2014. White mold was prevalent in this experiment and was rated several hours after digging.

Biomass of rye at planting was similar for each treatment, with an average of 2870, 2640, and 3020 lb dry matter (DM) per acre in the KMC, Orthman, and Unverferth plots, respectively. There was an interaction with more rye biomass in the Unverferth single row plots and KMC twin row plots than in the KMC single row plots (unrelated to any treatment effects, just a product of the field randomization), although should not have been a factor on peanut production

because of the quantity of biomass in all plots. Data related to peanut performance is summarized in Table 1.

Table 1. Peanut yield and grade (Total Sound Mature Kernels [TSMK]), plant stand at emergence, plant stand at harvest, and white mold incidence at digging following cover crop, strip-tillage implement, and row pattern treatments at Tifton, GA in 2014. All differences reported are at the p=0.05 level of significance, and means within a column not followed by the same letter are significantly different.

	Pod Yield	TSMK	Emerg. stand	Harvest stand	White mold
Cover Crop[a]	lb/ac	%	plants/ft	plants/ft	%
Rye	4299 a	72.9 a[d]	2.5 b	2.7 b	13.5 a
None	4464 a	70.6 b	3.2 a	3.3 a	17.7 a
Strip-Till Implement[b]					
KMC	4450 a	72.0 a	2.7 a	2.8 a	15.8 a
Orthman	4175 a	72.3 a	2.7 a	3.0 a	12.7 a
Unverferth	4519 a	70.8 a	3.1 a	3.1 a	18.4 a
Row Pattern[c]					
Single	3640 b	71.3 a[d]	2.4 b	2.6 b	19.5 a
Twin	5123 a	72.1 a	3.3 a	3.4 a	11.8 b

[a] Data pooled over rep, tillage, and row pattern.
[b] Data pooled over rep, cover crop, and row pattern.
[c] Data pooled over rep, cover crop, and tillage.
[d] An interaction between cover and row pattern occurred.

There were denser plant stands when there was no cover crop present than when there was a cover present. This can sometimes occur when cover crop residue is abundant and causes interference with the ability of the planter to open a furrow or physical interruption of seed drop by residue causing the seed to deflect and miss the opened furrow. There were also denser plant stands in twin row than in single row, which can sometimes occur since seed plates rotate at a faster speed in single row than in twin row and can cause more skips (holes with no seed) leading to reduced seed drop and resulting lower plant stands in single rows. The interaction observed with cover crop and row pattern for grade (%TSMK) showed improved grade in twin over single when there was no cover crop, but no difference when there was a cover crop. This is similar to the 2013 data, although the grade improvement for twins was where there was cover crop, with no difference when there was not a cover crop. There was also a better grade in single row with cover crop than without cover crop, but this is not consistent with previous years of data where there was no difference in grade between cover crop treatments. The improvement in yield for twins above singles is consistent with both of the previous years of data in this trial.

For the second consecutive year, there was heavy incidence of white mold in the field where this trial took place (the trial was conducted in different fields each year). Similar to the 2013 data, this year had more white mold in single rows than twins, regardless of cover crop.

From this data, and the previous two years of data included, there were no indications that any of the three strip-till implements provided any advantage in plant stand, yield, or grade of peanut over another. There were also no consistent data suggesting that inclusion of exclusion of a rye cover crop had any effect on the variables analyzed. The only variable with consistent impact on the results was row pattern, where twin row had improved results over single row. This was true for yield, grade, plant stands, and incidence of white mold over the course of the 3-years of experiments.