

## National Peanut Board / Southeast Peanut Research Initiative

**EXECUTIVE SUMMARY** for 2015 NPB Project # 418, entitled "Evaluation of Tillage, Cover Crop and Herbicide Effects on Weed Control in Peanut Production Systems" – Univ. of Georgia, by R. Scott Tubbs.

To ensure sustainability, multiple integrated weed management strategies must be developed in order to provide growers the most cost effective means for production, while achieving adequate management and long-term viability. With peanut being a staple economic crop in the southeastern U.S. and with the increased pressure of herbicide resistant weeds, development of integrated weed management practices is crucial to producers in this area. Presently, herbicides are used on approximately 97% of all crop acres in the U.S., which can contribute to increased selectivity for resistance. The peanut crop is known to have a relatively poor competitive ability with problematic weeds because of its low canopy and prostrate growth. The objective of this project was to evaluate the system effect on peanut production by integrating conservation tillage, a rye cover crop, and three herbicide input intensities to determine effective integrated weed management systems that might promote sustainable weed control practices.

A split-plot design was used with main plot effects of tillage and sub-plot effects of herbicide treatments. The three main plot treatments included conventional deep-tillage, strip-till into a rye cover crop (rye planted in December 2014), or strip-till into a winter fallow. Georgia-06G peanut was planted on May 21, 2015 and followed by the sub-plot effect of herbicide applications of Valor, Cadre, or Strongarm alone, or all possible combinations thereof (along with a non-treated control). There were no interactions between tillage and herbicide treatments for any variable analyzed. Tillage had a significant effect on yield, grade, final plant stand at harvest, and days to row middle overlap (lapping). When peanut was strip-tilled into a rye cover crop or into fallow with no rye cover crop, yield was reduced, plant stand was lower, and it took six to nine additional days for row middles to overlap than when compared to the conventional tillage treatment. Rye residue can interfere with planting and emergence in strip-till scenarios, even when planted with row cleaners (which were used in this trial). The remaining rye straw in row middles can also impede vine growth, taking longer for vines to overlap the row middles since the rye straw may force peanut vine growth upward/away from the soil instead of growing directly prostrate across the soil surface.

Herbicide treatments did not result in any differences except for amount of time to lapping, however. This is not consistent with the previous year of data. A combined analysis over years and including the two years of data from the Alabama location of this trial will need to be performed to determine overall consistencies, including economic analyses and weed control ratings which have not been performed at the time of this report.

Overall, these results suggest that inclusion of rye may impede development of peanut. While there wasn't an interaction with any of the herbicide treatments, the rye residue may have intercepted and reduced efficacy of herbicides compared to the conventional tillage and fallow strip-till scenarios where there was no residue to prevent the herbicide from reaching its target of the soil surface and small emerging weed seedlings.

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## NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH INITIATIVE

**FINAL REPORT - 2015 funding cycle** for work done under project agreement entitled: "Evaluation of Tillage, Cover Crop and Herbicide Effects on Weed Control in Peanut Production Systems".

NPB Project # 418  
BID # 1321  
SID # GA-168  
UGA Account #25-21-RF328-088  
UGA Proposal #051359-01

INSTITUTION: University of Georgia

Principle Investigator: Dr. R. Scott Tubbs

EXPIRATION DATE: 30 June 2016

SPRI CONTACT: Joy Purvis  
NPB CONTACT: Bob Parker

### **Final Report:**

To ensure sustainability, multiple integrated weed management strategies must be developed in order to provide growers the most cost effective means for production, while achieving adequate management and long-term viability. With peanut being a staple economic crop in the southeastern U.S. and with the increased pressure of herbicide resistant weeds, development of integrated weed management practices is crucial to producers in this area. Presently, herbicides are used on approximately 97% of all crop acres in the U.S., which can contribute to increased selectivity for resistance. The peanut crop is known to have a relatively poor competitive ability with problematic weeds because of its low canopy and prostrate growth. The objective of this project was to evaluate the system effect on peanut production by integrating conservation tillage, a rye cover crop, and three herbicide input intensities to determine effective integrated weed management systems that might promote sustainable weed control practices.

A split-plot experiment was implemented at the UGA Lang Farm with Rain Reel/gun irrigation to address herbicide efficacy in various tillage management and cover crop effects. Main plot effects were tillage/cover crop treatments, including conventional deep turn tillage (no cover crop in winter), a winter fallow (no cover crop) followed by strip-till, and strip-till into a winter cover crop of 'Wrens abruzzo' rye (planted at 90 lb seed/ac on December 19, 2014 and fertilized with 64 lb N/ac of 34-0-0 on March 25, 2015). Rye was terminated on May 12, 2015 with an application of paraquat (32 oz/ac + glyphosate (32 oz/ac). Conventional tillage (deep turn with moldboard plow) land preparation was performed on May 11, 2015 in appropriate treatments. Sub-plot effects within each main plot tillage treatment included different herbicide regimes consisting of the following:

- 1) No herbicide
- 2) Cadre alone (4 oz/ac)
- 3) Strongarm alone (0.45 oz/a)
- 4) Strongarm + Cadre (0.45 oz/ac + 4 oz/ac)
- 5) Valor alone (3 oz/ac)
- 6) Valor + Cadre (3 oz/ac + 4 oz/ac)
- 7) Valor + Strongarm (3 oz/ac + 0.45 oz/ac)
- 8) Valor + Strongarm + Cadre (3 oz/ac + 0.45 oz/ac + 4 oz/ac)

All Valor applications were pre-plant (May 13, 2015); Strongarm was applied pre-emergence after planting (May 23, 2015); Cadre was applied post-emergence (July 1, 2015) for all treatments involving each respective herbicide. All plots received a blanket application of clethodim on June 11, 2015. Peanut (Georgia-06G) was planted on May 21, 2015. Digging occurred on October 14 and harvest on October 30, 2015 after several weather delays.

Table 1. Peanut yield and grade (Total Sound Mature Kernels [TSMK]), plant stand at emergence, plant stand at harvest, and days to row overlap (lapping) for tillage and herbicide treatments at Tifton, GA in 2015. Means within a column not followed by the same letter are significantly different at the P=0.05 level.

	Pod Yield	TSMK %	Emerg. stand plants/ft	Harvest stand plants/ft	Lapping d after plant
<b><u>Tillage<sup>a</sup></u></b>					
Conventional	5567 A	75.7 A	2.9	3.1 A	83.2 B
Fallow	4363 B	72.7 B	2.8	2.6 B	89.6 A
Strip-Till into rye	3436 C	71.5 B	2.9	2.6 B	92.3 A
<b><u>Herbicide Treatment<sup>b</sup></u></b>					
None	4055	71.9	2.8	2.7	90.7 AB
Cadre	4224	73.7	2.8	2.7	88.2 B-D
Strongarm	4503	74.1	2.9	2.8	83.7 D
Cadre + Strongarm	4435	71.9	3.0	2.8	88.3 A-D
Valor	4414	72.4	2.8	2.6	86.8 B-D
Valor + Cadre	4824	73.8	2.8	2.8	95.1 A
Valor + Strongarm	4888	74.9	2.8	3.0	84.3 CD
Valor + Cadre + Strongarm	4299	73.8	2.9	2.9	90.1 A-C

<sup>a</sup> Data pooled over rep and herbicide treatments.

<sup>b</sup> Data pooled over rep and tillage.

There were no interactions between tillage and herbicide treatments for any variable analyzed. Tillage had a significant effect on all variables except for plant stand at emergence (Table 1). Conventional tillage provided optimized results for all variables where a difference occurred (yield, grade, harvest plant stand, and days until row middle closure [lapping]). There were no differences between strip-tillage treatments regardless of whether rye was or was not present (fallow) for all variables, except for yield where the fallow treatment exceeded the yield of the treatments including rye as a cover crop.

Herbicide treatments did not result in differences between treatments for any variable except for the amount of time to lapping. There were no distinguishable trends among the herbicides or combinations with regards to lapping date.

Overall, these results suggest that strip-till into a rye cover crop can be at a disadvantage in terms of yield compared to systems that do not include a cover crop, which is similar to the first year of data for this trial in 2014. However, in 2015, there was also further separation with the conventional tillage treatment yielding more than the fallow treatment (which was not deep-turned with a moldboard plow). There was no separation among herbicide treatments, unlike 2014, which may partially be attributed to less overall weed pressure in the 2015 trial compared to 2014, as indicated by the ability to harvest the non-treated plots. Weed control ratings were compiled by USDA-ARS in Auburn, AL who were cooperators on this project. That information will be incorporated prior to publication submission.

Data related to this project was presented at the 2016 Southern Weed Science Society meeting in February 2016.