PEANUT RESPONSE TO STARTER FERTILIZER ACROSS TILLAGE SYSTEMS

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SUMMARY

The benefits of conservation systems have been documented across the Southeast, however, the widespread adoption of conservation systems for peanut (*Arachis hypogea* L.) lags behind other crops despite these benefits. Previous research has documented inconsistent peanut yields in conservation systems, especially for single rows, compared to conventional tillage peanuts. As a result, the possibility of reduced yields in conservation systems has concerned growers and limited the adoption of peanut production in conservation systems.

Starter fertilizers have been successfully adopted in conservation systems with other crops. A starter application supplies a small amount of soluble fertilizer near the root zone of young plants, which strengthens young root systems, enhances early season growth, protects the plants from unfavorable environmental conditions, and potentially decreases the susceptibility of plants to various pests throughout the growing season. The benefits associated with starter applications could also permit earlier planting dates with increased yields in conservation systems compared to conventional peanut production. However, limited research has investigated how peanut responds to starter fertilizer. Therefore, the objective of this research was to determine the interactive effects of various starter fertilizer combinations and placements for two planting dates across conventional and conservation tillage peanut production systems during the 2008 and 2009 growing seasons.

The experimental design consisted of a strip-split-plot with planting date (mid to late April and mid to late May) as the vertical plot and tillage system [conventional and strip tillage with a rye (*Secale cereale* L.) cover crop] as the horizontal plots and a 3x2 factorial combination of starter fertilizer (no starter, N starter alone at a rate of 30 lb N ac^{-1}, and N and P together applied at a rate of 30 lb N ac^{-1} and 12.5 lb P ac^{-1}) and placement (2x2 and in the row behind the subsoil shank) as subplots. Individual subplot size was 12 X 40 feet. Each treatment was replicated four times for a total of 96 plots with one location in Headland, Alabama at the Wiregrass Research and Extension Center and another location in Tifton, Georgia at the Lang Farm. The results from the Alabama location will only be presented in this report. With the exception of starter fertilizer applications, normal agronomic and pest management practices were administered to maximize peanut production. Data collection included yield, percent total sound mature kernels, and whole plant biomass samples approximately 4 weeks after planting to measure biomass. All data were analyzed separately within year with all fixed effects and interactions considered different if Pr > F was equal to or less than 0.1.

In 2008, an interaction was observed between planting date and tillage systems for peanut yield. Strip tillage peanuts from the first planting date and conventional tillage peanuts from the second planting date averaged 14% greater yields compared to the other planting date and tillage combinations. Fertilizer sources and placement only slightly affected yields with N and N + P

applied in a 2x2 band superior to the other fertilizer and placement combinations. Total sound mature kernels, a measure of peanut quality, were maximized in the conventional tillage peanuts from the first planting date, however, as previously mentioned, this treatment did not correspond to the highest yields. Early season plant biomass samples from the conventional tillage plots were 58% greater than samples from the strip tillage plots, regardless of the planting date. The difference between tillage systems was greatest for the second planting date. As with yield, fertilizer source and placement had a slight effect on early season plant biomass. N+P applied in a 2x2 band produced the highest early season plant biomass.

In 2009, the interaction between planting date and tillage systems was again observed for peanut yields, but the results were drastically different. Conventional tillage peanut yields from the second planting date were 20% higher compared to all other combinations. A clear explanation does not exist why the conventional peanuts were superior, but the 2009 growing season was extremely wet, which could have been detrimental for peanuts grown in a strip tillage system that typically retains more soil moisture than conventional tillage systems. Total sound mature kernels were also highest in conventional tillage peanuts from the second planting date with a difference over 1.5% compared to the other tillage and planting date combinations. Fertilizer source and placement also affected total sound mature kernels, but it appeared that deep tillage associated with deep placement resulted in the highest total sound mature kernels. Unfortunately, plant samples from the second planting date were not collected in 2009. As a result, the analysis of early season plant biomass was limited to the first planting date. Early season plant biomass from the strip tillage system was 14% greater than biomass from the conventional tillage system. It appears that the additional plant biomass did not translate into increased peanut yields, however, a complete analysis is not possible. N+P in a 2x2 band produced superior early season plant biomass compared to all other combinations.

The peanut cultivar (Georgia 03L) chosen for this experiment represents many of the new cultivars available to growers, however, Georgia 03L will no longer be commercially available. These new cultivars possess highly resistant disease packages compared to cultivars utilized in the past. As a result, expected benefits associated with starter fertilizers with earlier planting dates could have been overshadowed by the hardiness of the new cultivar. These findings do not provide strong evidence for the use of starter fertilizers in peanut production, but this summary only represents the findings at one location over two years. The results from the Georgia location will be examined in the future to determine how well they agree with findings from Alabama, as well as, examining results from on-going experiments related to starter fertilizer use in peanuts.