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Conservation Systems in the Southeast

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INTERPRETIVE SUMMARY

This presentation describes how conservation systems that include non-inversion tillage and cover crops, a key component of conservation systems, are managed in the Southeast to maximize benefits. Benefits include weed suppression, moisture conservation, and increased organic matter contents. Management techniques focus on planting dates, fertilization, termination dates, and equipment modifications to facilitate successful adoption of conservation systems with high residue cover crops in the Southeast.

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Nitrogen Rates for Biomass Sorghum Production Across Tillage Systems.

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ABSTRACT

Biomass yields and nutrient removal across different tillage systems and nitrogen rates are not well established for forage sorghum (*Sorghum bicolor* L. Moench) grown as an energy source in the Southeast. An experiment was initiated in long-term conventional and conservation tillage systems o a Compass loamy sand to determine total dry matter (TDM) production and selected nutrient uptake across six different N rates (0, 34, 67, 101, 134, 168 kg ha^{-1}) and two sorghum cultivars, photoperiod sensitive (ES 5200) and a non-photoperiod sensitive sweet sorghum (Sugar T) with four replications. Total dry matter yields averaged 16.3 Mg ha^{-1} (2010), 15.4 Mg ha^{-1} (2011) and 16.5 Mg ha^{-1} (2012) across rates, tillage systems, and cultivars. Preliminary optimum N fertilizer rates were between 101 and 134 k N ha^{-1}. Nitrogen uptake was highest in 2010 (148.8 kg ha^{-1} compared to 2011 (99.3 kg ha^{-1}) and 2012 (110.4 kg ha^{-1}), but was not consistent across tillage systems. Phosphorus uptake for the top three N rates increased 21% compared to no N, but this was only observed for ES 5200. Potassium uptake was 22% greater in 201 (162.2kg ha^{-1} compared to 2011 (132.8 kg ha^{-1}), but was inconsistent across tillage systems and sorghum cultivars. However, preliminary results indicate that root knot nematode (*Meloidogyne incognita* numbers were increased under the ES 5200 cultivar. As a result, TDM yields for this cultivar were consistent, but much lower than expected. This study is an on-going study with one more year of data collection planned. Results to date have shown some inconsistencies that may be attributed to the nematode pressure observed with the E 520 cultivar, but results for the sweet sorghum cultivar appear to be unaffected by nematodes.

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Cotton Population and Yield following Rye and Crimson Clover Termination with Roller/Crimper and Herbicides in an Alabama No-till System

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ABSTRACT

Cover crops are an essential component of no-till agriculture and because of important benefits such as improved soil quality, weed control and moisture conservation, the use of cover crops has been increasing. Typically, under optimal weather conditions, a three week time period, after rolling/crimping, is required to achieve termination rates above 90% and eliminate competition between the cover crop and cash crop for soil moisture. A common method to enhance the cover crop termination process and keep recommended cash crop planting dates is to apply a herbicide in addition to rolling. However, synthetic herbicides cannot be used in organic production, thus approved organic herbicides may be used. The objectives of this experiment were to determine the effectiveness of terminating rye (Secale cereale L.) and crimson clover (Trifolium incarnatum L.) utilizing an experimental two-stage roller and three different types and application rates of herbicides on cover crop termination rates, cotton (Gossypium hirsutum L.) population and yield during the 2009 and 2010 growing seasons in central Alabama. Each herbicide (glyphosate and two organic herbicides: Weed-Zap and vinegar 20% acidity) was applied as a continuous spray, every second crimp and every third crimp through a high speed solenoid nozzle system. Cover crop termination rates were assessed at rolling and one, two, and three weeks after rolling. Volumetric moisture contents were measured using a portable time domain reflectometry (TDR) probe during each week following cover crop termination. In 2009, rye produced 8,400 lbs/ac and crimson clover generated 5,900 lbs/ac of dry biomass. In 2010, biomass for both cover crops was substantially lower (3,500 lbs/ac for rye and 3,100 lbs/ac for crimson clover) due to below freezing temperatures and excess precipitation in January. Results indicate that rye termination rates were above 95% for all rolling treatments three weeks after the rolling operation. In both years applying glyphosate with rolling helped to increase rye termination near 100% two weeks after rolling. In contrast, organic herbicides did not increase cover crop termination compared to roller alone. In 2009, three weeks after rolling, termination rates for crimson clover were lower (80%) due to higher soil available moisture during the evaluation period. The termination process can be faster with continuous or reduced supplemental applications of glyphosate compared to the roller alone, but this was not observed with organic herbicides. Applying organic herbicides did not increase the termination process compared with the roller/crimper alone. Herbicide application amounts were reduced by 31% for every second crimp and 42% for every third crimp compared with the continuous rate. In 2009, there was no difference in cotton population following rye and crimson clover averaging 41,000 plants/ac. In contrast, cotton population following rye was significantly lower (24,000 plants/ac) compared to crimson clover (42,000 plants/ac) in 2010 and might be associated with limited soil coverage due to reduced biomass, high temperature, and a lack of rainfall during the emergence period. Cotton yield following rye was significantly higher and produced more bolls compared to crimson clover. This difference could be attributed to nitrogen released by crimson clover that

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promoted vegetative growth and limited reproductive development. Cotton plants following crimson clover were also taller compared to rye. In 2009, seed cotton yields were 3,100 lbs./ac, and 2,500 lbs/ac, following rye and crimson clover, respectively. In 2010, a rainfall deficit and high temperatures negatively impacted cotton yield and substantially reduced yields compared to 2009 (1,600 lbs/ac following rye and 1,450 lbs/ac following crimson clover). Overall, rolling treatments did not affect cotton population and yield. In contrast, cotton population and yield were affected by different weather conditions during these two growing seasons of 2009 and 2010.