TILLAGE EFFECT ON EARLY GROWTH AND NUTRIENT ACCUMULATION Philip J. Bauer Thomas F. Ducey Laurel Kluber USDA-ARS Florence, SC

<u>Abstract</u>

Conservation tillage is widely used in cotton production (Gossypium hirsutum L.). A review of the literature suggests optimizing production with conservation tillage management may require some modifications to nutrient management programs. Nitrogen, phosphorus, potassium, and sulfur are the four nutrients most affected by changes in tillage management. Lack of soil mixing with tillage causes slower decomposition of residues and results in a lower availability of nitrogen and sulfur in conservation tillage systems. Lack of soil mixing also results in immobile nutrients (phosphorus and potassium) accumulating on the soil surface with repeated fertilizer applications. Tillage also affects the arbuscular mycorrhizae that live in a symbiotic relationship with the plant on the roots. Arbuscular mycorrhizae influence plant nutrient uptake, particularly phosphorus. Additionally, yield potential can be higher with conservation tillage (due to more available soil water). Studies have found higher optimal applied nitrogen and potassium rates with conservation tillage because of higher yield potential. To investigate the effect of tillage on early season cotton growth and nutrient accumulation on coastal plain soils, we conducted an experiment in 2012 and 2013 to investigate biomass and nutrient accumulation of cotton early in the season. Using plots that were established in 1978 to compare conventional to conservation tillage, plant biomass and nutrient concentrations in whole cotton plants were measured for eight weeks at two week intervals beginning approximately two weeks after emergence. In the two years of this study, there was little difference between the two tillage systems for plant biomass at any sampling time. Similarly, concentrations of most nutrients (including nitrogen and potassium) in the plant tissues were not affected by tillage. Phosphorus and sulfur concentrations of the plants were impacted by tillage. Cotton grown with conservation tillage had higher concentrations of phosphorus but lower concentrations of sulfur than conventional tillage at most sampling dates in each year.