

EVALUATION OF COVER CROPPING AND TILLAGE MANAGEMENT ON SOIL HEALTH AND COTTON PRODUCTION IN A SEMI-ARID ENVIRONMENT**Katie L. Lewis****Paul DeLaune****Wayne Keeling****Texas A&M AgriLife Research****Abstract**

Semi-arid production regions of Texas are challenged with maintaining crop production under depleting ground water resources and diminishing soil health. Deficit irrigation combined with cultural practices that enhance soil health are two broad strategies that will likely optimize inputs and maximize nutrient and water-use efficiencies possibly making dryland farming more profitable. In order to enhance the longevity and economic viability of crop production, conservation tillage, crop rotation, and cover crop practices must be implemented. When optimized for regional conditions, these practices should conserve water and soil resources through increased water holding capacity and soil organic C (SOC), which thereby reduces irrigation water requirements, while also improving soil health. Increasing SOC content will likely enhance aggregate formation and reduce soil degradation, erosion, and compaction, and thus increase water and nutrient availability to plants and microorganisms as well as the soils capacity for C sequestration in long-term cropping systems. Demonstration of these conservation practices is vital for ensuring the productive capacity of soil in semi-arid farming regions. Management practices for improving soil health are successfully being demonstrated in an intensive monoculture cotton cropping system in Lamesa, TX. These practices, including conservation tillage and rye cover were implemented 17 years ago. Soil organic C in the top 10 cm has nearly doubled using conservation tillage and rye cover compared to conventional practices. Following irrigation and rain events, reduced tillage and cover cropping enabled the soil to retain and store greater moisture when there is a tendency for greater percolation particularly in a sandy soil. According to the Soil Health Test, conservation practices have increased the soil health rating and the soil's nutrient value. Cover crop biomass on a dry weight basis under rye cover (3,413 kg DM ha⁻¹) was much greater than under mixed cover (2,015 kg DM ha⁻¹). Cover crop and conservation tillage did not affect cotton lint yield or quality.