WATER SAVINGS AND IMPROVED YIELD STABILITY FOR IRRIGATED AND NON-IRRIGATED COTTON

Russell C. Nuti
Ronald B. Sorensen
USDA-ARS, National Peanut Research Laboratory
Dawson, GA
Clinton C. Truman
USDA-ARS, Southeast Watershed Research Laboratory
Tifton, GA
Marshall C. Lamb
USDA-ARS, National Peanut Research Laboratory
Dawson, GA

Abstract

The Southeast U.S. receives 130 cm of annual rainfall, however cotton production is still limited by water. Irrigation, when available, is used to supplement natural precipitation to sustain profitable crop production. Increased water capture would improve water use efficiency and reduce irrigation requirements, thus reducing input costs. Furrow diking is a cost effective management practice that is designed to create a series of depressional storage basins in the furrow between crop rows to catch and retain rainfall and/or irrigation water. Furrow diking has been widely accepted and adopted in arid regions, but has not been adapted for cotton production in the Southeast. The objective of this study was to compare water use efficiency between furrow diked and non-diked cotton in Southwest Georgia. Studies were conducted in irrigated and non-irrigated cotton each year from 2005-2007 at two locations. Water availability (soil water potential) was used to base irrigation timing and validate variability in water capture. In rainfall simulation, furrow diking reduced runoff and erosion by 3.5 times compared to non-diked cotton. Based on rainfall simulation (equal amount over time), furrow diking increased infiltration by 38%, resulting in 7.1 days of estimated plant available water for diked plots and only 3.9 days of estimated plant available water for non-diked plots. The first year of the study had more than average rainfall and all irrigated treatments produced similar yield and net returns. In 2006 and 2007, irrigated furrow diked cotton required an average of 3 inches less water to produce similar cotton yield and net returns. Furrow diking showed an average response over 4 irrigation rates by improving cotton yield by 152 lb/A in 2006. In 2006, furrow diking irrigated cotton improved net return as much as $160/A and improved non-irrigated yield by 58%.