

Agronomic and Ecological Effects of Innovative and Traditional Cropping Systems

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ABSTRACT

Recently developed agricultural practices have each been shown to result in improvements in crop productivity, soil quality, and/or environmental conservation. However, few studies have examined the agronomic and ecological effects of these innovative production practices when used as part of a wholistic cropping system. In this long-term field experiment, we monitored site-specific changes in crop productivity, soil chemical and physical properties, and pest populations resulting from the use of a conservation-tillage (CT) and a traditional-tillage (TT) system. In addition, we measured the effects of these two cropping systems on sediment, nutrient, and surface water runoff. This study was conducted from 1998 through 2005 using a split-field comparison at the Clemson University Pee Dee Research and Education Center in Florence, SC. A 14-acre field was split in half, with one half of the field receiving traditional production practices (disking, in-row subsoiling, traditional herbicides, single rate application of P) and the other a conservation-tillage production system (no surface tillage, broadcast deep tillage, Roundup Ready herbicide program, precision application of P). Changes in soil nutrient levels and nematode populations in the top 6-in of soil were monitored by taking soil samples on a 50-ft grid basis on both sides of the field. Corn (*Zea mays* L.) was planted in the study in 1999, 2001, and 2003 and cotton (*Gossypium hirsutum* L.) in 2000, 2002, and 2004. Cotton lint and corn grain yields were measured using commercially available yield monitors and GPS. Red imported fire ant mounds were located and marked using GPS following both planting and harvest of each crop. Nutrient, sediment, and water runoff were measured at three locations on each side of the field. Agronomic, soil quality, environmental, and ecological results from this long-term study will be discussed.