CHANGES IN SOIL P LEVELS WITH INNOVATIVE AND TRADITIONAL CROPPING SYSTEMS

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ABSTRACT

Most agricultural fields on the southeastern Coastal Plain contain a diversity of soil types, resulting in a wide-range of crop productivity and consequently, soil fertility levels across the landscape. Conservation tillage results in the accumulation of P near the soil surface, thereby making it susceptible to offsite movement in runoff water. Thus, low-yielding areas of fields planted with conservation tillage may be a significant source of P in runoff water. However, these areas should also show the greatest benefit from the precision application of P fertilizer. In this study, we monitored site-specific changes in soil fertility levels resulting from the use of conservation-tillage (CT) and traditional-tillage (TT) systems. 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) and the other a conservation-tillage production system (no surface tillage, broadcast deep tillage, Roundup Ready herbicide program). Phosphorus was precision applied on the CT side of the field based upon soil samples taken on a 50-ft grid basis and applied on the TT side of the field at a rate based upon a bulk soil sample taken across that side of the field. Corn (*Zea mays* L.) was planted in the study in 1999, 2001, 2003 and cotton (*Gossypium hirsutum* L.) in 2000, 2002, 2004. Phosphorus was the only nutrient we found that could be precision applied. Initially, there were areas high in soil P (greater than 100 lbs/acre) on both sides of the field. These were either low-yielding areas or areas where water ponded after major rainfall events. On the TT side, those areas remained high in soil P for the duration of the study. Other areas in the TT side became deficient in soil P over time. In contrast, areas of the CT side became more uniform in soil P over time, near the 50 to 60 lb/acre level. Results showed precision application of P can effectively reduce soil P to acceptable levels when conservation tillage practices are used on the southeastern Coastal Plain.