## YIELD AND WEED CONTROL IN CONVENTIONAL AND ROUNDUP READY® COTTON-CORN ROTATED UNDER CONSERVATION TILLAGE IN THE MISSISSIPPI DELTA K.N. Reddy, M.A. Locke and R.M. Zablotowicz USDA-ARS Southern Weed Science Research Unit Stoneville, MS

## **Abstract**

In recent years, profit margins in cotton production have declined due to high production costs, low commodity prices, and stagnant yields. Farmers are looking for ways to survive financially by increasing their production efficiency. There is an urgent need to find profitable crop production systems that increase crop yields without greatly increasing production costs. Recently, there has been renewed interest in producing cotton in a rotation system to overcome chemical and biological factors associated with a yield plateau that occur in continuous cotton production system. This study examines the effects of rotating conventional and Roundup Ready® corton with conventional and Roundup Ready® cort on soil properties, weed control, and yield.

A field experiment was conducted in 2000 and 2001 at the USDA-ARS Southern Weed Science Research farm, Stoneville, MS on a Dundee silt loam (pH 6.7 and 1.1% organic matter). The experiment was conducted in a randomized complete block design with four replications. The plot size was eight, 40-inch rows, 150 feet long. Rotation systems were continuous cotton, continuous corn, cotton-corn, and corn-cotton. There was one set of treatments for each conventional cotton-corn and Roundup Ready® cotton-corn rotation system. Field preparation consisted of fall subsoiling, disking, and bedding in 1999. The entire experimental area was maintained under conservation tillage from the fall of 2000. The identity of the 40-inch spaced beds was maintained. The tillage operations consisted of fall subsoiling and re-bedding. In the spring (2000 and 2001), the experimental area was treated with Gramoxone Extra (1.6 qt/A) to kill existing vegetation prior to planting crops. Cotton 'Stoneville 474' and 'DP 436RR' were planted on May 11, 2000 and April 18, 2001. Corn 'Pioneer 3223' and 'RX 738/740 RR' were planed on April 7, 2000 and March 22, 2001. Crops were furrow irrigated as needed.

Herbicide programs consisted of Cotoran (3 pt/A) plus Prowl (2.4 pt/A) PRE followed by Staple (1.2 oz/A) POST in conventional cotton, and Cotoran (3 pt/A) plus Prowl (2.4 pt/A) PRE followed by Roundup Ultra (2 pt/A) POST in Roundup Ready® cotton. In conventional corn, Bicep II Magnum (2.1 qt/A) PRE was followed by Bicep II Magnum (1.1 qt/A) POST, and in Roundup Ready® corn, Roundup Ultra (1.5 pt/A) early POST followed by Roundup Ultra (2 pt/A) late POST with no PRE herbicides. PRE herbicides were applied broadcast at planting. Early POST and late POST herbicides were applied 3-4 and 5-6 wk after planting, respectively.

Control of barnyardgrass, browntop millet, broadleaf signalgrass, southern crabgrass, common purslane, hyssop spurge, pitted morningglory, prickly sida, sicklepod, smooth pigweed, and yellow nutsedge in cotton and corn was 90% or higher regardless of herbicide program. In 2001 (2<sup>nd</sup> year of study), soil organic matter was similar in all rotation systems, whereas soil pH was lowest in continuous cotton compared to continuous corn, cotton-corn, or corn-cotton systems. Plant populations of both conventional and Roundup Ready® cotton rotated with corn were similar to that of continuous cotton suggesting that cotton stand establishment was not affected by plant residues from the previous corn crop.

Observations from two years indicate that cotton yield following rotation with corn increased by 10% in the conventional cultivar and by 19% in the Roundup Ready® cultivar compared to continuous cotton. Corn yield also increased by 12% in the conventional cultivar and by 5% in the Roundup Ready® cultivar when rotated with cotton. These results indicate that the rotational system provides an opportunity to increase both cotton and corn yield over a mono-cropping system without increasing input costs. Long-term impact of cotton-corn rotation on soil properties, soil microbial populations, weed species and population shifts, and crop yield as compared to mono-cropping system is being investigated.