with an average lint yield of 939 lb/A/yr where cotton followed cotton and 1047 lb/A/yr for cotton following corn. The response to rotation has ranged from an -5.1% to +50.1% with an average response of 11.4% (108 lb/A/yr).

Several factors have affected the rotational benefits with the primary influence coming from climate/weather related phenomena. Specifics included rainfall total and distribution, solar radiation and cloudiness, humidity and wind (air movement), and physical limitations such as drainage or irrigation. During the time of these studies, rainfall in August has set all time records for the least (0.0 in, 2000) and most (8.47 in, 2001) in back-to-back years. Total rainfall has ranged from more than 18 inches above normal to more than 13 inches below normal for the region. There has also been as much as ten inches difference between the locations in the same year leading to different response in the same year. The DREC location has had more problems with timely irrigation and severe insect infestations compared to the TSF location. The largest rotational responses (percent) have occurred in years where severe droughts occurred and where irrigation was not timely or sufficient. In other years, excessive rainfall and the associated cloudy days resulted in photosynthetic stress and subsequent fruit shed. Heavy vegetative growth has also resulted in severe boll rot that was more pronounced in cotton following corn compared to cotton following cotton. Production-related problems such as delayed planting (related to harvest windows), weed competition in rotation system, antagonistic pesticides, and pesticide drift have also contributed to variations from year to year. In rotations, some residual herbicides cannot be used due to the potential for carryover in following crops. Increased pressure from perennial grasses such as bermudagrass and johnsongrass has resulted in lower yields for cotton following corn as compared to cotton following cotton. Many of the problems have been cleaned up in the second year of cotton following corn. Bio-technology offers some solutions for the problems that have been identified and have been incorporated into the studies. In the last two years, the dynamics of rootknot and reniform nematodes has become the center of attention. Rotations involving corn lead to a decrease in reniform nematodes in many cases.

▸ Soil Acidity And pH As Influenced By N-Fertilization And Irrigation

Presented by Dr. J. Scott McConnell
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Soil pH is an indicator of soil acidity and is the single most informative soil test regarding the overall productivity of a field. pH-values below seven are considered to be acidic; pH-values near seven are considered neutral; and pH-values greater than seven are considered basic. pH is calculated using logarithmic p-functions. The p-function is the logarithm of a number multiplied by negative one. Therefore, the pH of a system is the negative logarithm of the hydrogen ion concentration. Acid soils are typically defined as having soil pH values less than optimum for plant growth. Generally, soils with pH values below 5.5 tend to impede plant growth. The source of soil acidity may be classed as either geologic or agricultural. Geologic soil acidity results from the weathering of sulfide and aluminum bearing minerals. Agriculturally produced soil acidity may be generated from the application of ammoniacal-nitrogen fertilizers, sulfur and sulfide fertilizers, and the removal of basic cations of the soil with crop harvest. Irrigation water with high salt content is known to add basic cations to soils and thereby raise the soil pH and reduce the soil acidity. Caution should be exercised in the use of soil pH values. Since pH is a logarithmic function, it may not be averaged, but must be converted to acidity for statistical analysis.

Long-terms studies were conducted to determine the effect of ammoniacal-nitrogen fertilizer treatments in conjunction with irrigation methods on cotton. These studies were conducted in side-by-side irrigation blocks at the Southeast Branch Experiment Station at

Rohwer, Arkansas, on an Hebert silt loam (fine-silty, mixed, thermic Aeric Ochraqualfs) soil. This test, the McConnell - Mitchell Plots, is the oldest continuous test in Arkansas. The irrigation method reported is furrow flow (FI) and was compared to a dry land (DL) control. Nitrogen treatments reported within each block are 0-, 60-, and 120 lb N/acre. Nitrogen treatments were first applied in 1982 and continued through1999; discontinued from 2000 through 2003; then resumed in 2004. Soil samples were taken in the early spring prior to N-fertilization from depths of 0 to 6 inches and 6 to 12 inches. The samples from three replicates of each N-treatment from both blocks were analyzed for pH. The calcium, sodium and bicarbonate content of the irrigation water at the test site had the potential to drive the soil pH up. Fertilization with ammoniacal nitrogen sources has the potential to reduce soil pH. Soil pH was monitored over the duration of the experiment to determine the irrigation and N-fertilization treatment effects on soil acidity.

Initially, in 1982, the soil pH of the test site was uniform with an average pH of 5.8 in both the 0 to 6 inch and 6 to 12 inch depth. As the study progressed differences in soil pH were observed as a consequence of both N-fertilization and irrigation. Soil samples taken in the spring of 1985 showed increases in pH in the FI block, ranging from 6.3 to 6.7. No change in pH was observed in the DL block. N-fertilization apparently negated some of the irrigation effect in the FI block. The pH of soil treated with 120 lb N/acre was approximately 6.0, while the pH of the unfertilized plots was approximately 6.9. No significant effect was observed in the DL due to N-fertilization. Trends similar to 1985 were observed when the 1990 samples were analyzed. The elevated pH observed in the FI block during 1985 remained higher in 1990 than values initially observed in 1982. The soil pH of DL block was further reduced from 1985, ranging from 5.3 to 5.4. The greatest N-treatment, 120 lb N/acre, produced the lowest soil pH, 4.8. Changes in soil pH in 1995 and 2000 were similar to those observed in 1990. Samples taken from the DL block indicated the soil was continuing to acidify, particularly when N-fertilization rates were high. Samples taken from the FI block indicate that irrigation was preventing rapid soil acidification. Soil pH in the FI block was greater than the DL both in 1995 and in 2000. The soil pH of the FI block trended lower with increasing N-rate in 1995 and 2000. The lowest pH was observed in this study occurred in 2000 in DL soil treated with 120 lb N/acre. This soil pH, 4.2, was substantially lower than the initial, background pH found eighteen years earlier.

Fertilizer N-treatments were discontinued for the 2000 through 2003 growing seasons to further examine the changes on soil properties and plant growth characteristics of cotton. Irrigation treatments were continued all years throughout the 2000 to 2003 growing seasons. Prior to resuming N-fertilizer applications in 2004, soils were sampled and analyzed. These samples indicate a slight increase in soil pH in the DL block compared to 2000. Soil samples taken from the FI block indicated a reasonably stable pH compared to 2000 and 1995, although suspending the 120 lb N/acre treatment may have resulted in a slightly higher pH.

▸ Management Strategies Against Southern Root-Knot And Reniform Nematodes In Cotton

Presented by Dr. Charles Overstreet
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Nematodes continue to be one of the major pest problems that cause major losses each year to cotton. The two most important nematodes in the mid-South include the Southern root-knot and reniform nematodes. The root-knot nematode has been a problem since cotton was grown in this country but reniform has only developed into a major pest within the last 50 years. Losses can range from 5-10% in fields that show little if any symptoms