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Long-term Nitrogen Fertilization Effects on Corn Yields and Soil Properties

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Larry Bundy, Todd Andraski and Jeff Osterhaus have recently reported on a long-term nitrogen fertility study with continuous corn conducted at the Arlington Research Station. This study was started in 1958 by Art Peterson and is still on going. Three nitrogen rates (none, medium, and high) have been used throughout the study. The medium and high rates have changed over time and are currently 125 and 250 lb N/acre. In 1985, lime was added to one-half the plots to raise the pH to 6.5 to 7.0.

This long-term study has documented the effects of long-term N fertilization and liming on productivity and soil fertility parameters. The researchers measured yield, soil nitrogen and carbon, cation exchange capacity (CEC), and pH.

This study has found a number of interesting results and are summarized below:

- Long-term nitrogen fertilization increased soil organic carbon and nitrogen content, and N availability.
- Nitrogen fertilization decreased pH and CEC in un-limed plots but increased where lime was used. CEC is a measure of nutrient holding capacity and is an important soil parameter to long-term soil productivity.

Corn yields have doubled in the 45-year history of these plots where N was added and also increased in the plots where lime was added. In addition there was no indication of decline in corn yields over this time period and in fact the highest yields have occurred in the last four years.