

Project Overview

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Major: Biological Systems Engineering

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Background

Following World War II and the availability of agricultural nitrogen (N) and irrigation systems, there has been documented evidence of increasing nitrate levels in the ground water. This problem is most severe in areas that have sandy soils with a shallow water table. Some wells have shown levels increasing at a rate of 1 ppm/year (Engberg and Spalding 1978). There are many health risks associated with heightened levels of nitrogen in drinking water which caused the Environmental Protection Agency to place a 10 ppm limit for nitrate on all public water supplies. The number of towns required to find alternative water sources or install water purification stations continues to increase, which is both difficult to manage and costly for many of Nebraska's smaller communities.

Summer Project

The overall goal for the pollution prevention research conducted in the summer of 2005 was to document the effectiveness of new farming practices that both maintain a high yield while decreasing the amount of nitrogen being percolated into the ground water. Specifically, the tasks included collecting data on water applied to crops, fertilizer used, and viability of the resultant corn crop.

The research activities included:

- Managing irrigation scheduling with Watermark® soil moisture sensor and tipping buckets,
- Documenting the effectiveness of a proprietary slow release fertilizer,
- Documenting the effectiveness of a proprietary cross-linked polymer in increasing water retention,
- Studying the effects of various forms of crop rotation on preventing nitrogen leeching,
- Studying the relationship between crop yield, N rate, and irrigation, and
- Documenting the effectiveness of compost on sandy soils.

Results

The intern's involvement was critical to the data collection to prove the proposed method of irrigation was viable and would save water, energy, and money without harming crop yield. Extrapolating the potential savings from this project alone to all applicable Nebraska producers, as much as **87 billion gallons** of irrigation water would be reduced, as well as **over 1 million MBTU/year** and the associated dollar savings of **\$73.5 million** from the operation of irrigation well pumps.