Wheat Profitability with Variable-Rate Applied Nitrogen

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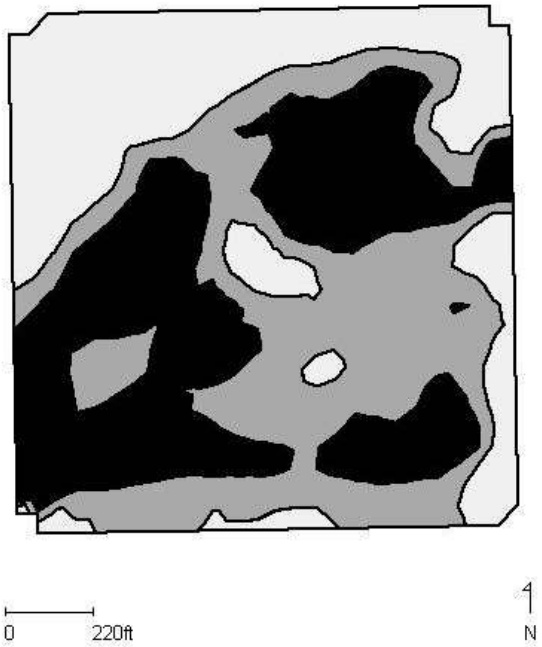
An increasing number of farmers have yield monitors on their combines that provide crop yield data. Farmers are collecting the data but aren't effectively using it for future crop management strategies. One strategy is to use yield maps, soils data and other geospatial data to precision-rate apply nitrogen in order to efficiently use N for increased crop yields while reducing N fertilizer costs. In 2002, the NDSU Carrington Research Extension Center began a precision ag project with the primary objective of answering the simple question "Are the results from variable-rate N fertilizer application to wheat more profitable compared to wheat performance by applying N based on a composite (traditional) soil test?" A second objective with the project is for NDSU staff to become familiar with the precision ag technology to assist farmers on practical applications.

A Carrington Center 33-acre, irrigated, seed production field was selected for this precision ag project. The field was soil sampled by one-half acre grids to gather an accurate and complete soil analysis database. Additional field data available included multi-year yield maps, a topography map, soil EC (generated using Veris technology), aerial and infrared photographs, and satellite images.

In 2006, urea was preplant applied at variable rates to one-half of the irrigated wheat field, while one N rate was applied to the other half of the field. The N rates were based on a fall 2005 composite soil test, 40 lb/acre N soil credit for the 2005 soybean crop, and a base yield goal of 56 bu/A. The 'check' half of the field received 60 lb N/acre while the variable rate half received 30, 60, or 90 lb N/acre. The N rate prescription map (map 1) was generated with the SMS (AgLeader Technology) computer program using 2003-05 yield data. The urea was custom applied by Mainline Agronomy, Eldridge. After harvest, a profit/loss map (map 2) was generated to compare the profitability of the study. Conclusions cannot be made on this first year of data.

Map 1. N prescription map: black = 90 lb, grey = 60, and white = 30 lb N/acre.



Map 2. Profit and loss map: black = high range, grey = mid-range, and white = low range]

This work at the Carrington Center will be continued in the future. Additional input data (e.g. soils, aerial photos, and satellite images) need to be utilized to increase the accuracy of the N prescription map and ultimately the profitability information.

The Carrington Center data will be added to a NDSU Extension Service Spatially-Managed Farms program that involves a database, initiated in 2005, from several farmers in the Carrington and Dickinson areas.