Variable fertilizer nitrogen application based on the Delta Yield index: a field study

Ivan O'Halloran, Peter A. von Bertoldi, Jason Cathcart, *Department of Land Resource Science, University of Guelph* and Keith Reid, Doug Aspinall and Adam Hayes *Ontario Ministry of Agriculture and Rural Affairs.*

Abstract

A quick review of the both the scientific and popular literature indicates that many different approaches have been suggested for the prediction of variable fertilizer N applications in the field. In previous meetings of this conference we have presented the general outline and approach taken for our site-specific crop management project in Ontario. Briefly, historical data sets of grain corn response trials to fertilizer N (encompassing some 300 site-years worth of data) indicated that most yield response curves were quadratic in nature. The data also clearly showed that the most economical rate of fertilizer N (MERN) application was poorly correlated to either maximum yield or economic yield, and these factors accounted for less than 15% of the observed variability in MERN. However, the delta yield (yield fertilized minus yield not fertilized) calculated at either the maximum yield or economic yield accounted for 50 to 75% of the variability observed in MERN. In addition, closer examination of the B and C coefficients from the quadratic equations (i.e. $Y = A + BN - CN^2$) indicated that these coefficients were not independent of one another. The significance of this observation is that by knowing the relationship between the two coefficients only two rates of N application are needed to predict MERN. Preliminary studies of the delta yield approach for predicting variable N application rates were quite promising. Thus, one objective of our project was to test this method across a wider range of soil, climatic and management conditions.

In the poster we provide a step by step guide as to how we developed a variable N application rate map for one of our 26 farm sites using the delta yield index. In the spring of 1997, variable fertilizer N rates were applied based on the delta yield data collected in 1995. Three adjacent strips (each strip is a planter width) were broken into segments based on the rate of fertilizer predicted by the delta yield approached. The adjacent segments were then randomly assigned to receive either a zero, variable or full fertilizer N application. (The full N rate represents what the producer typically uses.) Evaluation of the effectiveness of the approach at this site will be presented in the poster.

PROCEEDINGS OF THE TWENTY-SEVENTH

NORTH CENTRAL EXTENSION-INDUSTRY

SOIL FERTILITY CONFERENCE

Published for
The North Central Extension-Industry Soil Fertility Conference
by
Potash & Phosphate Institute
772 - 22nd Avenue, South
Brookings, SD 57006
605-692-6280

November 19-20, 1997

St. Louis Westport Holiday Inn
St. Louis, Missouri

Volume 13

Program Chairman and Editor:

Dr. Gary Hergert
University of Nebraska-Lincoln
Institute of Agriculture and Natural Resources
West Central Research & Extension Center
Route 4, Box 46A
North Platte, NE 69101