Use of Research and Modeling Information in Community-based Watershed Planning: Nutrient Management Demonstrations in the Maquoketa River Watershed

John Rodecap, Gerald Miller and Susan Brown, Iowa State University

Introduction

Nonpoint source nutrients are a concern in agricultural watersheds of the cornbelt. In the Maquoketa River basin, an 8-digit HUC watershed in Northeast Iowa, three years of intensive monitoring confirmed excessive nitrogen (N) and phosphorus (P) losses.

Extension involvement

With support from USDA CSREES and EPA Region 7, Iowa State University and University Extension have provided community development, education and technical assistance in targeted subwatersheds of the Maquoketa. Extension to communities specialists facilitated the formation of citizens watershed councils. Cooperating scientists and extension field specialists delivered information and education resources in response to the councils' requests.

Producer response

Participatory learning has empowered the councils to adopt their own nutrient delivery goals and prioritize nutrient and manure management practices for their watersheds. In order to evaluate the performance of these practices, producers have voluntarily been host to over 50 on-farm nutrient management demonstrations since 2001.

Impacts and Outcomes

- Participatory learning has empowered cooperators and their neighbors to set their own nutrient goals for the watershed.
- Demonstration results are widely publicized in the Maquoketa watershed and northeast Iowa via news releases, newsletters and presentations.
- Most cooperators and their neighbors have also participated in a targeted, two-year nutrient management education program. Over 50% of cropland in the watersheds is farmed by nutrient demonstration and education participants.
- An associated state and federally-funded watershed project has recognized the council's impact measured by a high rate of participation in cost shared practices.
- The results show how local action can build community capacity for performance-based, sustainable adoption of environmental goals and improved nutrient management practices in agricultural watersheds.

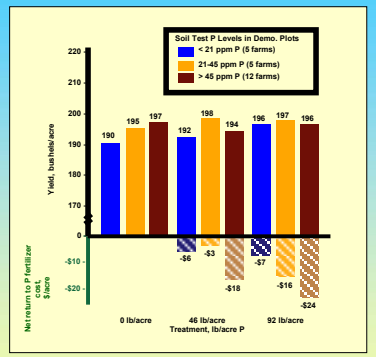
Phosphorus

In Iowa, P concentration in surface waters is ten-fold greater than the ecoregion nutrient criterion proposed by EPA.

P management issues in the watershed:
- Need for intensive, properly conducted soil testing.
- Education on P soil test analysis interpretation.
- Reducing P application rates on High and Very High testing soils.
- Take appropriate manure P credits.
- Excess dollars spent.

Applied P research and demonstrations – example:

The graph below summarizes results from 22 on-farm P management demonstrations during 2001-2003. Results document that P addition on High and Very High-testing soils is not economical, in addition contributes to a potential environmental problem.



Grower comment: If anyone does not understand the importance of phosphorus management following all that has been written and said, they have been completely tuned out.

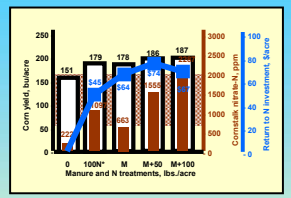
Manure

Only a small number of livestock producers were aggressively accounting for their manure nutrients.

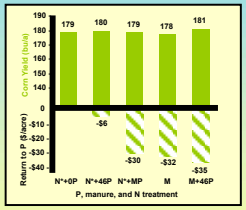
Manure management issues in the watershed:
- Developing confidence in manure as a nutrient resource.
- Taking a representative manure sample for analysis
- Analysis interpretation and crediting.
- Determining application rate and uniform manure application

Applied research and demonstrations – example:

For management demonstrations, manure nutrients were analyzed and cooperators' applicators calibrated. At each site, the basis of comparison is the cooperator's normal manure application rate (M). Variations included adding commercial N and P. Direct comparison of commercial nutrients to their manure analysis gives producers more confidence in the demonstration results.



Corn yield, end-of-season cornstalk nitrate-N and return to nutrient investment from 20 manure demonstrations, 2000-03. Corn at $2.40 per bushel and N at $.20 per pound. N*Indicates 100 pounds N per acre on corn following soybean, 150 pounds N per acre on continuous corn. First-year crop available manure N averaged 133 pounds per acre.



Return to P fertilizer investment from 20 manure demonstration sites, 2000-2003, using $0.23 cents per pound P, $2.40 per bushel corn. N* indicates 100 pounds N per acre on corn following soybean, 150 pounds N per acre on continuous corn. Manure P averaged 139 pounds per acre. Commercial P at 46 pounds per acre is the one-year removal rate.

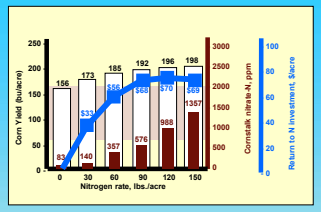
Grower comment: I reduced my manure spreading rate in half to cover twice the acreage as a result of manure spreader calibration and manure analysis.

Nitrogen

As corn yields increase it is natural to assume considerably more N will be required for corn production.

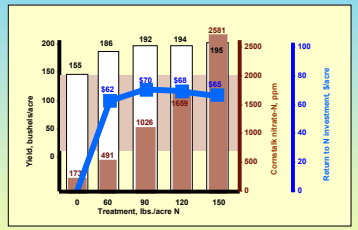
Nitrogen management issues in the watershed:
- Typical nitrogen investment for corn following soybean was $30+ per acre.
- Elevated nitrates in drinking water has long been identified as a concern.
- Nitrogen pricing encourages fall application.

Applied research and demonstrations - example:



Replicated multiple N treatments were applied to 19 small plot corn-following-soybean demonstrations, 2000-2003. Corn yield, cornstalk nitrate-N and return to N investment. Corn priced at $2.40 per bushel, N at $0.20 per pound.

The Iowa Corn Growers Association has partnered financially to encourage their members to compare N rates using GIS/GPS in field-scale N management demonstrations. Corn yield, cornstalk nitrate-N and return to N investment results from 13 field-scale N demonstrations, 2002-03.



Grower comment: A producer advised by his crop consultant to use 160 pounds of N per acre had a peak yield in his N-rate demonstration at 90 pounds per acre. The 70 pounds extra N at $.15/lb on 900 acres equaled $9,450. He said, "I am anxious to discuss these results with my consultant."

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Further information - http://extension.agron.iastate.edu/waterquality/projects/maquoketa.html

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