



# Water Watch

A newsletter for the Maquoketa River Watershed

## Project news

### Corn-following-soybean trials yield over 200 bushels per acre

by Chad Ingels, nutrient and manure management specialist, Maquoketa Watershed Project

Between 1995 and 2000, the number of acres planted to soybeans in the eight counties that the Maquoketa River flows through has increased from 389,000 acres to 668,000 acres.

Growers have added soybeans to their rotation in response to the farm program and commodity prices, and some use the rotation to break weed, insect and disease cycles associated with continuous corn production. An added benefit is the reduced amount of nitrogen needed for corn following soybeans in the rotation.

During the last two crop seasons nine Maquoketa River Watershed producers have hosted various rates of nitrogen (N) and phosphorus (P) demonstrations on their farms. The corn following soybeans were fertilized with N rates of 0, 30, 60, 90, 120 and 150 pounds per acre. These sites also had replicated treatments of P<sub>2</sub>O<sub>5</sub> at 0, 46 (crop removal) and 92 (twice crop removal) pounds per acre. Two demonstrations in the Onslow area, a garden spot this season, had

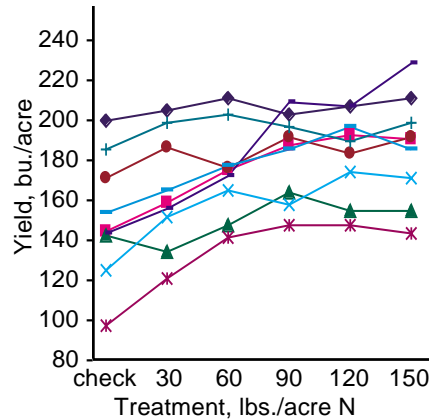


Figure 1. Corn yields for nine sites, corn following soybeans, crop years 2000-01.

treatment averages more than 200 bushels per acre up to 229 bushels per acre as indicated in figures 1 and 2.

The average return to dollars spent for N fertilizer (at 20 cents per pound of N) and corn at either \$2.00 or \$2.40 per bushel is shown in figure 3. The largest return to N fertilizer was the 90 pounds N per acre rate due to the increasing total cost of N and declining yield response with additional N input.

Residual N in the cornstalks

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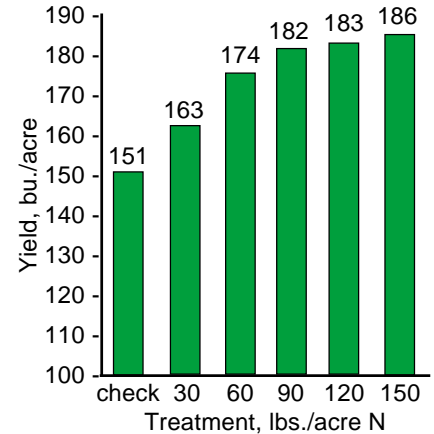


Figure 2. Nine-site average corn yields, corn following soybeans, crop years 2000-01.

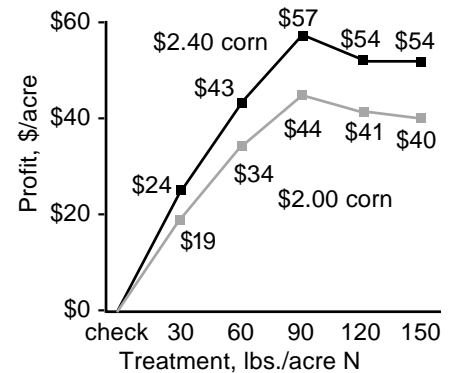
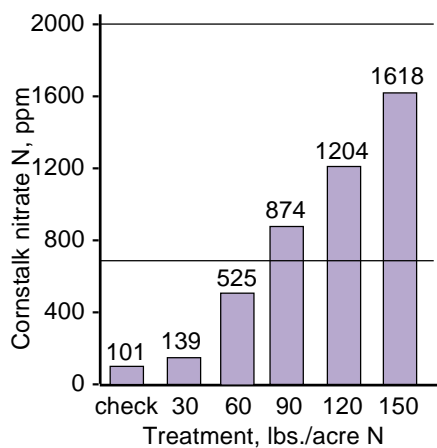


Figure 3. Profitability of additional N (N at \$0.20 per pound and corn at \$2.00 and \$2.40 a bushel).

## Corn-following, cont.

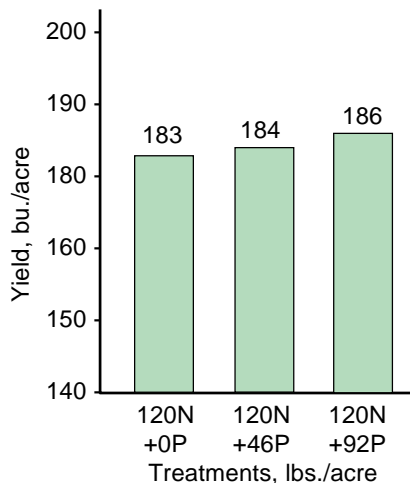
following maturity was measured for all N treatments as shown in figure 4. The check, 30 and 60 pounds N per acre treatment did not have enough N available to optimize corn production. Beginning at the 90 pounds N per acre rate and increasing to 1,618 parts per million (ppm) nitrate N with 150 pounds of N per acre applied, the stalk nitrate results were within the 700 to 2,000 ppm optimum range.



**Figure 4. Nine-site average corn-stalk nitrate N, crop years 2000-01. Optimum range of 700 to 2,000 ppm marked by lines.**

There was a very small yield response to the one- and two-year crop removal rates of added P, as

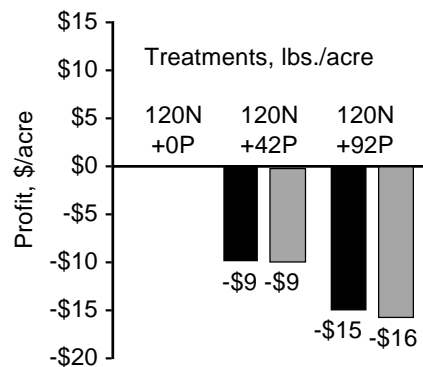
shown in figure 5. The cost of added P was significantly greater than the income from the additional corn yields, as shown in figure 6.



**Figure 5. Two-year average corn yields, corn-following-soybean phosphorus demonstrations.**

Iowa State University recommends fertilizing with P when soil tests fall below the high range (less than 21 ppm P), with an option to use a low rate of P in starter fertilizer when P tests are in the high soil test range.

One producer has said, "The days of wholesale fertilizer application are over, and we need to take a real look at the effective rates of fertilizer under various conditions."



**Figure 6. Corn value response to commercial P ( $P_2O_5$  at \$0.23 per pound, corn at \$2.00 and \$2.40 a bushel).**

A recent University of Illinois study showed that soil test levels as low as 20 ppm P with any commonly used tillage system will result in P in runoff water that is two times greater than the benchmark limit of 0.035 ppm set for lakes in Environmental Protection Agency Region 7.

Maquoketa Watershed Project staff extend their appreciation for hosting these demonstrations to Jule Brown, Joe Wingert, Gary Soules, Pauline Antons and Alan Jacobs, Neal and Kirby Paulson, Gary and Dan Bockensedt, John and Pete Kalb, and the Glen Janssen family.

## Refined manure management returns crop production profits

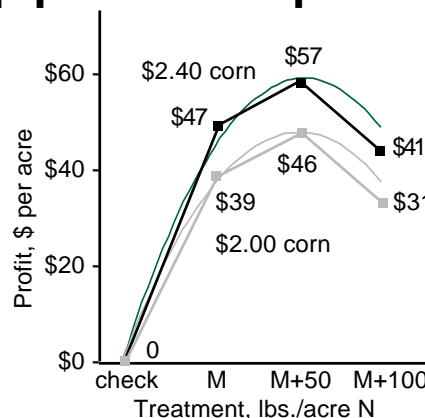
by Chad Ingels, nutrient and manure specialist, Maquoketa Watershed Project

Ten Maquoketa Watershed farmers have hosted on-farm manure management demonstrations during the last two crop seasons. Their average corn income when manure was the only nitrogen (N) and phosphorus (P) fertilizer source, compared with the zero check, resulted in increased gross corn income of \$39 per acre when corn was valued at \$2.00 a bushel and N at 20 cents a pound.

At \$2.40 per bushel corn, the improved yields from manure application resulted in \$47 per acre increased gross income, as shown in figure 1.

The average first-year crop-available N credits from manure averaged 150 pounds per acre for the 10 demonstrations.

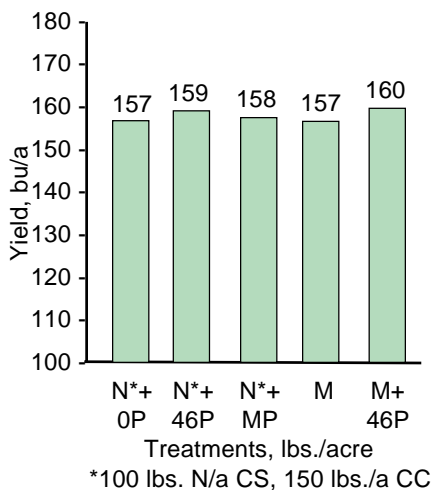
Because all demonstration farms had high or very high P tests on the manure demonstration sites,



**Figure 1. Profitability of additional N (N at \$0.20 per pound and corn at \$2.00 and \$2.40 a bushel).**

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## Refined manure, cont.



**Figure 2. Ten-site average corn yields, manure and phosphorus demonstrations, crop years 2000-01.**

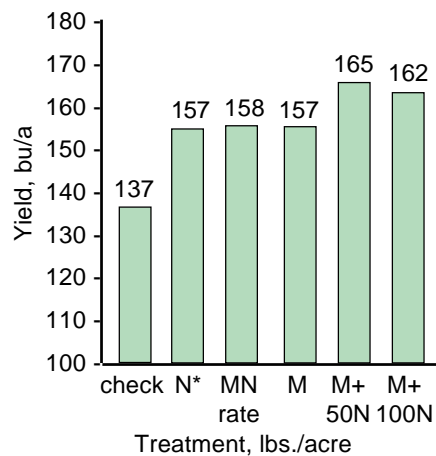
there was not a consistent yield response to the 214 pounds average per acre of P added in the manure resource, as shown in figure 2.

This result was expected due to the high to very high pre-demonstration soil tests for P. Thus, adding P fertilizer to these fields resulted in a net loss of income.

The manure N contribution was calculated using adjustment factors of field manure history and N loss from surface application versus manure incorporation.

Replicated treatments of commercial N applied at the first year crop available N rate (contribution) from the manure (MN rate) was applied randomly within each manure demonstration site. The equivalent N application resulted in an average corn yield of 157 bushels per acre from the manure N source and 158 bushels per acre from the commercial N application, as shown in figure 3.

The addition of 50 pounds of N to the manure application resulted in the highest average yield of 165



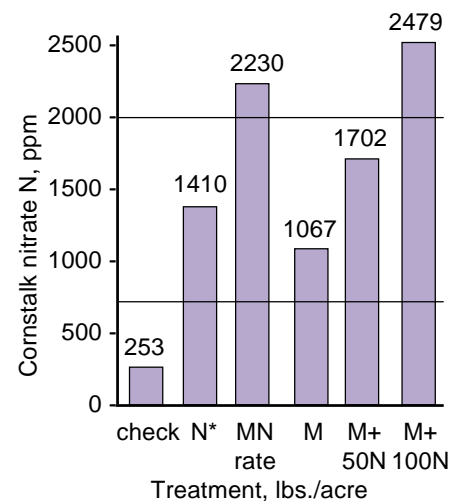
**Figure 3. Ten-site average corn yields, manure and nitrogen demonstrations, crop years 2000-01.**

bushels of corn per acre. The response to the additional N was most evident in the demonstrations where the manure N contribution was less than 100 pounds per acre. The higher N contribution from swine finishing manure applied in excess of 3,000 gallons per acre demonstrated no benefit from the additional N.

On average, when 100 pounds of N was added to the manure application, bringing the average N available to 250 pounds per acre, there was a loss in yield of 3 bushels per acre versus the 50 pounds per acre additional commercial N treatment.

The end-of-season cornstalk nitrate N (residual N in the corn plant at maturity) was higher, 2,479 parts per million (ppm) nitrate N ( $\text{NO}_3\text{-N}$ ) with the 250 pounds N per acre, as shown in figure 4.

The optimum range for cornstalk  $\text{NO}_3\text{-N}$  is 700 to 2,000 ppm, with analyses over 2,000 ppm indicating a high probability that the N application rate exceeded the N requirement of the crop.



**Figure 4. Ten-site average cornstalk nitrate N, manure demonstration sites, crop years 2000-01. Optimum range is 700-2,000ppm.**

These demonstrations indicate that manure is a significant N and P resource for crop production.

The type of manure applied, amount, method and uniformity of application are all factors that need to be considered when determining whether to supplement a manure application with additional N. The demonstrations show that applying more than 50 pounds per acre of N isn't justified when using typical manure application rates.

There is a need for adequate additional N from commercial fertilizer when insufficient amounts of manure are applied.

Maquoketa Watershed Project staff express their appreciation to the following manure management field demonstration cooperators: Darrell Rosburg, David Moorman, David and Richard Venteicher, Marvin Heims, Randy and Rodney Hamlett, Tom Hayes, C&J Farms, Verle Jones, Don Thole, Bill Hayes, Tim and Jim Recker, Ron and Dwight Reid, Keith Bumgartner and Sons, and Bob Recker.

## Maquoketa River projects update

A fall tour of conservation practices was held Oct. 13 in the **Lake Delhi** Watershed. The tour included stops showcasing grassed waterways, contour buffer strips and a constructed wetland. A shoreline demonstration project was completed on 345 feet of shoreline along the lake. Landowners, the Lake Delhi Recreation Association and the Lake Delhi Advisory Committee also were involved with the project.

A nine-member **Whitewater Creek** watershed development grant core committee has met twice to plan a Dec. 12 community meeting to gather information from watershed residents. The meeting will be held at 7 p.m. in the Northeast Iowa Community College conference center in Peosta.

At their Nov. 15 meeting, **Mineral Creek** watershed council members learned the results of nitrogen and phosphorus field demonstrations held on watershed cooperator farms and that six producers are enrolled in the nutrient management workshop series. Seventy-five percent (\$30,900) of the Environmental Protection Agency Section 319 funding and 62 percent (\$62,100) of the Iowa Department of Agriculture and Land Stewardship funding has been approved for construction of conservation practices in the watershed. Nearly as many residents (27) are waiting for the survey of practices as have been served in the fiscal year that started July 1.

The **Maquoketa River Alliance** is planning a watershed-wide

RiverFest to be held Friday, March 22, at the Berndes Center on the Jones County Fairground in Monticello. The day-long festival will feature booths and seminars on what is being done in the watershed as well as what residents can do to improve water and environmental quality in the Maquoketa River.

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