



# Water Watch

A newsletter for the Maquoketa River Watershed

## Project news

### Fine-tuning N application for profits, water quality

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

Three area producers, Jule Brown, Gary Soules, and Joe Wingert, cooperated with Iowa State University Extension Maquoketa Watershed Project staff during crop year 2000 with on-farm demonstrations comparing different nitrogen (N) rates for corn production following soybeans.

Results from these N management demonstrations show that N use can be reduced from average watershed levels while maintaining yield and increasing profit. Reducing commercial N application may promote more efficient crop use of soil N, therefore decreasing the chance of N moving into the surface water system.

The six treatments, 0, 30, 60, 90, 120, and 150 pounds of N per acre, were replicated three times at each site.

Figure 1 shows the three-site average yield for the six treatments. Without any commercial N applied, the yield was 120 bushels per acre. An

addition of 30 pounds of N per acre provided 15 more bushels per acre than the check. Likewise, the 60 pounds of N per acre treatment yielded 15 more bushels per acre than just 30 pounds of N per acre. However, the next two treatments, 90 pounds N and 120 pounds N per acre, increased yields by only five and three bushels per acre, respectively. The final treatment of 150 pounds of N per acre actually showed a lower yield than the 120 pounds per acre N rate.

Maximum yield was achieved with 120 pounds of N per acre, but profitability of N fertilizer was

maximized at 90 pounds of N per acre, as shown in figure 2.

In this evaluation N was given a value of \$0.20 a pound and corn was valued at \$2.40 per bushel (black line) and \$2.00 per bushel (gray line). Using \$2.40 per bushel corn, \$66 per acre is returned to the producer when investing 90 pounds N per acre. Even though 120 pounds of N per acre yields three bushels per acre better, the return on the investment was also \$66 per acre. Treatments of 60 and 150 pounds N per acre return \$59 and \$54 per acre, respectively.

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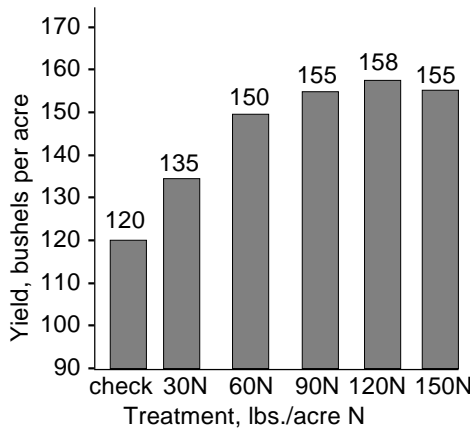


Figure 1. Corn following soybeans three-site average corn yields, crop year 2000.

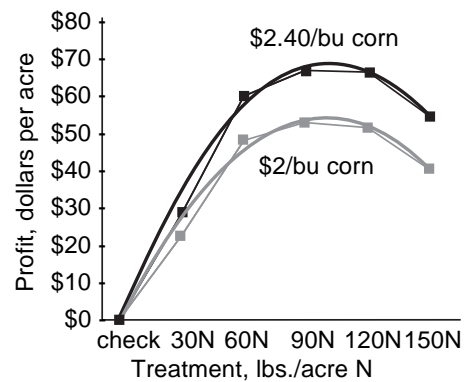


Figure 2. Profitability of additional N (N at \$0.20 per pound and corn at \$2 a bushel and \$2.40 a bushel).

## Fine-tuning, cont.

When \$2.00 per bushel corn is assumed, 90 pounds N per acre actually returns one dollar more than 120 pounds N per acre, \$52 to \$51 per acre. The 60 pounds of N and 150 pounds of N per acre treatments follow behind with returns of \$47 and \$40 per acre respectively.

Producers may not be comfortable applying 90 pounds N per acre to soybean stubble for corn production, but applying more than 120 pounds N per acre may cut into farm profits. Some N rate in between may provide the best yield and profit scenario for individual farms.

In conclusion, the nitrogen management demonstrations show that N use can be reduced from current levels while maintaining

corn yields and expanding farm profits. Results from year 2000 produced corn yields with a 158 bushels per acre average where 120 pounds N per acre was applied to soybean stubble. This yield compares to the January 1999 producer survey which reported a five-year average of 160 bushels per acre for the watershed. Further demonstrations need to be conducted in the following crop seasons to confirm these findings and support the goals of the Headwaters Council and watershed producers.

Water monitoring efforts within the Maquoketa headwaters have increased community awareness of crop nutrients in surface water and have producers interested in fine-tuning N fertilizer inputs.

A January 1999 survey of area farmers showed an average

application rate of 128 pounds of N per acre on fields going to corn following soybeans. Producer responses ranged from 75-260 pounds of N per acre. Using survey results, the Texas Institute for Applied Environmental Research (TIAER) developed several computer modeling scenarios of the Maquoketa headwaters in regards to nitrogen, phosphorus, and sediment.

With the survey information and modeling results from TIAER the Headwaters Council set a goal of reducing N loss by 50 percent from current levels. The Council realizes that area farmers have control over the nitrogen application in the headwaters watershed.

For more details about these demonstrations, contact the MWP staff in Fayette at (319) 425-3233.

## Demonstrations show P fertilizer applications reduce profits

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

Phosphorus (P) management demonstrations in the Maquoketa Headwaters Watershed this crop year show that yields are not increased and profits are actually reduced when crop removal rates of phosphate,  $P_2O_5$ , fertilizer are applied to soils on three farms in the watershed. Soils on two of the demonstration sites were in the very high soil test range, while one site had a low P soil test prior to the demonstrations.

To field test the economic benefits of reducing P applications, the Watershed Council enlisted Maquoketa Watershed Project staff to conduct on-farm demonstrations with area producers. Jule Brown, Gary Soules and Joe Wingert were cooperators during crop year 2000.

These field demonstrations compared three rates of commercial phosphate and 120 pounds of nitrogen (N) per acre applied to corn following the previous soybean crop.

Soil tests were taken at each site in fall 1999. Replicated plots were measured and triple phosphate

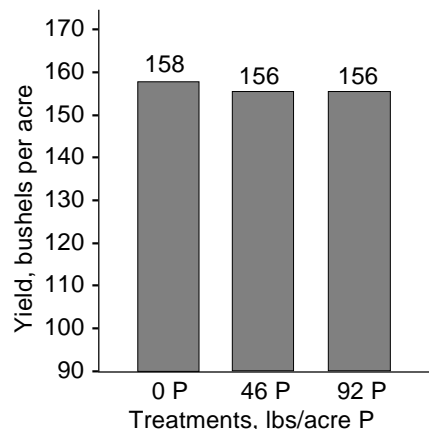


Figure 1. Average yields at the three demonstration sites. Each received 120 pounds of N per acre.

fertilizer was applied to three different treatments at the time of soil testing.

The compared treatments were 0 P, 46 pounds of P per acre and 92 pounds of P per acre. The 46 pounds of P and 92 pounds of P per acre rates are one-year crop removal and two-year crop removal respectively. In the spring of this year, immediately following planting, N at the rate of 120 pounds per acre was applied as ammonium nitrate to each treatment.

At harvest, yields were measured for the three treatments. Figure 1 shows that there was no yield benefit by adding phosphorus to the soil. Soil tests of the three treatments were also taken at harvest. The addition of P at the one year crop removal rate did not change the soil test results,  
*continued next page*

## Demonstrations, cont.

compared to no additional P; both showed 47 parts per million (ppm). The soil test increased only slightly at the two-year crop removal rate, to 58 ppm.

An economic comparison between the treatments was made by assuming  $P_2O_5$  at \$.23 per pound and corn at \$2.40 per bushel (black bar) and \$2.00 per bushel (gray bar), shown in figure 2. With the

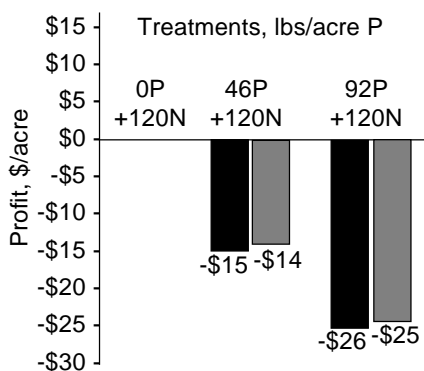


Figure 2. Corn value response to commercial P ( $P_2O_5$  at \$0.23 per pound, corn at \$2 a bushel and \$2.40 a bushel).

similar yields, the addition of P at the one-year crop removal rate actually reduced profit by \$15 per acre and \$14 per acre. When adding the two-year crop removal rate the losses increased to \$26 per acre and \$25 per acre.

Soil tests taken from within the watershed in the fall of 1999 show that 88 percent of fields are testing high or very high for soil P.

This information supports results from a January 1999 survey of producers in the watershed. The survey showed average annual commercial  $P_2O_5$  applications of 35 pounds per acre on corn following soybean rotations and 41 pounds per acre on continuous corn.

In addition, the Headwaters Watershed Council estimates that 90 percent of row-crop land in the watershed received an annual crop-removal application of commercial phosphorus.

These demonstrations reinforce

Iowa State University recommendations that suggest when soils are testing high or very high for P, adding commercial broadcast phosphorus fertilizer does not increase profits.

Eliminating unnecessary fall-applied fertilizer would reduce the amount of P left on the soil surface susceptible to run-off events through the winter months. The elimination of unnecessary fall-applied P is the first step in the long-term reduction of soil P levels that affect surface-water P levels and help achieve the Watershed Council's goal of 50 percent reduction of P leaving the watershed.

Look for more demonstrations comparing three rates of P application to be conducted within the headwaters watershed during the following crop seasons.

For more details about these demonstrations, contact the MWP staff in Fayette at (319) 425-3233.

## Fall field day and conservation buffer visit set for Nov. 1

A fall field day focusing on new technologies in fertilizer and crop residue management will be held Wednesday morning, Nov. 1, on the Darrell Rosburg-Smith farm near Arlington. The field day runs from 10 a.m. until noon and is sponsored by the Maquoketa Headwaters Watershed Council.

After lunch there will be a visit to the Bob Bassett riparian site south of the field day site.

Equipment to be demonstrated during the morning field day includes a new nitrogen placement management technology machine that is the subject of research by Iowa State University Ag and Biosystems Engineering staff.

Other equipment and demon-

strations are a strip tillage machine that works with minimal residue disturbance, and deep placement of phosphorus and potassium. Also, there will be manure incorporation equipment, manure field calibration and the results from the 2000 crop year manure management demonstrations.

Plans also include a demonstration of the Hurricane Ditcher, a machine used to improve existing waterways where the channel has filled as a natural process of effectively keeping topsoil from washing off the field.

And there will be a demonstration of a fabric-laying machine recently purchased by the Fayette Soil and Water Conservation District. The SWCD purchased the machine in

response to expressed difficulty the last two years in establishing waterways during the heavy spring rainfall periods.

The Darrell Rosburg-Smith farm site is on B Avenue in Section 2 of Putnam township, 2.25 miles north of Iowa Highway 3.

Bassett's riparian site is one mile south on B Avenue. Trees Forever is cosponsoring the riparian visit along with the Headwaters Council.

The **Mineral Creek Watershed** Council is sponsoring a similar field day on Tuesday, Oct. 31, from 10 a.m. until noon. The field day will be held on the Mike and Steve Streeper farm, 1.5 miles north of Onslow on Iowa Highway 136.

# Maquoketa River projects update

The **Lake Delhi Maquoketa River Water Quality Team** IOWATER volunteers complete their first year of water quality data collection in November. The U. S. Geologic Survey will conduct a sediment study in Lake Delhi under a two-year cooperative agreement.

In August, **Mineral Creek Project's** IOWATER volunteers selected 22 sites in the watershed to begin monitoring on a monthly basis. Eleven Mineral Creek watershed residents received IOWATER training.

Tom Sperflage is the Iowa Department of Agriculture and

Land Stewardship environmental specialist for the **Maquoketa Headwaters Project**, responsible for assisting in the development of BMPs and related cost-share



Tom Sperflage



## Starmont students visit Backbone monitoring site

Eighth grade students of Starmont Middle School instructors Lee Ward and Mark Klingner visited the Iowa State University monitoring site on the Maquoketa River in Backbone Park on Oct. 10, where they also practiced classroom math and science skills, such as calculating stream flow.

funding with cooperators. He is working from the Natural Resources Conservation Service office, West Union; the phone is (319) 422-6201.

•Students from Starmont High School are ready to begin sampling Maquoketa Headwaters Watershed tile line outlets this fall. The next step is recruiting producers and landowners who are willing to let the students take samples from tile lines on their property.

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