Growers Reach Beyond Current BMPs

Best Management Practices

Many media and regulatory agencies are focusing on production agriculture and specific grower management practices as a cause of environmental problems. The actual data quantifying the importance of production agriculture versus other sources of pollution is extremely limited. Likewise, data quantifying the specific impact of one management practice versus another is also limited or nonexistent.

This is not another article saying that farmers are polluting the environment and Iowa needs more regulations and more regulation enforcers. Instead, this publication focuses on how Iowa growers have become more proactive by collecting data and demonstrating differences among management practices on their own fields on over 100 locations in 2001. This initiative is not only funded with grower checkoff dollars, but also with dollars from the Iowa Department of Agriculture and Land Stewardship as part of the Integrated Farm and Livestock Demonstration Program.

Iowa Soybean Association
Your Partner for Growth!

Iowa Soybean Promotion Board

Iowa Department of Agriculture and Land Stewardship

Iowa State University

IFL Integrated Farm / Livestock Management Demonstration Program

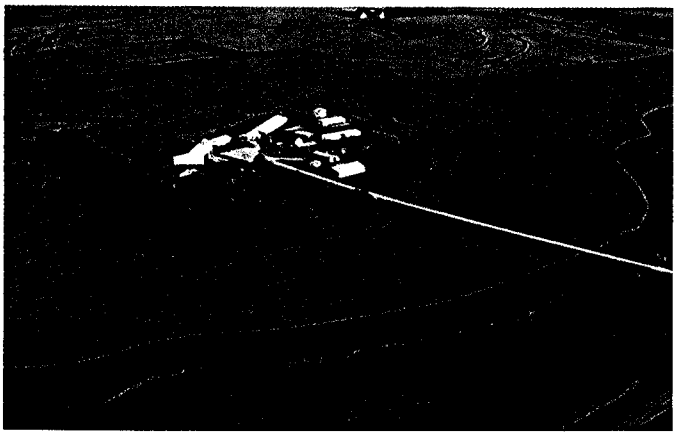
The Iowa Soybean Association and the Iowa Soybean Promotion Board believe in empowering growers to do their own on-farm testing. The underlying assumption is that growers who constantly evaluate the performance of their specific management options will continue to be more profitable and better stewards of the environment. With support from the Iowa Department of Agriculture and Land Stewardship, crop consultants, coops and researchers at Iowa State University, a network of over 100 growers with Global Positioning Systems and combines equipped with yield monitors were formed to do their own on-farm validation of nitrogen (N) management practices in 2001.

The focus of the effort is to assist growers in voluntarily comparing their current practice to an alternative practice by giving them technical support and a financial safety net for any lost productivity. For crop years 2001 and 2002, growers are comparing their regular N fertilizer rate to a lower rate in replicated strips across 20 acres at over 250 different locations in Iowa.

The results of this project verify with data that the majority of growers are not only doing a good job with their N management, but they are doing better than can be done with current BMPs. Recommendations for current BMPs don't take into consideration differences in soil types within fields or differences found within regions of the state.

Data collected from grower fields show that current BMPs are not adequate for modern producers. Growers are working together to refine their management practices. The results suggest growers can improve N fertilizer use efficiency, which decreases environmental risks and increases grower profitability.

Improving performance can only be achieved by growers being proactive and constantly evaluating and refining their own N management on their farm. Each farm has a unique set of conditions. People who argue that the problem is caused by growers who won't follow the current BMPs should recognize that BMPs need to change. Policy and resources dedicated to adoption of outdated BMPs should be challenged, and this is finally happening in Iowa.



Demonstration Project Profile

COOPERATOR: Ray Gaesser
LOCATION: Corning, Iowa (Southwest)

Three nitrogen (N) rates (50 lbs, 100 lbs, and 150 lbs) replicated three times. Trials were performed on corn following corn (corn-on-corn) on the north side of the field and on corn following soybean (corn-on-soy) on the south end of the field.

RESULTS: Corn-on-soy required a higher N fertilizer rate than corn-on-corn. The N requirements changed spatially within the field. The lower yielding portions of the field required more N than higher yielding areas of the field.

TRIAL SUMMARY Crop Year 2001

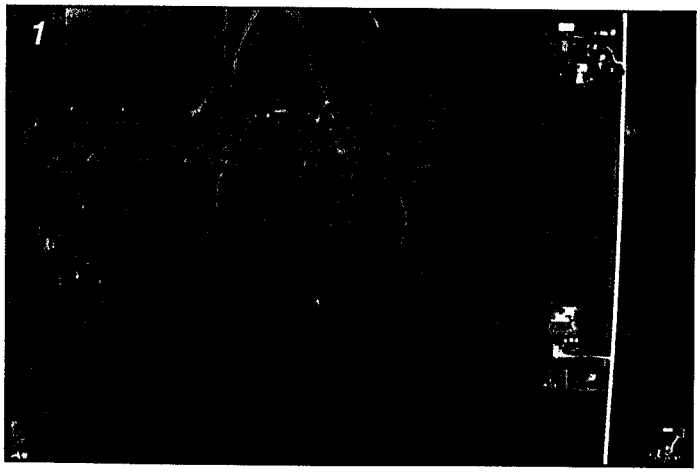
Results:	N Rate	YIELD (corn-on-corn)	YIELD (corn-on-soy)
*Farmer normal practice	**150 lb N/a**	**140.5 bu/a**	**143.0 bu/a**
Farmer alternative practice	**100 lb N/a**	**143.2 bu/a**	**136.9 bu/a**
Low N treatment	**50 lb N/a**	**127.7 bu/a**	**128.1 bu/a**
Difference between 150 and 100 lb N /a		**-2.7 bu/a**	**6.1 bu/a**

**Yield goal-based recommendations would call for 170 lb N/acre for corn-on-corn and 124 lb N/acre for the corn-on-soy.*

Assuming 50 lbs N @ $0.17/lb = $8.50/acre, the corn-on-corn trial saves the farmer at least $8.50/acre from his normal practice or $11.90/acre compared to yield goal-based recommendations. For the corn-on-soy trial, the 150 lb N/acre treatment resulted in a 6.1 bushel/acre yield improvement @ $2.00 / bushel = $12.20 yield advantage, which was reduced to a $3.70 profit after paying for the fertilizer.

In addition to the average yields for treatments, data were collected to better recognize which portions of a field needed additional or reduced amounts of N. This field was selected for spatial analysis because data from the low N rates predict benefits from variable rate fertilization. Spatial differences in yield can be related to other factors to help the grower identify portions of a field that may need less N than other areas.

FIGURE 1.
Color aerial photograph of Ray Gaesser field demonstration
The color aerial photo contains both trials of corn-on-soy and corn-on-corn. The corn-on-corn trial is near the top of the



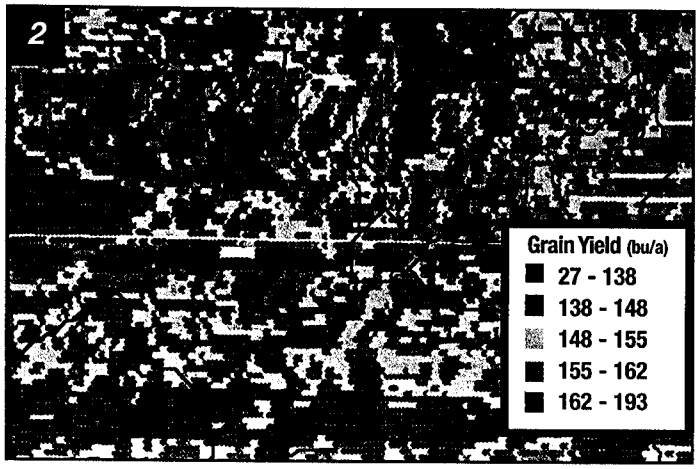
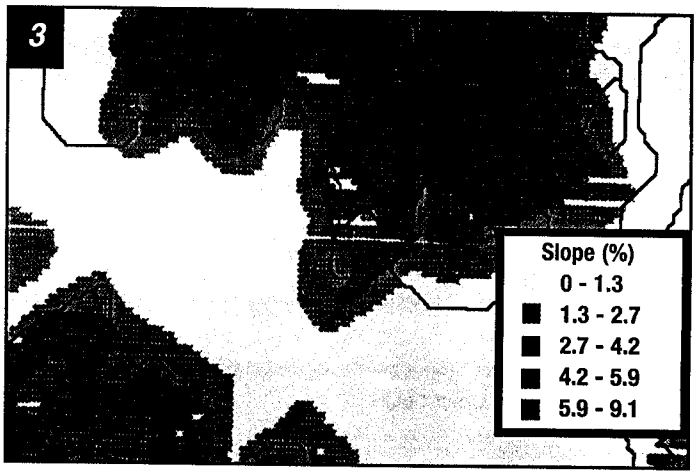


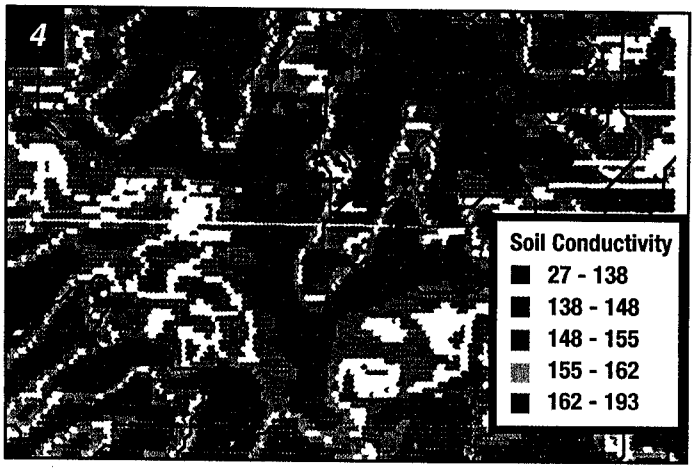
image and the corn-on-soy is near the bottom. In both trials, the yellow streaks can be seen for the 50 lb N/acre treatments. Notice how these patterns change spatially. These changes can be compared to other maps that can be used to help explain why areas are different. Note, this type of information does not require a GPS and yield monitor, so anyone can easily obtain similar types of information

FIGURE 2. GRAIN YIELD MAP

This is a grain yield map made from data collected with a combine equipped with a GPS and yield monitor. The black lines are boundaries of different soil types, which is generated by soil survey. The green color represents higher yields and the brown color represents lower yielding areas of the field. You will notice that yield patterns show some relation to the soil types. Also, notice the lower yields for the test on the south end of the field, which was the corn-on-soy trial. You can see the majority of the trial area having reduced yields as compared to the corn-on-corn trial on the north end (see the aerial photo in Figure 1).

While the yield maps are interesting, the interpretation of the yield map itself takes additional processing. Such processing leads to summaries presented at the beginning of this case study. In addition, more analysis is needed to relate the differences in yield resulting from the N test strips compared to other data layers such as the slope, elevation and soil conductivity (shown in the following figures).





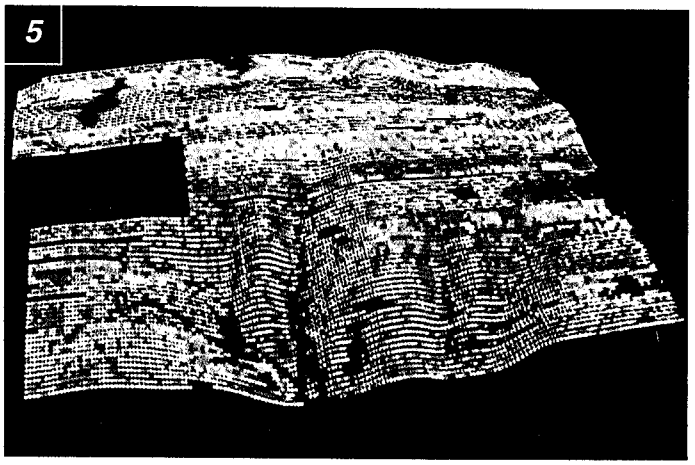


FIGURE 3. SLOPE MAP

This is a slope map made from the elevation data collected with a survey grade GPS. The black lines are the boundary of the different soil types. The darker the color, the steeper the slope. The relative position of the soil on the landscape has a major influence on soil formation and weathering. The steeper the slope, the greater potential for erosion. Comparing the degree of slope with the degree of N stress (most easily seen in the color photo in Figure 1) shows that the areas with higher slope have the most N stress.

It is interesting to note that the highest N requirements occured in the lowest yielding regions of the field. This conflicts with the current BMP that assumes N fertilizer needs are proportional to yield goals. *(cont. on back)*

(Profile continued)

FIGURE 4. SOIL CONDUCTIVITY MAP
This is a soil conductivity map that shows the difference in the soil, such as texture. From this example, you can see that the soil conductivity roughly follows the patterns shown by the black lines, which indicate boundaries of different soil types. You can see the patterns are better defined by the differences in color. Although these differences in soil can be mapped, this by itself does not give information on how to manage them. Using data like the soil conductivity, combined with the yield response data to field treatments, can help identify opportunities to improve nutrient management practices.

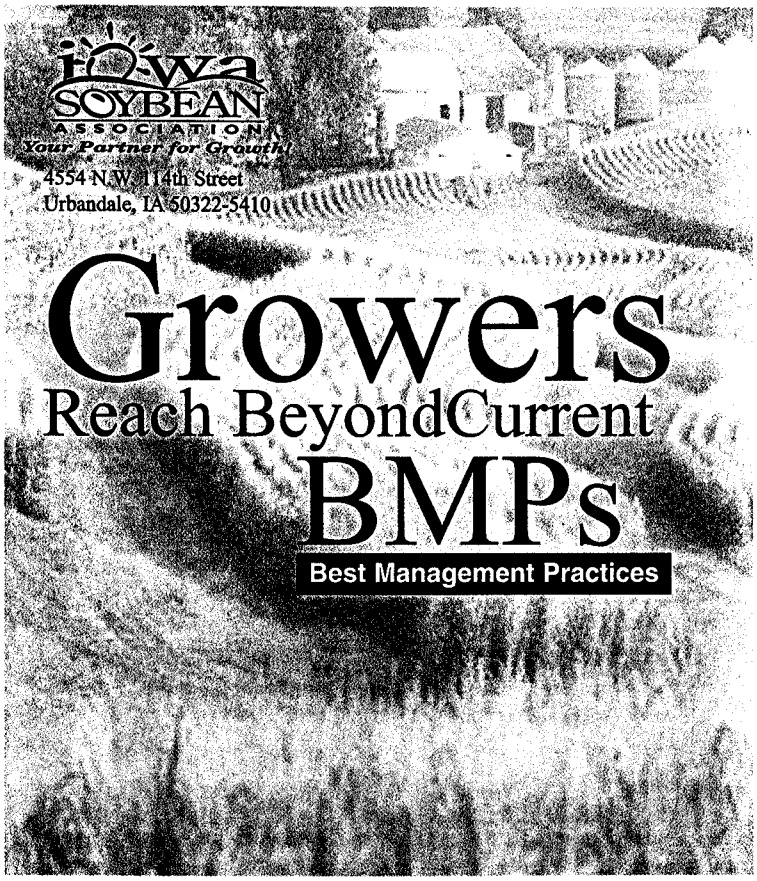
FIGURE 5. GRAIN YIELD OVER ELEVATION.
To help visualize the differences, the yield information can be combined with the elevation data to develop a 3-D perspective. The blue regions represent the lower yielding areas and the red, the higher yielding areas. Notice the differences in yield illustrated by the blue streaks on the side slopes of this figure.

While this is only one of over 100 field trials implemented in 2001, future newsletters will focus on more of the data summaries. The best place to learn about what growers are doing and what they found during 2001 will be at the Iowa On-Farm Nitrogen Conference from 9 a.m. – 4 p.m., on March 1, 2002, at the Starlite Hotel in Ames, Iowa. The conference fee, which includes a meal, is $18 if registered by Feb. 25. Registration can be completed by calling Mary Whitcomb at 1 800-383-1423. The fee is $38 for attendees registering the day of the conference.

IOWA ON-FARM NITROGEN CONFERENCE

Best Western Starlite Village
I-35 & 13th Street
Ames, Iowa
Friday, March 1, 2002
9 a.m. — 4 p.m.

We are currently securing participants for the 2002 crop year. Slots are limited. If you are interested in being part of the On-Farm Network, contact Tracy Blackmer at 1 800-383-1423.



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