

Site-Specific Management

Cindy L. Pearson¹, David Clay² and Cheryl L. Reese³

Strategic Approach to Site-Specific Systems

Designing a successful site-specific management strategy is challenging because factors affect crop yield and quality at specific sites within fields. The first step in site-specific management includes defining your goals. The goals should be site-specific, realistically geared to the individual farm and farmer. Steps for designing a successful site-specific management program include:

1. Define goals;
2. List decisions that must be made to reach the goals;
3. Determine data needed to support decisions;
4. Determine tools needed to collect, manage and interpret the data;
5. Determine requirements for achieving goals;
6. Inventory the labor, equipment and information resources available;
7. Make adjustments to meet projected future needs;
8. Collect and interpret the data;
9. Modify production plan based on data interpretation;
10. Implement the improved plan;
11. Repeat the process (Reetz and Fixen, 1999).

Profitability

Farmers and agribusinesses should remember three facts:

- (1) because site-specific farming (SSF) practices are site-specific, their profitability potential also will be site-specific;
- (2) site-specific farming may or may not require variable rate equipment and
- (3) site-specific farming is the process of converting information from several different sources into improved decisions.

An economic analysis should be conducted to determine the feasibility of the different management options.

Quality

Production historically has been providing a raw material of grain and fiber, for the feed industry, and other uses. This system rewards quantity and pays little attention to quality. That is changing. New market trends focus on quality components and on the needs, desires and demands of the customer. These customers face increasing demands from their customers, and passing

those requirements on to their raw material suppliers. Grain and fiber producers who recognize these requirements and respond favorable may be rewarded in the marketplace. Many of these requirements will force site-specific management to be a part of the normal production system.

Wheat producers in the northern Great Plains market grain under a quality payment system that provides economic incentives for optimizing grain protein. Protein concentration in grain is greatly influenced by the level of nitrogen (N) and water stress. Many fields show significant spatial variability in N fertility (Figure 1) and in available water. Plant available water is generally highest in footslope (lower elevation) areas and lowest in summit areas (higher elevation). To maintain high protein contents, the amount of N is directly related to available water.

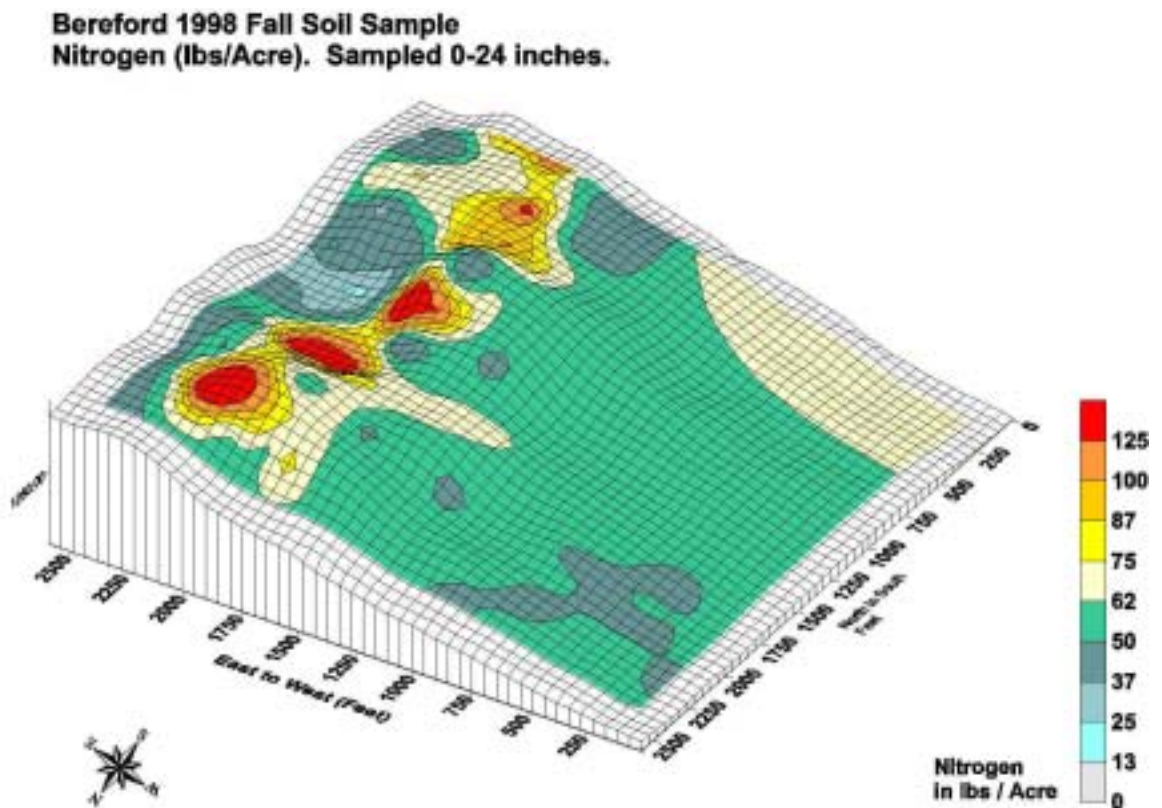


Figure 1. Map showing soil nitrogen in lbs / acre over a 160 acre field.

Conventional uniform application ignores this variability and can lead to the higher production areas in a field having relatively low protein quality in wheat. Therefore, the question arises as to whether grain protein can be optimized on a site-specific basis by accounting for spatial variability of N and water within individual fields. More about the relationship between grain protein and soil nitrogen can be learned at this website:

“Grain Protein Sensing to Identify Nitrogen Management in Spring Wheat” by D. S. Long, R. E. Engel, and P. Reep. Document is available in Adobe Acrobat format at: [http://www.ppi-far.org/ppiweb/ppibase.nsf/\\$webindex/article=05C7314B852569660063B5163E1C6069](http://www.ppi-far.org/ppiweb/ppibase.nsf/$webindex/article=05C7314B852569660063B5163E1C6069).

Environmental Quality:

Precision farming can improve environmental quality through two approaches. First, in the past many land managers have applied insurance treatments to the land. For example, if the university recommendation is 100 lbN/a, then a manager might apply 120lbN/a. The difference between the university recommendation and application is the insurance. A hypothesis of precision farming is information can be used in replacement of insurance.

Second, precision farming is the application of treatments to specific areas of the land based on actual need. Using this approach areas where chemicals are over applied are reduced. A concept behind site-specific farming is that by reducing over application, the impact of agriculture on the environment can be reduced. More about the relationship between environmental quality and soil nutrients can be learned at this website:

1. “Site-Specific Use of the Environmental Phosphorus Index Concept” by C. S. Snyder, T. W. Bruulsema, A. N. Sharpley, and D. B. Beegle. Document is available in Adobe Acrobat format at: [http://www.ppi-far.org/ppiweb/ppibase.nsf/\\$webindex/article=28F949238525695300581E031A2C31B0](http://www.ppi-far.org/ppiweb/ppibase.nsf/$webindex/article=28F949238525695300581E031A2C31B0).

Additional information on strategic planning is available at the websites listed below:

1. SDSU Precision Farming Web Page:
<Http://www.abs.sdstate.edu/abs/precisionfarm/index.htm>
2. “Strategic Approach to Site-Specific Systems” by Reetz, Jr. H. R. and P. E. Fixen. Document is available in Adobe Acrobat format at:
[http://www.ppi-far.org/ppiweb/ppibase.nsf/\\$webindex/article=33BDADAF852569660064DF9E5D8C7639](http://www.ppi-far.org/ppiweb/ppibase.nsf/$webindex/article=33BDADAF852569660064DF9E5D8C7639).

References:

1. Reetz, Jr. H. R. and P. E. Fixen. 1999. Strategic Approach to Site-Specific Systems. In ‘Site Specific Management Guidelines’, SSMG-28. Norcross, GA.

Author information:

¹ 6th grade science teacher, Mickelson Middle School, Brookings, SD, South Dakota State University, Brookings, SD

² Associate Professor, South Dakota State University, Brookings, SD

³ Research Associate, South Dakota State University, Brookings, SD

Funding provided by: North Central Soybean Board, South Dakota Corn Utilization Council, South Dakota Soybean Research and Promotion Council, EPA, USDA-IPM, and South Dakota State University Experiment Station.

[Return to Home Page](#)