

## Indiana NCR180 Report - 2003

**Title:** Site-Specific Management Center (SSMC)

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**Abstract:** The SSMC activities in 2002 focused on outreach. The *Precision Farming Profitability* book was widely used in community colleges, workshops and other settings. Teaching materials for use with the book, including figures from the book and example quiz questions, were placed on the SSMC website. GPS workshops were held in conjunction with the Purdue Diagnostic Training Center (DTC) and area cooperatives. A plan to reorganize and refocus the SSMC on outreach is being implemented in 2003.

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### Publications:

Blumhoff, Greg K. "The Order 1 Soil Survey: Getting It Ready to Use," *SSMC Newsletter*, January, 2002.

Lowenberg-DeBoer, J. "Liability Problems for Autonomous Equipment?" *SSMC Newsletter*, February, 2002.

Blumhoff, Greg K. "Introduction to the Nuts and Bolts of Directed Crop Scouting With Remotely Sensed Data," *SSMC Newsletter*, March, 2002.

Blumhoff, Greg K. "A Comparison of Directed Crop Scouting and Traditional Sampling" *SSMC Newsletter*, April, 2002.

Colonna, Ignacio. "Comparison of Organic Matter Interpolated Maps from 0.5 and 2.5 Acre Grids Using Geostatistics," *SSMC Newsletter*, May, 2002.

Lowenberg-DeBoer, J. "Blocks vs. Strips for On-Farm Experimentation," *SSMC Newsletter*, June, 2002.

Blumhoff, Greg, and Chris Johannsen, "Perspectives on the Application of Remote Sensing for Site-Specific Management," *SSMC Newsletter*, July, 2002.

Mercuri, Pablo, "Agricultural Terrain Analysis Using Remote Sensing Derived Elevations," *SSMC Newsletter*, August, 2002.

Lowenberg-DeBoer, J., "Zero Rates in Site-Specific On-Farm Trials," *SSMC Newsletter*, September, 2002.

Lowenberg-DeBoer, J. and Rodolfo Bongiovanni, "The Status of Site-Specific Crop Response," *SSMC Newsletter*, October, 2002.

Urcola, Hernan, and J. Lowenberg-DeBoer, "What questions should be asked about Yield Monitor Use for Hybrid and Variety Selection?" *SSMC Newsletter*, November, 2002.

Lowenberg-DeBoer, J., "Will Farmers Chose Precision Farming or Convenience Agriculture?" *SSMC Newsletter*, December, 2002.

**Title:** Remote Sensing Applications in Agriculture

**Principal Investigator:** Chris Johannsen

**Abstract:** Annual focus of remote sensing applications included Nitrogen management, soil landscape dynamics, soil variability, crop residue assessment, yield-influencing factors, corn rootworm detection, crop scouting, and weed anomaly monitoring. Research related to soil variability and landscape features and pest detection is planned for 2003.

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**Title:** Site-Specific Fertilizer Recommendations and Sampling Guidelines

**Principal Investigator:** Sylvie Brouder

**Abstract:** Major concentration involved site-specific data integration, evaluation, and development related to fertilizer recommendations and use efficiency in Indiana cropping systems. Plans for 2003 include GIS and RS data use in developing site-specific fertilizer recommendations and soil fertility interactions related to grain quality.

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**Title:** Site-Specific Applications for Grain Quality Traits, Tillage Systems, and Crop Residue

**Principal Investigator:** Tony Vyn

**Abstract:** Primary emphasis on high oil corn and soil variability, tillage interactions, and residue affects on grain yield and quality traits were evaluated. Continued research is planned for 2003 related to site-specific variables use in value-added crop production.

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**Title:** On-Farm Harvest Timing, Yield Monitor Calibration, and GPS Crop Management Technologies

**Principal Investigator:** Robert Nielsen

**Abstract:** On-Farm trials were conducted to assess the value of various site-specific technologies related to harvest, soil sampling, and pest monitoring. GPS technology evaluations were conducted to understand the value of low-end versus high-end mapping equipment. 2003 plans include continued yield monitor testing and value of various GIS data layers for On-Farm trial development.

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**Title:** Remote Sensing and GIS Applications in Order 1 Soil Survey Development

**Principal Investigator:** Gary Steinhardt

**Abstract:** GIS and RS data were integrated to build, assist, and map Indiana soils to develop an Order 1 soil survey. Plans for 2003 include a review and establishment of mapping guidelines for Order 1 soil survey development.

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**Title:** Automated Measurement and Mapping of Soil Properties

**Principal Investigator:** Mark Morgan

**Abstract:** Rapid measurement and mapping of soil properties has shown potential for improving site-specific management. A model combining geo-statistics, agronomics and economics has been developed which demonstrates the potential benefit of high resolution soil pH maps when combined with variable-rate lime application. Similar modeling and data analysis is under development for properties like potassium and nitrogen. In addition, sensing systems are being investigated for mapping other soil properties including: potassium, nitrogen, and soil mechanical impedance at various depths in the profile. These sensors will ultimately provide the basis for accurate control of variable rate tillage and chemical application. Recent developments have lead to a patent for an automated soil pH measurement system which is being evaluated for commercialization.

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**Publications:**

Adamchuk, V.I., M.T. Morgan and D.R. Ess. 03/12/02. System and method for automated measurement of soil pH. U.S. Patent #6,356,830.

Brouder, S.M., M. Thom, V.I. Adamchuk and M.T. Morgan. Potential uses of ion-selective K electrodes in soil fertility management. Comm. Soil Sci. Plan Anal. (in press)

Adamchuk, V.I., M.T. Morgan, and J. M. Lowenberg-DeBoer. A Model for Agro-Economic Analysis of Soil pH Mapping. Precision Agriculture.(accepted)

**Title:** Information Source Preferences and Decision Making in Precision Agriculture

**Principal Investigators:** Daniel R. Ess and Stephen E. Hawkins

**Abstract:** A survey of adopters of precision farming (PF) techniques/technologies was conducted in 2002. Results from 135 Cornbelt respondents were analyzed to reveal that, fertilizer companies, other farmers, and agricultural consultants were the three most trusted sources of information related to investment in, and use of, PF. In addition, respondents reported information pertaining to PF techniques in current use and under consideration for future use. A related study was conducted to define information flow in PF systems functioning in commercial and research environments.

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**Publications:**

Ess, D.R., S. Fountas, J. Lowenberg-DeBoer, S.E. Hawkins, and S. B. Blackmore. Information source preferences in precision agriculture. ASA Abstracts 2003, Indianapolis, IN, Nov. 10-15, 2002.

S. Fountas, S.E. Hawkins, D.R. Ess, and S. B. Blackmore. Farm management decision analysis. ASA Abstracts 2003, Indianapolis, IN, Nov. 10-15, 2002.

S. Fountas, D.R. Ess, S.E. Hawkins, and S. B. Blackmore. Precision agriculture information systems. ASA Abstracts 2003, Indianapolis, IN, Nov. 10-15, 2002.

**Title:** Economics of Knowledge Intensive Agriculture for Crop Farms

**Principal Investigator:** J. Lowenberg-DeBoer

**Abstract:** In 2002 research moved forward in the four main areas: 1) evaluation of alternative approaches to spatial statistics for yield monitor and other agricultural data and 2) estimating the temporal stability of site specific response, 3) alternative methods of delineating management zones and 4) an evaluation of how site-specific management could improve sustainability of agriculture. In 2003 new areas of research include: a) the effect of the availability and opportunity cost of management time on adoption of precision agricultural technology, and b) alternative on-farm trial designs adapted to yield monitor use.

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**Publications:**

Bullock, David, J. Lowenberg-DeBoer and Scott Swinton, "Adding Value to Spatially Managed Inputs by Understanding Site-Specific Yield Response", *Agricultural Economics* 27(2002) p. 233-245.

Lambert, D.; Lowenberg-DeBoer, J.; and R. Bongiovanni. 2002. "Spatial Regression, an Alternative Statistical Analysis for Landscape Scale On-farm trials: Case Study of Variable Rate N Application in Argentina." Proceedings of the 6<sup>th</sup> International Conference on Precision Agriculture. Minneapolis, MN.

Bongiovanni, Rodolfo, and J. Lowenberg-DeBoer, "Economics of Nitrogen Response Variability over Space and Time: Results from the 1999-2001 Field Trials in Argentina," Proceedings of the 6th International Precision Agriculture Conference, Minneapolis, MN, 2002

Bongiovanni, R., and J. Lowenberg-DeBoer. 2001. "Precision Agriculture and Sustainability." VII Congreso de Maíz, Pergamino, Argentina. November 7-9, 2001. <http://www.agriculturadeprecision.org/ingles/indice.htm>.

Lowenberg-DeBoer, J. and Harold Reetz, "Phosphorous and Potassium Economics for the 21<sup>st</sup> Century," *Better Crops*, Vol. 86 (2002, No. 1), p. 4-8.

Lowenberg-DeBoer, J., "Economics of Site-Specific Management in Agronomic Crops", XXIV Congresso Nacional de Milho e Sorgo, Florianopolis, SC, Brazil, September 2002.

Bongiovanni, Rodolfo, "A Spatial Econometric Approach to the Economics of Site-Specific Nitrogen Management in Corn Production," PhD Dissertation, Department of Agricultural Economics, Purdue University, West Lafayette, IN, 2002.

**Title:** Precision Agricultural Services Survey

**Principal Investigator:** Jay Akridge

**Abstract:** The annual survey of agricultural retailers showed that precision ag service offerings were up in 2002 after several years of stagnation. Six out of every ten retailers responding used some precision agriculture technology in their business. Another survey is planned for early 2003.

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**Publications:**

Whipker, Linda, and Jay Akridge, "Precision Agricultural Services: Dealership Survey Results." Staff Paper No. 02-02, Center for Food and Agricultural Business, Purdue University, West Lafayette, IN, USA, June, 2002. ([www.purdue.edu/ssmc](http://www.purdue.edu/ssmc), click on publications and scroll down).