Title: Site-Specific Management Center (SSMC)

Principal Investigators: Jay Akridge, Agricultural Economics; Larry Biehl, Electrical & Computer Engineering; Jeff Boyer, Manager, Davis Purdue Ag Center; Sylvie Brouder, Agronomy; Paul Carter, Agronomy; Ellsworth Christmas, Agronomy; Rich Dirks, Botany & Plant Pathology; Bernard Engel, Ag & Biological Engineering; Daniel Ess, Ag. & Biological Engineering; Jerry Fankhauser, Director, Purdue Agricultural Centers; Jane Frankenberger, Ag. & Biological Engineering; Kevin Gibson, Botany & Plant Pathology; Steve Hawkins, Assistant Director, Purdue Agricultural Centers; Chris Johannsen, Agronomy; Jess Lowenberg-DeBoer, Agricultural Economics; Gaines Miles, Ag. & Biological Engineering; Doug Miller, Agricultural Economics; Mark Morgan, Ag. & Biological Engineering; Robert Nielsen, Agronomy; Gary Steinhardt, Agronomy; Mack Strickland, Ag. & Biological Engineering; Larry Theller, Ag. & Biological Engineering; Tony Vyn, Agronomy.

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:


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


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:

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:
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, 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, click on publications and scroll down).