

Conference Conference PROGRAM

4th International Conference on PRECISION AGRICULTURE

*To highlight the latest significant research
and its application in precision agriculture*

CONFERENCE THEMES

NATURAL RESOURCES VARIABILITY

MANAGING VARIABILITY

REMOTE SENSING

PROFITABILITY

ENVIRONMENT

EDUCATION/OUTREACH

TECHNOLOGY

MODELING

A TO Z FOR PRACTITIONERS

JULY 19-22, 1998

Radisson Hotel Saint Paul
St. Paul, Minnesota USA

Sponsors

Precision Agriculture Center

The University of Minnesota Extension Service

ASA/CSSA/SSSA, ASAE, ASPRS, PPI



4th International Conference on PRECISION AGRICULTURE

JULY 19-22, 1998

Purpose

This conference will highlight significant research and its application in precision agriculture conducted largely in the two years since our last conference. It will offer oral and poster presentations and exhibits, an opportunity for discussion and exchange of information in various aspects of precision agriculture. Tuesday morning workgroup sessions will discuss research and development needs. The precision A to Z track will offer extended sessions on key topics for producers and agri-businesses.

Sponsors

The Tri-Societies (ASA/CSSA/SSSA)
American Society of Agricultural Engineers
ASPRS
Ag-Chem Equipment Company, Inc.
Ag Electronics Association
Agris Corporation
Cargill
Countrymark Cooperative
Cenex Land O' Lakes
Deere & Company
Gateway 2000
Growmark, Inc.
New Holland
Monsanto
OmniStar, Inc.
Potash and Phosphate Institute
Pioneer Hi-Bred International, Inc.
Precision Agriculture Center
SST Development Group, Inc.
Tyler Industries, Inc.
University of Minnesota Extension Service

Certified Crop Adviser (CCA) credits have been applied for.
Check at the registration desk for current information.



Table of Contents

4th International Conference on Precision Agriculture

	PAGE
Meeting Room Map	4
Session Chairs, Moderators & Program Notes	5
Program Overview	6
PROGRAM	
Sunday, July 19	8
AFTERNOON	
Concurrent Research Session:	
Engineering Technology	8
Yield Measurements	9
Industry Updates	9
A to Z Track:	
Yield Map Interpretation	8, 16
Monday, July 20	10
MORNING	
General Session	10
Concurrent Research Sessions:	
Natural Resource Variability	10
Engineering Technology	11
Environment	11
A to Z Track:	
Precision Management Strategies for Growers	10, 16
AFTERNOON	
Concurrent Research Sessions:	
Natural Resource Variability	10
Engineering Technology	11
Technology Transfer	11
A to Z Track:	
CyberFarm	10, 16
Poster Session, authors present	10
Tuesday, July 21	12
MORNING	
Concurrent Research Sessions:	
Natural Resource Variability	12
Managing Variability	13
Crop Modeling	13

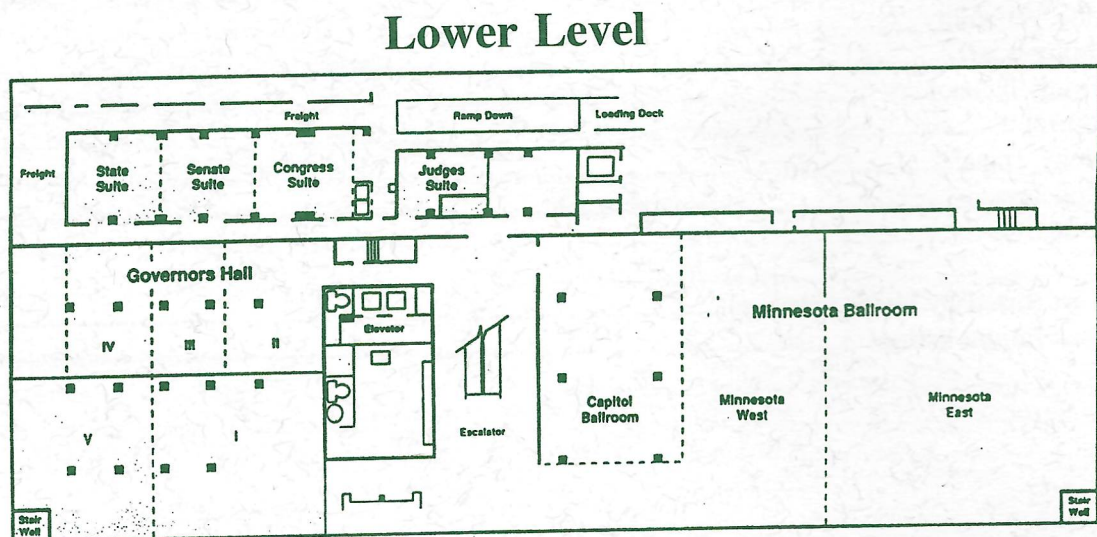
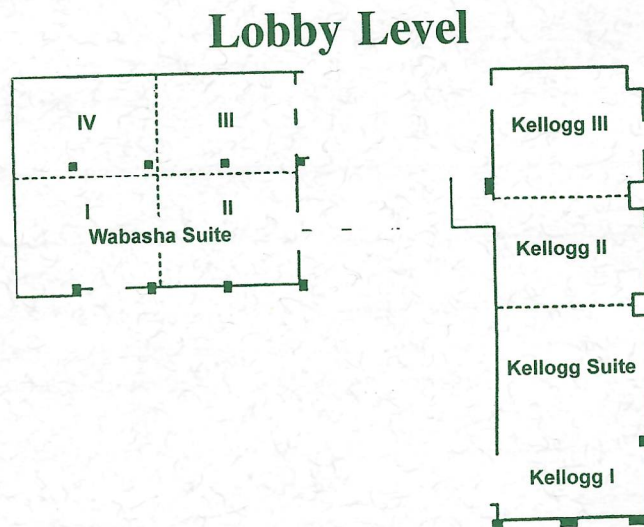
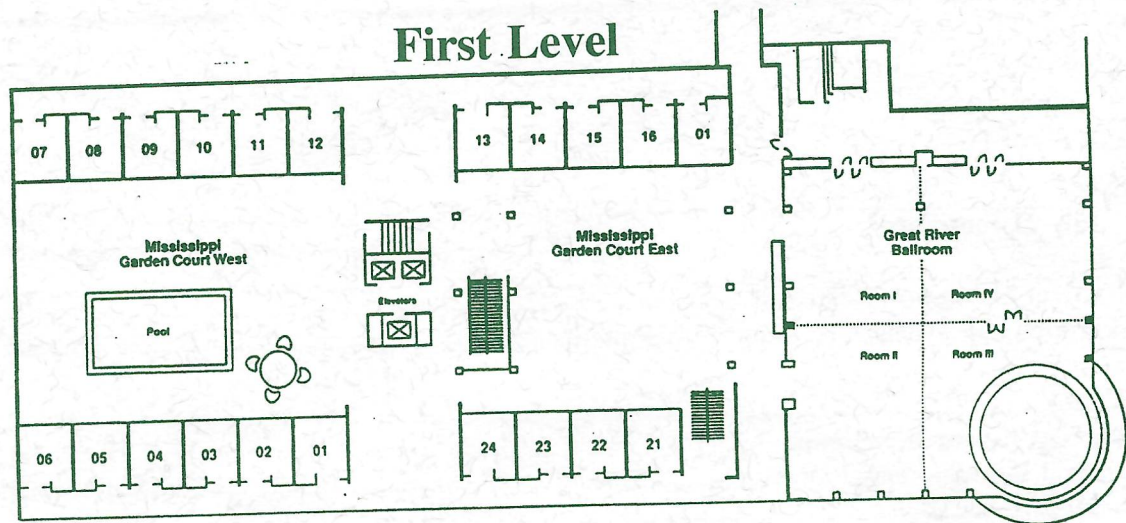


Table of Contents

4th International Conference on Precision Agriculture

	PAGE
MORNING	
Tuesday, July 21 continued	
A to Z Track:	
Nutrient Management Methods	12, 17
Workgroups and Workgroup Room Assignments	12, 18
AFTERNOON	
Concurrent Research Sessions:	
Natural Resource Variability	12
Managing Variability	13
Remote Sensing	13
A to Z Track:	
CyberFarm (repeated)	12, 17
PACE® CyberDealership	12, 17
Wednesday, July 22	14
MORNING	
General Session	14
Concurrent Research Sessions:	
Profitability	14
Managing Variability	15
Remote Sensing	15
A to Z Track:	
Precision Pest Management	14, 17
Poster Session Titles	19
Natural Resource Variability	19
Managing Variability	19
Profitability	20
Engineering Technology	20
Environment	20
Technology Transfer	20
Crop Modeling	21
Remote Sensing	21
Exhibitor List (listed by booth number)	22
Exhibitor List (alpha listing)	24

Radisson Hotel Saint Paul Meeting Room Map





Session Chairs, Moderators and Program Notes

4th International Conference on Precision Agriculture

Sunday, July 19

Concurrent Research Session

- 1:00 Engineering Technology Workshop
Chair: *Tom Colvin, USDA-ARS-NSTL*

A to Z Track

- 2:00 Yield Map Interpretation (YMI) Workshop
Moderator: *Leslie Legg, Precision Agriculture Center, University of Minnesota*

Industry Updates

- 1:00 Moderator: *Grant Mangold, @gInnovator*
1:00 Moderator: *Bob Wanzel, PrecisionAg Illustrated*

Monday, July 20

Concurrent Research Sessions

Natural Resource Variability

- 10:20 Chair: *J. Bouma, Wageningen Agricultural University, The Netherlands*
1:00 Chair: *F. Pierce, Michigan State University*

Engineering Technology

- 10:20 Chair: *S. Searcy, Texas A & M University*
1:00 Chair: *J. Stafford, Silsoe Research Institute, UK*

Environment

- 10:20 Chair: *D. Mulla, Precision Agriculture Center, University of Minnesota*

Technology Transfer

- 1:00 Chair: *S. Swinton, Michigan State University*

A to Z Track

Precision Management Strategies for Growers

- 10:20 Moderator: *Bruce Nowlin, Blue Earth Agronomics*

CyberFarm

- 1:00 Moderator: *Stuart Pocknee, NESPAL, University of Georgia*

Tuesday, July 21

Concurrent Research Sessions

Natural Resource Variability

- 8:00 Chair: *C. Kvien, NESPAL, University of Georgia*
9:40 Chair: *S. Cook, CSIRO, Australia*
1:00 Chair: *G. Nielsen, Montana State University*
3:00 Chair: *A. McBratney, University of Sydney, Australia*

Managing Variability

- 8:00 Chair: *S. Fleischer, Penn State University*
9:40 Chair: *E. Schnug, Institute of Plant Nutrition and Soil Science, Germany*
1:00 Chair: *J. Shanahan, Colorado State University*
3:00 Chair: *G. Johnson, University of Minnesota*

Crop Modeling

- 8:00 Chair: *J. Sadler, USDA-ARS-Florence*
9:40 Chair: *N. McLaughlin, Agriculture Canada Research Branch*

Remote Sensing

- 1:00 Chair: *G. Hart, USDA-ARS-NRI-RSRL (retired)*
3:00 Chair: *R. Heiniger, North Carolina State University*

A to Z Track

Nutrient Management Methods

- 8:00 Moderator: *Scott Murrell, Potash & Phosphate Institute*

CyberFarm

- 1:00 Moderator: *Stuart Pocknee, NESPAL, University of Georgia*

PACE® CyberDealership Workshop

- 2:00 Moderator: *Jim Sulecki, Farm Chemicals & Ag Consultant Magazines*

Wednesday, July 22

Research Concurrent Sessions

Profitability

- 8:00 Chair: *J. Lowenberg-Deboer, Purdue University*

Managing Variability

- 8:00 Chair: *P. Fixen, Potash & Phosphate Institute*

Remote Sensing

- 8:00 Chair: *J. Schepers, USDA-ARS-Lincoln*

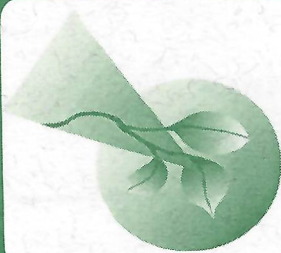
A to Z Track

Precision Pest Management

- 8:00 Moderator: *Zach Fore, Cenex Land O' Lakes*

Conference Changes & Announcements

- Oral presentations list lead authors. All paper contributors are recognized in the Conference Abstract Book.
- Field Equipment Demonstrations have been cancelled.
- Off Site Tours:
 - Ag Chem Manufacturing Plant and Technical Education Center
 - 1) July 22 – 3:00 p.m.
 - 2) July 23 – 9:00 a.m. & 1:00 p.m.



Program Overview

NOTE: Your name badge is your ticket for Conference sessions and meals.
Please wear it at all times while attending Conference events.

Sunday, July 19

11:00-6:00 Registration, *Lobby, Lower Level*

AFTERNOON

1:00-4:40 Concurrent Research Session: Engineering Technology Workshop – Yield Measurements, *Kellogg I*
1:00-5:00 Industry Updates, *Minnesota West Ballroom and Capitol Ballroom*
2:00-5:00 A to Z Track: Yield Map Interpretation, *Kellogg II, III*
3:00-3:20 BREAK, *location near meeting room*
4:00-5:00 Industry Sponsored Session: Ag Chem Software Tools, *Wabasha Suite*
5:00-7:00 Exhibit Opening, *Governor's Hall*
5:00-7:00 Reception and Cash Bar, *Governor's Hall*

Monday, July 20

MORNING

7:00-7:45 Continental Breakfast Buffet, *Minnesota East Ballroom*
7:00-5:00 Registration Continues, *Lobby, Lower Level*
8:00-8:15 Opening Remarks, *Minnesota East Ballroom*
8:15-8:30 Welcome, *Minnesota East Ballroom*
8:30-10:00 General Session, *Minnesota East Ballroom*
10:00-10:20 BREAK, *location near meeting room*
10:20-12:00 A to Z Track: Precision Management Strategies for Growers, *Capitol Ballroom*
10:20-12:00 Concurrent Research Sessions:

- Natural Resource Variability, *Great River Ballroom I*
- Engineering Technology, *Great River Ballroom II*
- Environment, *Great River Ballroom IV*

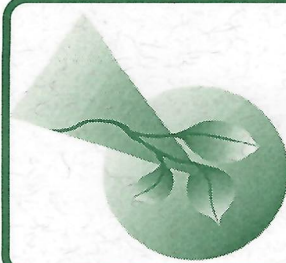
10:00-6:00 Exhibits Open, *Governor's Hall*
11:00-12:00 Industry Sponsored Session: AEA Data Exchange Standards, *Kellogg I*
12:00 LUNCH, *Minnesota East Ballroom*

AFTERNOON

1:00-3:40 Concurrent Research Sessions:

- Natural Resource Variability, *Great River Ballroom I*
- Engineering Technology, *Great River Ballroom II*
- Technology Transfer, *Great River Ballroom IV*

1:00-4:30 A to Z Track: CyberFarm, *Kellogg II, III*
2:40-3:00 BREAK, *location near meeting room*
3:40-6:00 Poster Session, authors present, *Mississippi Garden Court East*
5:00-6:00 Cash Bar, *Governor's Hall*



Program Overview

Tuesday, July 21

MORNING

- 7:00-7:45 Continental Breakfast Buffet, *Minnesota East Ballroom*
7:00-5:00 Registration Continues, *Lobby, Lower Level*
8:00-6:00 Exhibits, *Governor's Hall*
8:00-6:00 Posters on Display, *Mississippi Garden Court East*
8:00-10:40 Concurrent Research Sessions:
 - Natural Resource Variability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Crop Modeling, *Great River Ballroom IV*
8:00-10:40 A to Z Track: Nutrient Management Methods, *Capitol Ballroom*
9:20-9:40 **BREAK**, *location near meeting room*
9:30-10:30 Industry Sponsored Session: SSToolbox-A Power for Precision Farming, *Kellogg I*
10:40-12:00 Workgroups (*see your numbered name badge for room assignment*)
12:00 **LUNCH**, *Minnesota East Ballroom*

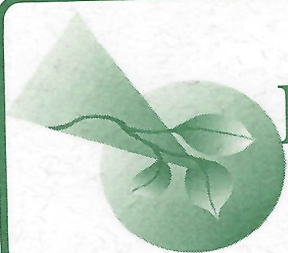
AFTERNOON

- 1:00-5:00 Concurrent Research Sessions:
 - Natural Resource Variability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Remote Sensing, *Great River Ballroom IV*
1:00-4:30 A to Z Track: CyberFarm, *Kellogg II, III*
2:00-5:00 A to Z Track: PACE® CyberDealership Workshop, *Capitol Ballroom*
2:40-3:00 **BREAK**, *location near meeting room*
5:00-6:30 Cash Bar, *Governor's Hall*
6:30 **BANQUET**, *Minnesota Ballroom East*

Wednesday, July 22

MORNING

- 7:00-7:45 Continental Breakfast Buffet, *Minnesota East Ballroom*
7:00-10:00 Registration Continues, *Lobby, Lower Level*
8:00-10:20 Concurrent Research Sessions:
 - Profitability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Remote Sensing, *Great River Ballroom IV*
8:00-10:20 A to Z Track: Precision Pest Management, *Capitol Ballroom*
10:20-10:40 **BREAK**, *location near meeting room*
10:45-11:45 General Session, *Minnesota Ballroom East*
11:45-12:00 Closing Remarks, *Minnesota Ballroom East*



Program — Sunday, July 19

Conference Agenda

11:00 REGISTRATION BEGINS (*Lobby, Lower Level*)

AFTERNOON

1:00 Concurrent Research Session: Engineering Technology Workshop: Yield Measurements, *Kellogg I*

1:00 Industry Updates, *Minnesota West Ballroom & Capitol Ballroom*

2:00 A to Z Track: Yield Map Interpretation Workshop, *Leslie Legg – Precision Agriculture Center; Tom Doerge – Pioneer Hi-Bred International, Inc. — see page 16 for details, Kellogg II, III*

3:00 BREAK, *location near meeting room*

4:00 Industry Sponsored Session: Ag Chem Software Tools, *Wabasha Suite*

5:00 Exhibit Opening, *Governor's Hall*

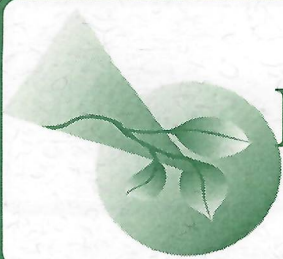
5:00 Reception and Cash Bar, *Governor's Hall*

Concurrent Sessions

Kellogg I

Engineering Technology Yield Measurements

- 1:00** Recent Advances in Yield Monitoring of Conveyor Harvested Crops – *Campbell, Ronald H.*
- 1:20** Evaluation of Sugarbeet Yield Sensing Systems Operating Concurrently on a Harvester – *Hall, Thomas L.*
- 1:40** Development of a Tomato Yield Monitor – *Upadhyaya, Shrini K.*
- 2:00** Mapping Peanut Yield Variability With an Experimental Load Cell Yield Monitoring System – *Durrence, Jeffrey S.*
- 2:20** Vector Method for Determining Harvest Area Using Combine Position Data – *Drummond, Scott T.*
- 2:40** Evaluation of Weighing and Flow-based Cotton Yield Mapping Techniques – *Searcy, Stephen W.*
- 3:00 BREAK**
- 3:20** Cotton Yield Sensor Produces Yield Map – *Gvili, Mike*
- 3:40** Measurement of Grain Yield in Japanese Paddy Field – *Iida, Michihisa*
- 4:00** Yield Deconvolution - A Wetted-Grain Pulse To Estimate The Grain-Flow Transfer Function – *Pringle, Matthew*
- 4:20** Definition, Measurement and Use of Yield Map Resolution – *Whelan, Brett*
- 4:40** Discussion



Program — Sunday, July 19

Concurrent Sessions

Minnesota West Ballroom

Industry Updates

Short presentations from companies with new product or service announcements.

- 1:00 Pioneer Split Planter Comparison Method – *Todd Peterson, Pioneer Hi-Bred International, Inc.*
- 1:25 New Add-Ins for AgLink – *Ted Macy, Agris Corp.*
- 1:50 Case/Tyler...Precision Ag Goes Full Circle – *Martin Rund, Tyler Industries Inc.*
- 2:15 FieldRover Data Collection – *David Waits, SST Development Group*
- 2:40 Concepts for a Public Precision Agriculture Database – *Tom Krill and Mark Fering, John Deere Precision Farming*
- 3:00 BREAK**
- 3:25 Knowledge From Data – *Joe Tevis, Ag Chem Equipment Co.*
- 3:50 SoilRx and VMS 200: New Tools for Data Analysis and Acquisition: – *Carol Snyder, Farmer's Software Association*
- 4:20 Grain Protein Sensors & University Partnerships – *Paul Reep, Milestone Technologies*

Capitol Ballroom

Industry Updates

Short presentations from companies with new product or service announcements.

- 1:00 Remote Sensing Introduction
- 1:15 Remote Sensing at the Ken Hood Farm – *Michael Seal, NASA Project Common Sensing*
- 1:50 Practical and Profitable Applications of AgSense Products – *Greg Knoblauch, Resource21*
- 2:15 The XSTAR Project – *Bernard Coquil, Matra Marconi Space*
- 2:40 Update: Spot Imaging and Precision Agriculture – *Chuck Nichols, Spot Image Corp.*
- 3:00 BREAK**
- 3:25 [Agricultural] Data Collection on a Handheld Computer – *Sandy Browne, FieldWorker Products Limited*
- 3:50 *To Be Announced*
- 4:15 GPS and Precision Ag: Getting the Best Bang for Your Buck – *Gene Hall, Starlink Inc.*



Program and Concurrent Sessions — Monday, July 20

Conference Agenda

MORNING

- 7:00 Continental Breakfast Buffet, *Minnesota East Ballroom*
7:00 Registration continues, *Lobby, Lower Level*
8:00 Opening Remarks: Pierre Robert, Conference Chairman, *Minnesota East Ballroom*
8:15 Welcome — M. Martin, Dean, College of Agricultural, Food & Environmental Sciences, University of Minnesota (*Minnesota East Ballroom*)
8:30 General Session, *Minnesota East Ballroom*

General Session

— Minnesota East Ballroom —

Precision agriculture will profoundly change the relationships between universities, companies and growers, as vast quantities of data originate at the farm, dwarfing what is available from university trials. Grant Mangold, @gInnovator, will talk about the human dimension shaping current adoption trends. Chris Schroeder, Partner at AEC / Centrec Consulting Group will discuss the characteristics that make organizations successful when operating in dynamic environments.

- 10:00 **BREAK**, location near meeting room
10:20 A to Z Track: Precision Management Strategies for Growers — see page 16 for details, *Capitol Ballroom*
10:20 Concurrent Research Sessions:
 - Natural Resource Variability, *Great River Ballroom I*
 - Engineering Technology, *Great River Ballroom II*
 - Environment, *Great River Ballroom IV*10:00 Exhibits, *Governor's Hall*
11:00 Industry Sponsored Session: AEA Data Exchange Standards, *Kellogg I*
12:00 **LUNCH**, *Minnesota East Ballroom*

AFTERNOON

- 1:00 Concurrent Research Sessions:
 - Natural Resource Variability, *Great River Ballroom I*
 - Engineering Technology, *Great River Ballroom II*
 - Technology Transfer, *Great River Ballroom IV*1:00 A to Z Track: CyberFarm — see page 16 for details, *Kellogg II, III*
2:40 **BREAK**, location near meeting room
3:40 Poster Session, authors present, *Mississippi Garden Court East*
5:00 Cash Bar, *Governor's Hall*

Concurrent Sessions

— Great River Ballroom - Room I — Natural Resource Variability

- 10:20 Understanding Variability in Four Fields in the UK — Blackmore, Simon
10:40 Spatial and Temporal Distribution of Surface Water Content in a Large Agricultural Field — Lascano, Robert J.
11:00 Quantifying the Effect of Water Availability on Corn Yield under a Center-Pivot Irrigation System — Morton, Ty W.
11:20 Temporal and Spatial Variation in Soil Nitrate Acquisition by Maize as Influenced by Nitrate Depth Distribution — Walters Daniel T.
11:40 In-Season Spatial Variability of Potato Petiole Nitrogen — King, Bradley A.

- 1:00 Plant Response to Complex Interactions: Soil Test For P and V Interactions With Soybean (Glycine Max L.) — Olness, Alan
1:20 Estimating Spatial Variability of Soil Salinity using Geostatistical Methods — Zhang, Renduo
1:40 Path Analysis of Some Heavy Metal Adsorption by Soil — Irmak, Seyyid
2:00 Spatial and Temporal Variability in Corn Growth, Development, Insect Pressure, and Yield — Karlen, Douglas L.
2:20 Site Specific Relationships Between Flag Leaf Nitrogen, SPAD Meter Values and Grain Protein in Irrigated Wheat — Miller, Robert O.
2:40 **BREAK**
3:00 Weed Seedling Population Responses to a Method of Site-specific Weed Management — Williams II, Martin M.
3:20 Dynamics in the Spatial Continuity of Insect Density — Fleischer, Shelby J.



Program and Concurrent Sessions — Monday, July 20

Concurrent Sessions

— Great River Ballroom - Room II — Engineering Technology

- 10:20 Soil Conductivity Sensing on Claypan Soils: Comparison of Electromagnetic Induction and Direct Methods – *Sudduth, Kenneth A.*
- 10:40 Development of a CAN Based Air Seeder Control System – *Lang, Frank*
- 11:00 Spatial Variability of Water Application from Center Pivot Irrigation and Precipitation – *Jordan, Robert W.*
- 11:20 Soil Doctor® Multi-Parameter, Real-Time Soil Sensor and Concurrent Input Control System – *Colburn, Jr., John W.*
- 11:40 Centimetre-Precision Guidance of Agricultural Implements in the Open Field by Means of Real Time Kinematic (RTK) DGPS – *Van Zuydam, R. P.*
-

- 1:00 Automatic Tractor Row and Contour Control on Sloped Terrain Using Carrier-Phase Differential GPS – *Bell, Thomas*
- 1:20 Comparing GPS Guidance with Foam Marker Guidance – *White, Eric*
- 1:40 The Omnistar Virtual Base Station System – *Ott, Lee*
- 2:00 System for Precise Dosage and Documentation of P, K, and Mg Application – *Lutticken, Ruth*
- 2:20 Surveying Biomass in Plant Populations – *Ehlert, Detlef*
- 2:40 BREAK**
- 3:00 Increasing Productivity of Equipment for Variable Rate Technology – *Skotnikov, Andrey V.*
- 3:20 Precision Agriculture Requires Precise Tuning – *Colvin, Thomas S.*
- 3:40 Applying Soil Electrical Conductivity Technology to Precision Agriculture – *Lund, Eric*

— Great River Ballroom - Room IV — Environment

- 10:20 Targeting Precision Agrichemical Applications to Increase Productivity – *Clay, S. A.*
- 10:40 Influence of Sewage Sludge Application on Soil Quality: I. Organic Matter, pH, Phosphorus, Potassium and Inorganic Nitrogen – *Tsadilas, C. D.*
-

Technology Transfer

- 1:00 The Growth and Development of Precision Agriculture Service Providers – *Casady, William W.*
- 1:20 Yield Mapping of On-farm Co-operative Fields in the SE Coastal Plain – *Sadler, Edward John*
- 1:40 Precision Farming - From Technology to Decisions: A Case Study – *Fleming, Kim L.*
- 2:00 Decision Making Strategies for Fertiliser Use in Precision Agriculture – *Schnug, Ewald*
- 2:20 Using the Decision Support System for Agriculture (DSS4Ag) for Wheat Fertilization – *Hoskinson, Reed L.*
- 2:40 BREAK**
- 3:00 Analysis and Design of an Information System for Spatially Variable Field Management – *Bergeijk, Jaap Van*
- 3:20 Adoption of Precision Agriculture Technologies by U.S. Corn Producers – *Daberkow, Stan G.*



Program and Concurrent Sessions — Tuesday, July 21

Conference Agenda

MORNING

- 7:00 Continental Breakfast Buffet, *Minnesota East Ballroom*
- 7:00 Registration continues, *Lobby, Lower Level*
- 8:00 Exhibits, *Governor's Hall*
- 8:00 Posters on Display, *Mississippi Garden Court East*
- 8:00 Concurrent Research Sessions:
- Natural Resource Variability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Crop Modeling, *Great River Ballroom IV*
- 8:00 A to Z Track: Nutrient Management Methods — see page 17 for details, *Capitol Ballroom*
- 9:20 **BREAK**, location near meeting room
- 9:30 Industry Sponsored Session: SStoolbox-A Power for Precision Farming, *Kellogg I*
- 10:40 Workgroups (see your numbered name badge and page 20 for room assignment)
- 12:00 **LUNCH**, *Minnesota East Ballroom*

AFTERNOON

- 1:00 Concurrent Research Sessions:
- Natural Resource Variability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Remote Sensing, *Great River Ballroom IV*
- 1:00 A to Z Track: CyberFarm — see page 17 for details, *Kellogg II, III*
- 2:00 A to Z Track: PACE® CyberDealership Workshop — see page 17 for details, *Capitol Ballroom*
- 2:40 **BREAK**, location near meeting room
- 5:00 Cash Bar, *Governor's Hall*
- 6:00 Poster Display Closes
- 6:30 **BANQUET**, *Minnesota Ballroom East*
- Banquet Announcements
 - FARM CHEMICALS magazine will present their SITELINER awards.
 - "The Company" will provide improvisational entertainment.

Concurrent Sessions

— Great River Ballroom - Room I — Natural Resource Variability

- 8:00 Precision Agriculture - Development of a Hierarchy of Variables Influencing Crop Yields — Runge, E. C. A.
- 8:20 Spatial Statistical Analysis of On-Site Crop Yield and for Site-Specific Management — Wendroth, Ole
- 8:40 Mapping and Interpretation of Sugar Beet Yield Differences — Broos, Bert
- 9:00 Learning from Yield Monitor Data: A Bayesian Approach — Hopkins, Jeffrey W.
- 9:20 **BREAK**
- 9:40 Effect of Soil Morphology on Crop Yield and Nutrient-Use Efficiency Responses for a Northern, Glaciated Landscape — Braum, Sebastian
- 10:00 Soil Surface Curvature and the Spatial and Temporal Variability of Corn Grain Yields on a Hillslope — Timlin, Dennis J.
- 10:20 Variability Scales of Surface Soil Sorptivity — Smith, Roger E.

-
- 1:00 Using Yield Maps to Regionalise Fields into Potential Management Units — Stafford, John V.
- 1:20 Soil Map Unit Composition and Scale of Mapping Related to Interpretations for Precision Soil and Crop Management in Iowa — Fenton, Thomas E.
- 1:40 Systematic Evaluation of Precision Farming Soil Sampling Requirements — Clay, David E.
- 2:00 Geoestatistical Applications in Mapping of Crop Yield and Soil Properties — Vieira, Sidney R.
- 2:20 Comparison of Interpolation Methods for Mapping Soil P and K Contents — Kravchenko, A. N.
- 2:40 **BREAK**
- 3:00 Aerial Photography and Satellite Imagery to Detect Deep Soil N Levels in Potato and Sugarbeet — Franzen, David W.
- 3:20 Monitoring Spatially Variable Crop Condition by Imaging Radiometry — Stafford, John V.
- 3:40 Utilization of Thermal Infrared Images to Detect Very Early Disease Spots — Duchesne, Jean
- 4:00 Emerging Concepts for Solving the Enigma of Precision Farming Research — Nielsen, Donald R.



Program and Concurrent Sessions — Tuesday, July 21

Concurrent Sessions

—Great River Ballroom - Room II—

Managing Variability

- 8:00 Precision Agriculture: A Unique Tool to Unify Production and Environmental Requirements in Agriculture – *Bouma, Johan*
- 8:20 On-Farm Testing Using the Adjacent Strip Comparison Method – *Doerge, Thomas A.*
- 8:40 On-farm Experimentation to Determine Site-Specific Responses to Variable Inputs – *Cook, Simon E.*
- 9:00 Precision Farming in Asia: Prospects and Progress – *Srinivasan, Ancha*
- 9:20 BREAK**
- 9:40 Selection and Application of Cultivars to Different Sites Within a Field – *Heiniger, Ronnie W.*
- 10:00 Spatial Potato Seed Piece Placement Monitoring System – *Hess, J. Richard*
- 10:20 Precision Agriculture in England - Current Practice and Research-based Advice to Farmers – *Dampney, Peter M.R.*
-
- 1:00 Evaluation of Site-Specific Corn and Soybean Management Systems in the Midwest – *Reetz, Jr., Harold F.*
- 1:20 Comparisons of Uniform and Variable Rate Fertilization Strategies Using Grid Soil Sampling, Variable Rate Technology and Yield Monitoring – *Yang, Chenghai*
- 1:40 Variable-Rate Phosphorus Fertilization: On-Farm Research Methods and Evaluation for Corn and Soybean – *Mallarino, Antonio P.*
- 2:00 Evaluation of Variable Rate N Use to Combinable Crops in England – *Dampney, Peter M.R.*
- 2:20 Variable Nitrogen Application - Effects on Crop Yield and Quality – *Thylen, Lars*
- 2:40 BREAK**
- 3:00 Using Field and Crop Characteristics for Site Specific Nitrogen Management on a Winter Wheat Crop – *Boisgontier, Denis*
- 3:20 Site-Specific Nitrogen Management of Irrigated Corn – *Ferguson, Richard B.*
- 3:40 Phosphorus Fertilizer Management Strategies for Variable Rate Fertilizer Applications in Center Pivot Irrigated Potato Rotations – *Davenport, Joan R.*
- 4:00 The Values of Precision for Weed Management in Broadacre Cropping Systems – *Cox, Peter*
- 4:20 Application of Precision Agriculture to Sugar Cane – *Cox, Graeme*
- 4:40 Precision Management of Soil Organic Carbon in Tea Lands of Sri Lanka – *Anandacoomaraswamy, A.*

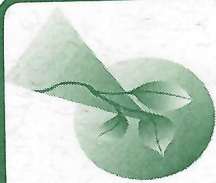
—Great River Ballroom - Room IV—

Crop Modeling

- 8:00 Development of a Soil Database to Support an Integrated Model-Based Approach to Precision Agriculture at the Farm Level – *Van Alphen, Jeroen B.*
- 8:20 Model-Based Technique to Determine Variable Rate Nitrogen for Corn – *Batchelor, William D.*
- 8:40 Performance of a Cotton Simulation Model in a Precision Farming Study. – *Landivar, Juan A.*
- 9:00 Evaluation of Crop Models to Simulate Site-specific Crop Development and Yield – *Fraisse, Clyde W.*
- 9:20 BREAK**
- 9:40 Simulation of Within Field Variability of Corn Yield with CERES-Maize – *Pierce, Francis J.*
- 10:00 Use of Simulation Models for Yield Map Interpretation and Yield Prediction of Dryland Wheat in Western Australia – *Adams, Matthew L.*
- 10:20 A Landform Segmentation Model to Support Precision Farming Decisions – *Pettapiece, Wayne W.*

Remote Sensing

- 1:00 Applying Remote Sensing Technology to Precision Farming – *Johannsen, Chris J.*
- 1:20 Spatial and Temporal Variability of Corn Canopy Reflectance – *Walthall, Charles L.*
- 1:40 Radar Imagery for Precision Crop and Soil Management – *Moran, M. Susan*
- 2:00 Remote Sensing Research in Wisconsin Soybean and Corn Production Fields – *Schuler, Ronald T.*
- 2:20 Mapping In-Season Soil Nitrogen Variability Assessed Through Remote Sensing – *Diker, Kenan*
- 2:40 BREAK**
- 3:00 Developing Calibration Techniques to Map Yield Potential Using Remote Sensing – *Wood, Gavin A.*
- 3:20 Assessing Yield Parameters by Remote Sensing Techniques – *Willis, Patrick R.*
- 3:40 Corn and Soybean Yield Indicators Using Remotely Sensed Vegetation Index – *Zhang, Minghua*
- 4:00 Tomato Yield - Color Infrared Photograph Relationships – *Pettygrove, G. Stuart*
- 4:20 Evaluating Commercial Cranberry Beds for Variability and Yield using Remote Sensing Techniques – *Oudemans, Peter V.*



Program and Concurrent Sessions — Wednesday, July 22

Conference Agenda

MORNING

- 7:00 Continental Breakfast Buffet, *Minnesota East Ballroom*
- 7:00 Registration continues, *Lobby, Lower Level*
- 8:00 Concurrent Research Sessions:
- Profitability, *Great River Ballroom I*
 - Managing Variability, *Great River Ballroom II*
 - Remote Sensing, *Great River Ballroom IV*
- 8:00 A to Z Track: Precision Pest Management —
see page 17 for details, Capitol Ballroom
- 10:20 **BREAK**, *location near meeting room*
- 10:45 **General Session**, *Minnesota Ballroom East*

General Session

—Minnesota East Ballroom—

Decision Support Systems have had a head start in the health care industry. Peter Amadio, MD and Chair, Information Infrastructure Policy Committee, Mayo Foundation, will discuss the evolution of the little black bag to the famous “black box” as a tool for diagnosis, dosing, and monitoring treatment results.

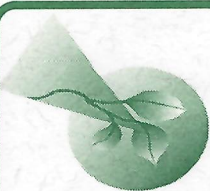
As we focus on challenges of creating accurate sensors and crafting site specific recommendations, it's easy to lose sight of the fundamental forces sharing how these capabilities will be deployed. Marc Vanacht, Metz-Vanacht Co., will picture possible future scenarios for precision agriculture, considering economic drivers and technological opportunities.

- 11:45 Closing Remarks, *H.H. Cheng, (Minnesota Ballroom East)*

Concurrent Sessions

—Great River Ballroom - Room I— Profitability

- 8:00 Evaluating the Economics of Precision Agriculture — *Snyder, Carol*
- 8:20 Spatial Break-Even Variability for Variable Rate Technology Adoption — *English, Burton C.*
- 8:40 Additional Analysis Tools Based on Yield Data — *Watkins, Hal*
- 9:00 Economics of Variable Rate Planting for Corn — *Lowenberg-DeBoer, J.*
- 9:20 Economics of Variable Rate Lime in Indiana — *Bongiovanni, Rodolfo*
- 9:40 Economic Returns and Environmental Impacts of Variable Rate Nitrogen Fertilizer and Water Applications — *Watkins, Brad*
- 10:00 From Data To Information: Adding Value To Site-Specific Data — *Swinton, Scott M.*
- 10:20 **BREAK**



Program and Concurrent Sessions — Wednesday, July 22

Concurrent Sessions

—Great River Ballroom - Room II— Managing Variability

- 8:00 Patch Spraying and Rational Weed Mapping in Cereals – *Christensen, Svend*
- 8:20 Modulation of Economically Important Cotton Fiber Properties by Field Spatial Variability – *Bradow, Judith M.*
- 8:40 Grain Protein Mapping for Precision Management of Dryland Wheat – *Long, Dan S.*
- 9:00 Yield Response of Wheat and Canola to a Topographically Based Variable Rate Fertilization Program in Saskatchewan – *Pennock, Dan*
- 9:20 The Accuracy of Site Specific Fertilizer Application; The Effect on Yield – *Goense, Daan*
- 9:40 Regression Analysis of Yield Monitor Data and Its Use in Fine Tuning Crop Decisions – *Kessler, Mark C.*
- 10:00 Integrating Precision Farming Tools to Achieve Sustainability – *Gaultmey, Larry D.*
- 10:20 BREAK**

—Great River Ballroom - Room IV— Remote Sensing

- 8:00 Remote Sensing as an Aid for The Spatial Management of Nutrients – *Schnug, Ewald*
- 8:20 Application of Remote Sensing to Irrigation Management in California Cotton – *Plant, Richard E.*
- 8:40 Application of Remote Sensing to Irrigation Management in California Cotton: Factors Influencing Vegetative Growth – *Munk, Daniel*
- 9:00 Spectral Reflectance Pattern Recognition for Segmenting Corn Plants and Weeds – *Hummel, John W.*
- 9:20 Sensor for Weed Detection Based on Spectral Measurements – *Wambacq, Patrick*
- 9:40 Use of Digital Imagery to Evaluate Disease Severity and Yield Loss Caused by White Mold of Soybeans – *Kurle, Jim*
- 10:00 Interest of Superspectral Remote Sensing Data and Agronomic Reflectance Models for Crop Management – *Coquil, Bernard*
- 10:20 BREAK**



A to Z Track Sessions — July 19 – 22

The A to Z Track presents “field ready” information in interactive sessions designed for consultants, dealers and growers. It is one of nine session tracks open to all participants at the 4th International Conference on Precision Agriculture.

Sunday, July 19

2:00-5:00 Yield Map Interpretation, *Kellogg II, III*

An interactive session that will lead participants through the interpretation process with the Precision Agriculture Center's training software. Participants will identify common map patterns, create profit maps, and debate decisions. Pioneer will provide an update of yield monitor accuracy.

Participants in this workshop can receive a \$150 discount on purchases of single user licenses for the YMI software (a \$345 value).

*Leslie Legg – Precision Agriculture Center;
Tom Doerge – Pioneer Hi-Bred International, Inc.*

Monday, July 20

10:20-12:00 Precision Management Strategies for Growers, *Capitol Ballroom*

Managing for growth or incremental improvements, water quality protection, or commodity crop differentiation—panel members will discuss diverse strategies for increasing returns with precision agriculture. Participants include

Chad Hertz–Herz Farm Management, Rob Myers–Red Top Farms, Steve Core–Corn Plus, Bruce Nowlin–Blue Earth Agronomics, and Ken Dalenberg–Scattered Acres Farm.

1:00-4:30 CyberFarm, *Kellogg II, III*

A “users group” session that explores the information management side of precision agriculture. The format will include brief presentations, discussions, and interactive computer demonstrations.

Topics are:

- How I Became a Computer Geek (but I still hate computers!)
- Precision Info on the Net
- Precision Data: Managing Too Much of a Good Thing
- Analysis and Overlays with GIS

Facilitators include: *Dennis Lindsay–Lindsay Farms & Monsanto, Stuart Pocknee–NESPAL/University of Georgia, Todd Golly–Ag Prophets, Craig Nelson–Mycogen Seeds, Matt Krusemark–University of Minnesota.*

(Session repeated Tuesday, 1:00-4:30 pm)



A to Z Track Sessions — July 19 – 22

Tuesday, July 21

8:00-10:40 Nutrient Management Methods, *Capitol Ballroom*

Methods for measuring and optimizing fertility given field variability, climatic conditions, and economic returns.

Topics are:

- Selecting Sampling Methods
- Capturing Mobile Nutrients
- Managing Manure
- Prescriptions & Profitability

Speakers include: *Scott Murrell—PPI, David Mulla—University of Minnesota, Dave Franzen—North Dakota State University, Wayne Thompson—Edaphos Limited, Lance Murrell—Erny's Fertilizer.*

1:00-4:30 CyberFarm (repeated - see program from Monday), *Kellogg II, III*

Facilitators include: *Dennis Lindsay—Lindsay Farms & Monsanto, Stuart Pocknee—NESPAL/University of Georgia, Todd Golly—Ag Prophet, Craig Nelson—Mycogen Seeds, Matt Krusemark—University of Minnesota.*

2:00-5:00 PACE® CyberDealership Workshop, *Capitol Ballroom*

Marketing and implementation strategies for providers of site specific services. The session includes:

- Adoption Trends Survey Results
- Service Marketing Tactics
- Case Study: GIS for Marketing & Distribution
- Case Study: A Full Service Retailer
- Case Study: Independents with Partners
- Panel Discussion: Presenters & Audience

Jim Sulecki—Farm Chemicals Magazine, Scott Swinton—Michigan State University, John Ahlrichs—Cenex Land O' Lakes, Perry Petersen (retired)—Terra, Bernie Paulson—McPherson Crop Management

Wednesday, July 22

8:00-10:20 Precision Pest Management, *Capitol Ballroom*

Precision pest management offers great potential for reducing the volumes of crop protection products applied, yet many commercial solutions are still in development. Hear the latest from science and industry on what's coming and what's available now.

- Nematodes
- Weed Distribution Patterns
- More Effective Scouting
- Spot Applications that Pay

Participants include: *Zach Fore—Cenex Land O' Lakes, Dave Mortensen—University of Nebraska, Lanny Ashlock—University of Arkansas, Montie Milner—Midwest Crop Consulting, Craig Kvien—NESPAL/University of Georgia*



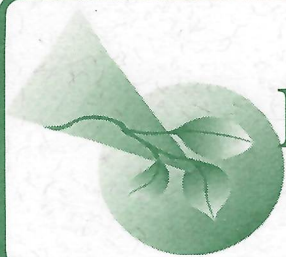
Workgroup Session

Various rooms

Your name badge is numbered in the lower left-hand corner — this number corresponds with the room that you are assigned to. Please find that number in this group and find the room indicated for the Workgroup Session.

<u>Number</u>	<u>Room Name</u>
1	Congress East
2	Congress West
3	Great River Annex
4	Great River I
5	Great River II
6	Great River III
7	Great River IV
8	Guest Room #121

<u>Number</u>	<u>Room Name</u>
9	Guest Room #122
10	Kellogg I
11	Senate
12	State
13	Wabasha I
14	Wabasha II
15	Wabasha III
16	Wabasha IV



Poster Session

Mississippi Garden Court East

(Posters are grouped by theme within each track.)

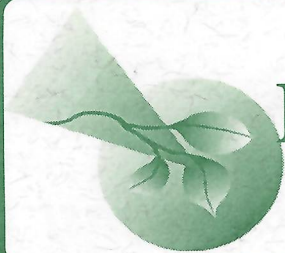
Natural Resource Variability

Comparison of GPS Methods for Deriving Terrain Attributes, *Tim Fiez*
Testing Quality of Soil Survey Geographic (SSURGO) Database for Precision Farming, *Robert Stermitz*
Grid Soil Sampling to Determine Manageable Physical and Chemical Properties Affecting Soybean Production, *Michael S. Cox*
A GIS-Based Model for Soil Sampling Strategies, *Andrey V. Skotnikov*
Evaluating Farmer Developed Management Zone Maps for Precision Farming, *Kim L. Fleming*
Temporal Changes in Fractal Dimensions of Soil Cracks with Desiccation, *K. Noborio*
Some Characteristics of Old River Terraces Soils in the Kizilirmak Plain of Turkey, *Seyyid Irmak*
Morphology of Three Terra Rossa Soils in the East Mediterranean Region of Turkey, *Seyyid Irmak*
The Salinity Problems of Some Quaternary Soils in the Central Anatolia Region of Turkey, *Seyyid Irmak*
Influence of Initial Moisture Content and Dissolved Organic Carbon (DOC) on Zinc Sorption by Two Arid Zone Soils, *A. M. Falatah*
Determination of Subsurface Flow Characteristics for the Installation of Groundwater Samplers, *Wayne P. Dulaney*
Variability of Corn/Soybean Yield and Soil/Landscape Properties Across a Southwestern Minnesota Landscape, *Bhairav R. Khakural*
Soil Specific Variability of P Fertility Status and P Sorption Characteristics in Clay Soils of the Montreal Lowlands Area (Quebec), *Michel C. Nolin*
Spatial Distribution of Soil Nitrogen Supplying Power: A Tool for Precision Farming, *Fernando Selles*
Corn Yield Response to 'D'Y Predicted Variable N Fertilization: An Ontario Field Study, *Ivan P. O'Halloran*
Spatial Variability of Soil Properties and Productivity Within Field at the Central-Chernozem Region of Russia, *Alvira G. Vasseneva*
A Suitability Analysis of Intensive Cropping in the Semi-Arid Central Great Plains, *H. Raymond Sinclair, Jr.*
Soil-Cover Quality Assessment System for Field Scale, *Ivan I. Vassenev*
Irrigated Corn Yield as Related to Spatial Variability of Selected Soil Properties, *Antonio M. Coelho*

Crop Yield Variability as Influenced by Water in Rain-fed Agriculture, *Sally Logsdon*
Predicting Yield Variability for Corn Grown in a Silty-Clay Soil in Northern Italy, *Rosa Marchetti*
Yield Response to Nitrogen Within Landscape Classes, *Sheilah C. Nolan*
Detection and Mapping of Soil Variability with a Yield Monitor, *Steven Winter*
Spatial Variability of Cotton Fiber Yield and Quality in Relation to Soil Variability, *Richard M. Johnson*
Mapping Weed Populations: The Cost of Counting and Identifying Seedlings and Seed, *L. J. Wiles*
Spatial Sampling for Crop Pests in Two Center Pivot Irrigated Fields, *Dawn Y. Wyse-Pester*
Spatial Variability in Corn Rootworm Distribution in Relation to Spatially Variable Soil Factors and Crop Condition, *Michael M. Ellsbury*
Rainfall Variability and Spatial Patterns for the SouthEast, *David D. Bosch*
Variability in Space of Podzoluvisol's Properties: Large Scale Study, *Jouliia Meshalkina*
Using Precision Agriculture to Enhance Landscape Structure in a Cornbelt Agricultural Watershed, *Robert C. Corry*
Impact of Topography and Management on Diseases of Canola and Wheat, *Randy Kutcher*
Phosphorous Extractability and Mobility in Soils as Affected by Polymer Amendment, *A. M. Falatah*

Managing Variability

Strategies for Variable Rate Nitrogen Fertilization in Hummocky Terrain, *Alan P. Moulin*
Side-by-Side Comparisons of Uniform and Site-Specific Nutrient Applications, *Ronnie W. Heiniger*
Use of Animal Wastes to Compensate for Spatial Variability, *Timothy J. Masek*
Precision Management of Fertilizer (P and K) for Potato Crop in Quebec, Canada, *Athyna N. Cambouris*
Implementation of Precision Fertilizing Concepts on Practical Farms in Western Germany, *Ruth Luticken*
Weed Management With Site-Specific Herbigation, *Charlotte V. Eberlein*



Poster Session

Mississippi Garden Court East

Managing Variability continued

- Spatial Variation in Atrazine Field Dissipation and Laboratory Mineralization and Their Relationship to Weed Control, *Zhuojing Liu*
- Planter and Seedbed Induced Variability, *Christopher, J. Fagan*
- Operationalisation of Precision Agriculture on a Large Scale Farm Estate in Eastern Germany, *Ewald Schnug*
- Use of Precision Farming Practices in Grape Production, *Robert L. Wample*
- Evaluating Commercial Cranberry Bogs for Variability: Developing Information for Precision Management, *Joan R. Davenport*
- A study of Traditional Methods on Soil Tillage in China, *Wang Xing-guang*
- Tidal Swamp Reclamation by Fork Irrigation Model at Center Kalimantan, Indonesia, *Afandie Rosmarkam*
- Soil Fertility Distribution in Livestock Production Systems with Pastures Directly Grazed, *Martin Diaz Zorita*
- An Integrated Nutrient Management System for Sustainable Rice Production, *Karamat R. Sistani*
- Using Some Precision Farming Applications to Assess Crop Yield in Relation to Soil pH Variability, *Ed F. Woodrow*
- Agricultural Ground Truthing GPS-GIS System, *Mark A. McGovern*
- Using GPS to Scout Cotton for Variable Rate Pix (Mepiquat Chloride), *Mary E. Thurman*
- Precision Peat Production, *S. M. Ward*
- Unevenness of Fertilizer Distribution and Determination of the Application Rate, *Joseph Kaplan*

Profitability

- Impact of Spatial Resolution on the Potential Profitability of Site-Specific N and P Management of Corn
Gary L. Malzer

Engineering Technology

- Elevation Comparisons Using Two Different Global Positioning Systems for Precision Farming, *David E. Clay*
- Use of Aerospace Structural Sensor Technology for Soil Physical Characterization, *Reed L. Hoskinson*

Engineering Technology continued

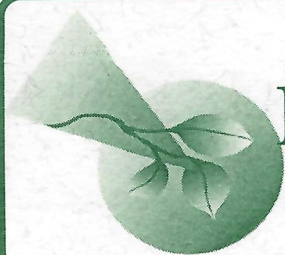
- Field Comparison of Two Soil Electrical Conductivity Measurement Systems, *Robert M. Fritz*
- Integrated Weighing Platform for Manure Spreader Regulation, *Philippe Zwaenepoel*
- Evaluation of Commercial Cotton Yield Monitors in Georgia Field Conditions, *Calvin D. Perry*
- Soybean Moisture Content Measurement Based on Impact Force Parameters, *Brian L. Steward*
- Scheduling of Site Specific Fertilizer Applications, *Daan Goense*
- The ISO 11783 Standard and Its use in Precision Agriculture Equipment, *Carlos E. Cugnasca*

Environment

- Site-Specific Herbicide Management for Preserving Water Quality, *Bhairav R. Khakural*
- Influence of Sewage Sludge Application on Soil Quality: II. Heavy Metals, *C. D. Tsadilas*
- Heavy Metals Content of Commercial Inorganic Fertilizers Marketed in the Kingdom of Saudi Arabia, *A. S. Modaihsh*
- Evaluating the Environmental Implications of Precision Agriculture in the Midwest Corn Belt, *U. Sunday Tim*

Technology Transfer

- Information System for Farms using Precision Agriculture Techniques; Compatibility with EDI Standards, *Gilbert Grenier*
- Technology-mediated Learning Environment in Precision Agriculture, *U. Sunday Tim*
- Weather Induced Variability in Site-Specific Management Profitability: A Case Study, *Ricardo P. Braga*
- Precision Agriculture at The University of Minnesota-Crookston: Combining "Hands-On" with "High Tech", *Aziz Rahman*
- Agroindustrial Sector Global Evaluation System, *George Sugai*
- Management-Oriented Model Guiding Within-season Nitrogen Management, *Russell Yost*



Poster Session

Mississippi Garden Court East

Technology Transfer continued

Site-Specific Agriculture Workshops Assist Farmers to Understand and Manage Soil-Landscape Variability, *Ronald L. McNeil*
Validation and Implementation of a Coordinated Precision Agricultural Curriculum, *Terry Brase*

Crop Modeling

Identifying Agroecozones in the Central Great Plains, *Randy L. Anderson*
An Object Model of Information Systems for Precision Agriculture, *Antonio Mauro Saraiva*
NLEAP Simulation of Crops and Soil Type Effects on Residual NO₃—N in the San Luis Valley, *Jorge A. Delgado*
Weed Detection in Field Corn Using High Resolution Multispectral Digital Imagery and Field Scouting, *Brian L. Broulik*
Predicting The Effect of N Deficiency on Maize Crop Duration and Yield, *Upendra Singh*
Potential Effects of N-Fertilization Scenarios in Small Watersheds in Southern Ontario, *Glaucio Roloff*

Remote Sensing

Remote Sensing as a Guide to Directed Sampling for Improved Site-Specific Management, *Devon D. Liston*
Directed Sampling Strategies Using Topography as a Basis, *David W. Franzen*
Evaluation of General Weed Management (GWM) Model: A Computerized Bioeconomic Weed Decision Aid for Row Crops, *Brian L. Broulik*
A Digital Camera System for Weed Detection, *Svend Christensen*
Weed Detection Based on Structural Information Using an Imaging Spectrograph, *Patrick Wambacq*
Image Analysis of 35-mm Aerial Photography for Estimating Various Plant Parameters, *Walter Bausch*
Spectral Properties of Sugarbeets Related to Sugar Content and Quality, *Daniel Humburg*
Spatial High Resolution Crop Measurements with Airborne Hyperspectral Remote Sensing, *Jean C. Deguise*



Exhibitor List (by booth number)

4th International Conference on Precision Agriculture

Booth Number	Company	Booth Number	Company
1	Rawson Control Systems, Inc. 116 2nd Street SE Oelwein, IA 50662	13	AGRIS Corporation 300 Grimes Bridge Rd Roswell, GA 30075
2	Precision Agriculture Center 439 Borlaug Hall 1991 Upper Buford Circle St. Paul, MN 55108	14, 34	Ag-Chem Equipment Co., Inc. 5720 Smetana Drive – Ste 100 Minnetonka, MN 55343
3	Pacific Meridian Resources 421 SW 6th Ave – Ste 850 Portland, OR 97204	15	RDI Technologies, Inc. 300 Highway 23, Suite One Spicer, MN 56288
4	Ag Leader Technology 1203A Airport Rd Ames, IA 50010	16	Agri ImaGIS 5174 30th St NE Maddock, ND 58348
5	Farmer's Software Association 800 Stockton Ave #2 Ft. Collins, CO 80524	17	Spectrum Technologies, Inc. 23839 W Andrew Rd Plainfield, IL 60544
6, 7	Concord Environmental Equipment RR 1, Box 78 Hawley, MN 56549	18	Vergis Technologies 601 N Broadway Salina, KS 67401
8	Leica Geosystems Inc. 3155 Medlock Bridge Rd Norcross, GA 30071	19	Omnistar, Inc. 8200 West Glen Houston, TX 77063
9	Micro Images Inc 201 North 8th St Lincoln, NE 68508	20	Raven Industries PO Box 5107 Sioux Falls, SD 57117
10	Noetix Research Inc #403 – 265 Carling Ave Ottawa, Ontario K1S 2E1 CANADA	21	Centrak 210 East Kiowa Fort Morgan, CO 80701
11	DICKEY-john Corporation 5200 DICKEY-john Rd Auburn, IL 62615-0010	22	Mid-Tech 2733 E Ash St Springfield, IL 62703
12	RESOURCE21 7257 South Tucson Way Englewood, CO 80112	23, 24	Gempler's, Inc. PO Box 270 Mt.Horeb, WI 53572



Exhibitor List (by booth number)

4th International Conference on Precision Agriculture

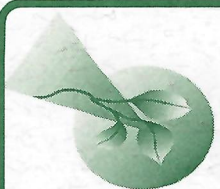
Booth Number	Company	Booth Number	Company
25, 26	Trimble Navigation Limited 9290 Bond St – Ste 102 Overland Park, KS 66214	41	Field Worker Products Limited H6-1477 Bay View Avenue Toronto, ON M4G 3B2, Canada
27	satcon system GmbH Obertheres, Bavaria 97531 GERMANY	42	ERDAS, Inc 2801 Buford Highway Atlanta, GA 30032
28	Highway Equipment Company 616 D Ave NW Cedar Rapids, IA 52405	43	Emerge 900 Technology Park Dr, Bldg 8 Billerica, MA 01821
29, 30	ESRI 380 New York St Redlands, CA 92373	44	Precision Ag Illustrated Magazine 15444 Clayton Rd – Ste 314 Ballwin, MO 63011
31	MapInfo Corporation One Global View Troy, NY 12180	45	SST Development Group, Inc. 824 N Country Club Rd Stillwater, OK 74075
32	Kluwer Academic Publishers 101 Philip Drive Norwell, MA 02061	46	Farm Chemicals/Ag Consultant 37733 Euclid Ave Willoughby, OH 44094
33	Farm Works Software PO Box 250 Hamilton, IN 46742	47	Tyler Industries, Inc P.O. Box 249 Benson, MN 56215
35, 36	TeeJet Technologies 7200 France S – Ste 128 Edina, MN 55435		
37, 38	KVH Industries, Inc. 50 Enterprise Center Middletown, RI 02842		
39	Potash & Phosphate Institute 14030 Norway St NW Andover, MN 55304		
40	Starlink Incorporated 6400 Highway 290 E – Suite 202 Austin, TX 78723		



Exhibitor List (alpha listing)

4th International Conference on Precision Agriculture

Company	Booth Number	Company	Booth Number
Ag-Chem Equipment Co., Inc. 5720 Smetana Drive – Ste 100 Minnetonka, MN 55343	14, 34	Farm Works Software PO Box 250 Hamilton, IN 46742	33
Ag Leader Technology 1203A Airport Rd Ames, IA 50010	4	Farmer's Software Association 800 Stockton Ave #2 Ft. Collins, CO 80524	5
Agri ImaGIS 5174 30th St NE Maddock, ND 58348	16	Field Worker Products Limited H6-1477 Bay View Avenue Toronto, ON M4G 3B2, Canada	41
AGRIS Corporation 300 Grimes Bridge Rd Roswell, GA 30075	13	Gempler's, Inc. PO Box 270 Mt.Horeb, WI 53572	23, 24
Centrak 210 East Kiowa Fort Morgan, CO 80701	21	Highway Equipment Company 616 D Ave NW Cedar Rapids, IA 52405	28
Concord Environmental Equipment RR 1, Box 78 Hawley, MN 56549	6, 7	Kluwer Academic Publishers 101 Philip Drive Norwell, MA 02061	32
DICKEY-john Corporation 5200 DICKEY-john Rd Auburn, IL 62615-0010	11	KVH Industries, Inc. 50 Enterprise Center Middletown, RI 02842	37, 38
Emerge 900 Technology Park Dr, Bldg 8 Billerica, MA 01821	43	Leica Geosystems Inc. 3155 Medlock Bridge Rd Norcross, GA 30071	8
ERDAS, Inc 2801 Buford Highway Atlanta, GA 30032	42	MapInfo Corporation One Global View Troy, NY 12180	31
ESRI 380 New York St Redlands, CA 92373	29, 30	Micro Images Inc 201 North 8th St Lincoln, NE 68508	9
Farm Chemicals/Ag Consultant 37733 Euclid Ave Willoughby, OH 44094	46	Mid-Tech 2733 E Ash St Springfield, IL 62703	22



Exhibitor List (alpha listing)

4th International Conference on Precision Agriculture

Company	Booth Number	Company	Booth Number
Noetix Research Inc #403 – 265 Carling Ave Ottawa, Ontario K1S 2E1 CANADA	10	satcon system GmbH Obertheres, Bavaria 97531 GERMANY	27
Omnistar, Inc. 8200 West Glen Houston, TX 77063	19	Spectrum Technologies, Inc. 23839 W Andrew Rd Plainfield, IL 60544	17
Pacific Meridian Resources 421 SW 6th Ave – Ste 850 Portland, OR 97204	3	SST Development Group, Inc. 824 N Country Club Rd Stillwater, OK 74075	45
Potash & Phosphate Institute 14030 Norway St NW Andover, MN 55304	39	Starlink Incorporated 6400 Highway 290 E – Suite 202 Austin, TX 78723	40
Precision Ag Illustrated Magazine 15444 Clayton Rd – Ste 314 Ballwin, MO 63011	44	TeeJet Technologies 7200 France S – Ste 128 Edina, MN 55435	35, 36
Precision Agriculture Center 439 Borlaug Hall 1991 Upper Buford Circle St. Paul, MN 55108	2	Trimble Navigation Limited 9290 Bond St – Ste 102 Overland Park, KS 66214	25, 26
Raven Industries PO Box 5107 Sioux Falls, SD 57117	20	Tyler Industries, Inc P.O. Box 249 Benson, MN 56215	47
Rawson Control systems, Inc. 116 2nd Street SE Oelwein, IA 50662	1	Vergis Technologies 601 N Broadway Salina, KS 67401	18
RDI Technologies, Inc. 300 Highway 23, Suite One Spicer, MN 56288	15		
RESOURCE21 7257 South Tucson Way Englewood, CO 80112	12		