

The Precision Agriculture Center, University of Minnesota

Presents the

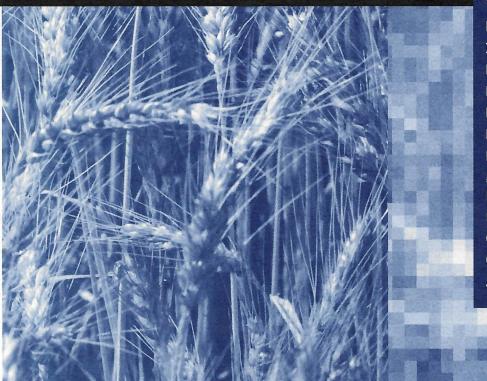
6th International Conference on

Precision Agriculture

and Other Precision Resources Management

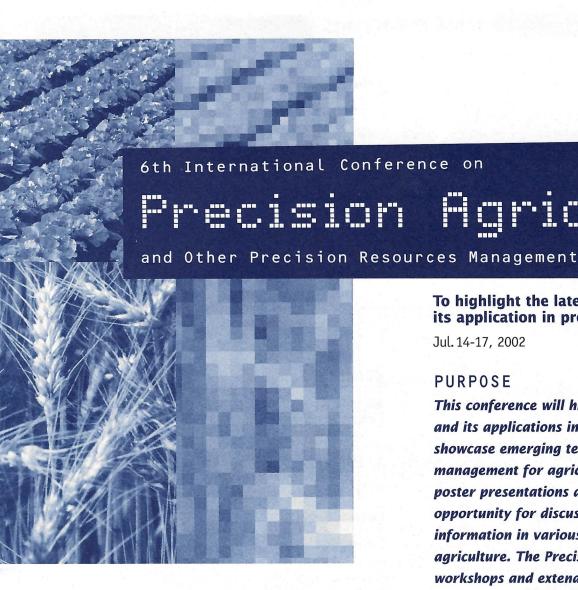


Jul.14-17.2002 Radisson Hotel South and Plaza Tower 7800 Normandale Blvd. Minneapolis -- Minnesota -- USA



CONFERENCE THEMES

Natural Resource Variability
Information Management
Precision Management
Profitability
Environment
Education/Outreach
Engineering Technology
Modeling
New Applications Around the World
Remote Sensing
Crop Quality
Geostatistics/Sampling
A to Z for Practitioners



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

griculture

Jul. 14-17, 2002

PURPOSE

This conference will highlight significant research and its applications in precision agriculture, and showcase emerging technologies and information management for agriculture. It will offer oral and poster presentations and exhibits, as well as an opportunity for discussion and exchange of information in various aspects of precision agriculture. The Precision A to Z Track will offer workshops and extended sessions on key topics for producers and agribusiness.

ORGANIZED BY:

The Precision Agriculture Center, University of Minnesota

AFFILIATE ORGANIZATIONS

University of Minnesota:

College of Agricultural, Food, and Environmental Sciences Agricultural Experiment Station Department of Soil, Water, and Climate Department of Biosystems and Agricultural Engineering Extension Service

COOPERATING ORGANIZATIONS

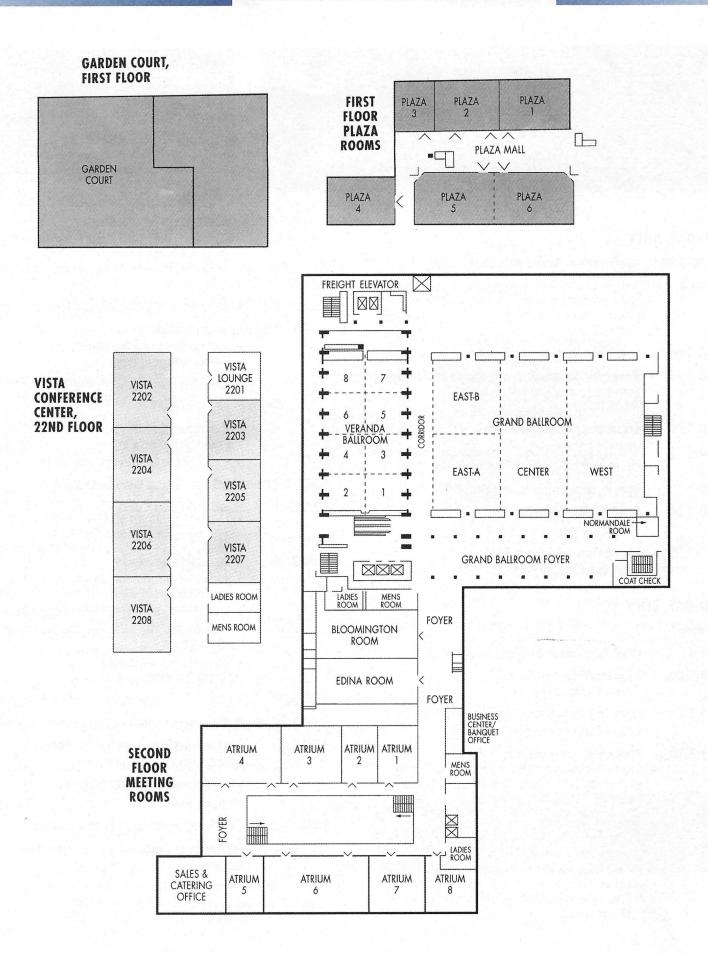
American Society of Agronomy, Crop Science Society of America, Soil Science Society of America American Society of Agricultural Engineers Potash and Phosphate Institute Consortium for Site Specific Resource Management NCR-180

SPONSORS

Cargill Crop Nutrition DigitalGlobe, Inc. EarthScan, Inc. Omnistar, Inc. Pioneer Hi-Bred International, Inc.

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Field Equipment Demonstrations9	• Crop Quality
Software Boutique	 Precision Agriculture
Workshop: Statistical Methods for Analyzing 9 On-Farm Experiments	A to Z for Practitioners
MONDAY, JULY 15	WEDNESDAY, JULY 17
	Morning
Morning	Concurrent Sessions:
General Session Concurrent Sessions Natural Resource Variability 10 Technology/Sensors 10 Remote Sensing/Nitrogen Management 11 Statistics/Geostatistics 11 At o Z for Practitioners 16 Afternoon Concurrent Sessions Natural Resource Variability 10 Technology/Sensors 10 Remote Sensing/Nitrogen Management 11 Statistics/Geostatistics 11 At o Z for Practitioners 16 Poster Session and Visual Image Contest Display 6 Technology Transfer Discussion Group 16	 Information Management Technology Transfer (Outreach and Curriculum) Profitability/New Applications/Environment A to Z for Practitioners A to Z for Practitioners Poster Session Natural Resources Variability Remote Sensing Precision Management Crop Quality Crop Quality Profitability Geostatiatics/Sampling Engineering/Technology Modeling Engineering/Technology Education/Outreach Environment Applications Around The World 21
THEODAY, HILLY 44	Exhibitor List
TUESDAY, JULY 16 Morning Concurrent Sessions Natural Resources Variability	Certified Crop Advisor (CCA) credits have been applied for. Check at the registration desk for current information.





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

SUNDAY, JULY 14			 Genomic Tools and Their Potential in 	
11:00-6:00 Registration, Grand Ballroom Foyer			Precision Agriculture; Nevin Young, Department of Plant Pathology, University	
12:30 & 2:00	Bus leaves for equipment demonstrations at UM Rosemount Research and Outreach Center, meet at north entrance by Plaza Java		of Minnesota	
		10:00-10:20	Break, near exhibits and posters	
	Coffee Shop	10:20-12:00	Concurrent Sessions	
1:00-5:00	Industry Update: Atrium 6		 Natural Resource Variability, Grand Ballroom West 	
1:00-3:40	Research Session: Applications of Remote Sensing to Precision Agriculture, Edina Room		 Technology/Sensors, Bloomington Room Remote Sensing/Nitrogen Management, Edina Room 	
1:00-5:00	Software Boutique, Plaza 1		Statistics/Geostatistics,	
1:30-4:30	Workshop: Statistical Methods for Analyzing On-Farm Experiments, Bloomington Room		Grand Ballroom Center A to Z for Practitioners, Atrium 6	
2:40-3:00	Break, near exhibits and posters	10:00-6:00	Exhibits, Grand Ballroom East A & B	
5:00-7:00	Exhibit Opening, Grand Ballroom East A & B	12:00-1:00	Lunch, Garden Court	
5:00-7:00	Reception and Cash Bar, Near Exhibit area	Afternoon	Community Constitution	
		1:00-3:00	 Concurrent Sessions Natural Resource Variability, Grand Ballroom West 	
MONDAY, JULY 15 Morning			Technology/Sensors, Bloomington Room	
			 Remote Sensing/Nitrogen Management, Edina Room 	
00-7:45 7:00-5:00	Cash Breakfast Buffet, Garden Court Registration continues,		 Statistics/Geostatistics, Grand Ballroom Center 	
	Grand Ballroom Foyer	1:00-5:00	A to Z for Practitioners, Atrium 6	
8:00-8:15	Opening Remarks: Pierre Robert, Chair, Grand Ballroom Center and West	3:00-3:20	Break, near exhibits and posters	
8:15-8:30	Welcome: John Vreyens, Office of International Agriculture Programs, College of Agricultural, Food, and Environmental Sciences, University of Minnesota	3:20-6:00	Poster Session: authors present, Veranda Ballroom and foyer	
			Visual Image Contest Display, Veranda Ballroom	
8:30-10:00	General Session:	5:00	Cash Bar, near exhibits and posters	
	 Precision Agriculture: A Dynamic Process; Simon Blackmore, Centre for Precision Farming, Royal Veterinary and Agricultural University, Denmark and Pierre Robert, Precision Agriculture Center, University of 	6:30-8:30	Technology Transfer Discussion Group, Bloomington Room	

Minnesota.

	TUESDAY -	JULY 16	2:50&3:10	Break for Concurrent Sessions	
	Morning		2:40	Break for A-Z	
	7:00-7:45	Cash Breakfast Buffet, Garden Court	4:00-5:00	Poster Session, Veranda Ballroom and Foyer	
	7:00-5:00	Registration Continues	5:30	Cash Bar, Garden Court	
	7.00 3.00	Grand Ballroom Foyer	6:30	Banquet, Grand Ballroom Center and West	
	8:00-6:00 8:00-10:20	Exhibits, Grand Ballroom East A & B Concurrent Sessions		Visual Image Contest Awards, presented by John Ahlrichs, DigitalGlobe, Inc. and Jeff Keiser,	
	8.00-10.20	 Natural Resources Variability (Electrical Conductivity and Sampling), Grand Ballroom West Technology/Guidance Systems, 		EarthScan Network, Inc. American Food: Mexican Bread; Swiss Ice Cream; South African Beer; presentation by Marc Vanacht, Ag Business Consultants	
		Edina Room	WEDNESDA	Y - JULY 17	
		 Remote Sensing/Pest Management, Grand Ballroom Center 		1 - JOET 17	
		 Precision Agriculture Management Systems, Bloomington Room 	Morning 7:30	Registration Continues, Grand Ballroom Foyer	
		A to Z for Practitioners, Atrium 6	8:00-10:20	Concurrent Sessions:	
	9:40-12:00	A to Z Concurrent Workshop, Plaza 1 Using Descriptive Statistics to Explore Data	8.00-10.20	 Information Management, Bloomington Room 	
	10:20-10:40	Break, near exhibits and posters		 Technology Transfer (Outreach and 	
	10:40-12:00	Concurrent Sessions: Modeling, Grand Ballroom West Technology/Yield, Edina Room		 Curriculum), Grand Ballroom Center Profitability/New Applications/ Environment, Grand Ballroom West A to Z for Practitioners, Atrium 6 	
		■ Technology Transfer,	10.20 10.45		
		Grand Ballroom Center Precision Agriculture Management	10:20-10:45		
		Systems, Bloomington Room • A to Z for Practitioners, Atrium 6	10:45-11:45	General Session: Moore's Laws and the Future of Technology; Andrew Odlyzko, Digital Technology Center, University of	
	12:00-1:25	Lunch, Garden Court		Minnesota	
		Welcome, Charles Muscoplat, College of		Grand Ballroom Center and West	
		Agricultural, Food, and Environmental Sciences, University of Minnesota Introduction, Ron Olson, Cargill Crop Nutrition Presentation by U.S. Secretary of Agriculture, Ann Veneman	11:45-12:00	Closing Remarks, Phillip Larsen, College of Agricultural, Food, and Environmental Sciences, University of Minnesota Grand Ballroom Center and West	
	Afternoon				
	1:30-3:00	A to Z Concurrent Workshops, Plaza 1 Profit Center Analysis			
	3:00-5:00	Digital Orthorectification of County Soil Surveys for GIS Application			
	1:30-4:00	Concurrent Sessions: - Profitability (Nitrogen and Yield), Grand Ballroom West	Note: Presenter Ready Room and Internet access in Normandale Room.		
		 New Applications from Around the World, Edina Room 	The	ne pressroom is located in Plaza 3.	
		 Crop Quality, Grand Ballroom Center Precision Agriculture (Management Zones and Tillage), Bloomington Room 			
	1.30-5.00	- A to 7 for Practitioners Atrium 6			

A to Z for Practitioners, Atrium 6

1:30-5:00

EDINA ROOM

Applications of Remote Sensing to Precision Agriculture, Edina Room

Chair: D. Wang, University of Minnesota

- 1:00: Combining Remote Sensing and Crop Growth Models to Estimate Within-Field Variability
 S.Y. Hong, C.W. Fraisse, K.A. Sudduth, N.R. Kitchen, H.L. Palm, and W.J. Weibold
- 1:20 Using Remotely Sensed Imagery to Assist with Management Decisions: A Learning Group Experience
 L.J. Rew, F. Dougher, R. Lawrence, C. Merja, G. Arnst, and D. Heiken
- 1:40 Nutrient Zone Management Using Imagery and Non-Imagery Information

 R.K. Gautam, S. Panigrahi, and S.S. Panda
- 2:00 Wavelet Segmentation Techniques to Determine Permanent Management Zones from Satellite Images

 J. Bergerou, L. Layrol, and F. Lahoche
- 2:20 Prototype Commercial System for Real-Time Mapping of Crop Density and GAI in Cereals G.A. Wood, J. Taylor, and D. Godwin
- 2:40 Break
- 3:00 Determination of Early Stage Corn Plant Height Using Stereo-Vision
 D.S. Shrestha, B.L. Steward, and T.C. Kaspar
- 3:20 The Impact of Climatological Conditions on the Acquisition of Remotely Sensed Data for Precision Agriculture Applications

 S.A. Samson and D. Gillham
- 3:40 Mapping Cotton Yield Variability Using Airborne Hyperspectral Imagery and Yield Monitor Data C. Yang, J.H. Everitt, and D. Murden

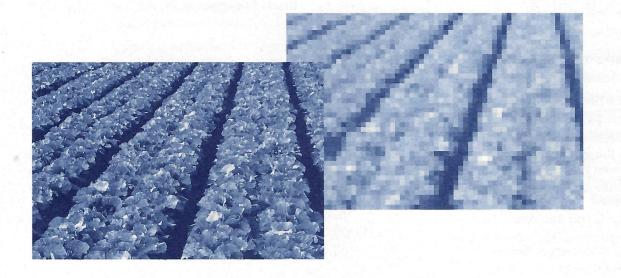
ATRIUM 6

Industry Updates

Moderator: Bob Wanzel, Doane Publishing

Short presentations from companies with new product or service announcements.

- 1:00 New Sensors for Precision Ag: Weather, Soil Moisture, Plant Stress, and Compaction; Doug Kiefer, Spectrum Technologies, Inc.
- 1:20 Autofarm Crop Cycle Solutions; Michael O'Connor, AutoFarm, a Division of IntegriNautics
- 1:40 GreenSeeker: Nutrient Needs, Sensing in Real Time; John Mayfield, NTech Industries, Inc
- 2:00 SST FarmRite Network; Matt Waits, SST Development Group, Inc.
- 2:20 SOILTEQ Product updates; Joe Tevis, SOILTEQ, Inc.
- 2:40 Break
- 3:00 CAN Bus: Legacy 6000 Control System; Dugan Petersen, Midwest Technologies Illinois, LLC
- 3:20 Omnistar "HP"; John Pointon; Omnistar, Inc.
- 3:40 Advancements in Geonics Soil Conductivity Meter Technologies; Mike Catalano, Geonics Limited
- 4:00 New Announcements and Developments from Raven Industries; Dan Rykhus, Raven Industries
- 4:20 Realtime Imagery for Production Agriculture; John Ahlrichs, DigitalGlobe, Inc.
- 4:40 New Trends in Remote Sensing; Lanny Faleide, Agri ImaGIS Multi-Spectral



PLAZA 1

Software Boutique

Moderator: Todd Golly, Golly Farms

- 1:00 Tracebility with Palm; Georg Duerrstein, satcomsystems
- 1:30 AGIS & Total Field Information System (TFIS), an agricultural resource planning system; Pat Trail, AgCode and John Wagner, Precision Partners
- 2:00 SST Stratus, Curt Woolfolk, SST Development Group, Inc.
- 2:30 SGIS 3, Nyle Wollenhaupt, SOILTEQ, Inc.
- 3:00 SMS Basic v3.0; Corey Weddle, Ag Leader Technology
- 3:30 Spatial Analysis of Precision Ag Data Using MapCalc Professional; Elaine McCallum, Red Hen Software
- 4:00 Hands-on trial of FarmWorks Software; Scott Nusbaum, FarmWorks Software
- 4:40 When Your Reputation Rides on Every Recommendation; Kimberly Terrell, Crop Data Management Systems, Inc.

BLOOMINGTON ROOM

Equipment demonstrated:

1:30-4:30 Workshop: Statistical Methods for Analyzing On-Farm Experiments,

Due to space limitations, open to pre-enrolled only

EVENING ACTIVITIES

5:00-7:00 Exhibit Opening;

Grand Ballroom East A & B

5:00-7:00 Reception and Cash Bar;

Near exhibit area

FIELD DEMONSTRATIONS

Field Demonstrations at Rosemount Research and Outreach Center, University of Minnesota

Meet shuttle bus at north entrance by Plaza Java Coffee Shop

	Bus departure	Bus return to Radisson
TRIP ONE	12:30	3:15
TRIP TWO	2:00	4:45

Equipment demonstrated:

- Profiler™, a compaction measurement device, Eric Lund, Veris Technologies
- Pixie by GEOSYS, Inc., an unmanned aerial vehicle, Christopher Iremonger and Ryan Roggenbuck, University of Minnesota
- GPS Autosteer Tractor Guidance System, Trimble Navigation
- Field Pack, Trimble Navigation
- AgGPS 160 Field computer, Trimble Navigation
- Field mapping with HGIS, Matt Hesse, SOILTEQ



GRAND BALLROOM WEST

Natural Resources Variability

Chair: D. Clay, South Dakota State University

- 10:20 Corn Yield Response to Nitrogen: Does it Vary Site-Specifically?

 S.M. Swinton, Y. Liu, A.N. Kravchenko, and N.R. Miller
- 10:40 Geostatic Relationships Between Micro and Marco Soil Analysis and Yield J.K. Curless, L.K. Binning, and J. Norman
- 11:00 Spatiotemporal Analysis of Rice Yield Variability in California

 A. Roel and R.E. Plant
- 11:20 Yield Variability in Sugar Cane
 I. Jhoty, S. Ramasamy, S. Blackmore, and J.C. Autrey
- 11:40 Influence of Landscape Position and Weeds on Water Stress in Soybean J. Jackson, S. Clay, and D. Clay
- 12:00 Lunch

Natural Resources Variability

Chair: N. Kitchen, USDA-ARS, University of Missouri

- 1:00 Spatial Analysis of Corn Response to Irrigation E.J. Sadler, C.R. Camp, Jr., D.E. Evans, and J.A. Millen,
- 1:20 Spatial Variability of Saturated Hydraulic Conductivity in Some Brazilian Soils under No Tillage S.R. Vieira and P.R.R. Martinho
- 1:40 Can C-13 Discrimination and Remote Sensing be Used to Evaluate Water Stress in Soybeans?

 D.E. Clay, S.A. Clay, C. Reese, and C.G. Carlson
- 2:00 Assessing Active Inorganic Chemical Variability of Soils with Resin Extraction
 A.E. Olness, M. Lieser, B. Kunze, H. Weiser, and J. Rinke
- 2:20 Improved Quantification of CO2, CH4, NO and N20 Fluxes from Agricultural Fields Using Geostatics, GIS and Image Analysis

 Nsalambi V. Nkongolo, Ryusuke Hatano,
 Kanta Kuramochi, and Sawamoto Takuji
- 2:40 Spatial and Temporal Variability of Soil Compaction in Conventional and No-Till Fields

 Y. Miao and P.C. Robert

BLOOMINGTON ROOM

Technology/Sensors

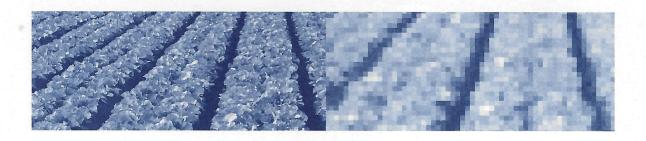
- Chair: S. Upadhyaya, University of California-Davis
- 10:20 An On-Line Protein Sensor From Research to Product L. Thylén, M Gilbertsson, T. Rosenthal, and S. Wren
- 10:40 Chlorophyll-Meter as a Remote-Sensing Tool for Diagnosing Nitrogen Stress in Corn Foliage M.C. Bélanger, L.E. Parent, A. Pellerin, L. Khiari, A.A. Viau, and N. Tremblay
- 11:00 Hydro N-Sensor: Tractor-Mounted Remote Sensing for Variable Nitrogen Fertilization

 A. Link, M. Panitzki, S. Reusch, and J. Lammel
- 11:20 Development of a Chlorophyll Measuring System for Precision Agriculture
 J.H. Sung, W.P. Park, I.G. Jung, S.C. Kim, C.K. Lee, and S.O. Chung
- 11:40 Field Evaluation of a Portable TDR Soil Moisture Probe D.L. Kieffer
- 12:00 Lunch

Technology/Sensors

- Chair: K. Sudduth, USDA-ARS, University of Missouri
- 1:00 A Sensor for Rapid Estimation of Plant Biomass R. Ehsan and, L. Lana
- 1:20 Sensing Systems for Site-Specific Assessment of Corn Plants

 J.W. Hummel, S.T. Drummond, K.A. Sudduth, and M.J. Krumpleman,
- 1:40 A Multi-Sensor Approach for Generating In-Field Pedological Variability Maps F.G. Lahoche, C. Godard, T. Fourty, V. Lelandais, and D. Lepoutre
- 2:00 Precision Pivot Irrigation
 C. Perry, S. Pocknee, G. Hart, G. Vellidis, D. Thomas,
 T. Wells, and C. Kvien
- 2:20 A Real-Time, Embedded, Weed-Detection and Spray-Control System
 N. Zhang, N. Wang, J. Wei, and Q. Stoll
- 2:40 Discussion



EDINA ROOM

Remote Sensing/Nitrogen Management

Chair: C. Kvien, NESPAL, University of Georgia

- 10:20 Comparison of Remote Sensing Imagery for Nitrogen Management E.R. Hunt, C.S.T. Daughtry, J.E. McMurtrey III, C.L. Walthall, and S. Liang
- 10:40 Successful Precision Agriculture in Northern Germany:
 Methods to Define Part Fields for Adjusted Nitrogen
 Fertilization of Wheat, Canola and Barley
 P. Treue
- 11:00 The Use of Remotely Sensed Imagery to Make Nitrogen Recommendations for Winter Wheat in Western Kentucky M.B. Bethel, T. Gress, L. Murdock, and C. Dillon
- 11:20 Development of Nitrogen Stress Maps from Aerial Photos L.L. Hendrickson, G. Gries, and S. Han
- 11:40 Midseason Nitrogen Application Using Remote Sensing D.L. Wright JR., V.P. Rasmussen, R.D. Ramsey, D.J. Baker, J.W. Ellsworth, and D. Grant
- 12:00 Lunch

Remote Sensing/Nitrogen Management

- Chair: L. Hendrickson, John Deere Ag. Management Solutions
- 1:00 Sensing Wheat for End Use Harvest and Late Nitrogen Fertilization Requirement Decisions

 D.J. Bonfil, Z. Schmilovitch, I. Mufradi, S. Asido, H. Egozi, A. Hoffman, and A. Karnieli
- 1:20 The Use of Remotely Sensed Imagery to Make In-Season Nitrogen Recommendations for Corn S.E. White
- 1:40 Field-Scale Evaluation of Variable N Rate Recommendations for Corn P.C. Scharf, N. Kitchen, K. Sudduth, J.G. Davis, and J. Lory
- 2:00 Real-Time Sensing and N Fertilization on a Field Scale Applicator
 J.B. Solie, R. Mullen, B. Raun, K. Freeman, M. Stone,
 G. Johnson, C. Washmon, S. Reed, and D. Needham
- 2:20 Development of a Non-Contacting Chlorophyll Fluorescence Sensor for Site-Specific Nitrogen Fertilization

 C. Bredemeier and U. Schmidhalter
- 2:40 Discussion

GRAND BALLROOM CENTER

Statistics/Geostatistics

Chair: J. Grove, University of Kentucky

- 10:20 An Innovative Approach Based on Neural Networks for Predicting Soil Components Variability F.G. Lahoche, C. Godard, T. Fourty, V. Lelandais, and D. Lepoutre
- 10:40 Frequency Analysis of Yield for Delineating Management Zones

 K. Diker, G.W. Buchleiter, H.J. Farahani, D.F. Heermann, and M.K. Brodahl
- 11:00 Spatial Regression, an Alternative Statistical Analysis for Landscape Scale On-Farm Trials: Case Study of Soil Density Trials in Central Illinois

 D. Lambert, R. Bongiovanni, and J. Lowenberg-DeBoer
- 11:20 Comparing Statistical Analysis for Landscape Scale Experimental Designs

 J.A. Hernandez and D.J. Mulla
- 11:40 VESPER 1.3 Spatial Prediction Software for Precision Agriculture

 B.M. Whelan, A. McBratney, and B. Minasny
- 12:00 Lunch

Statistics/Geostatistics

- Chair: D. Mulla, University of Minnesota
- 1:00 A Test of Within Field Variation of Corn Response to Nitrogen in Central Minnesota T.M. Hurley, G. Malzer, and B. Kilian
- 1:20 Study of the Spatial Correlation Between Highly Sampled Data (Electrical Resistivity, Yield) and other Pedo-Agronomic Parameters

 M. Dabas, P. Mechler, J. Tabbagh, F. Piraux, and D. Boisgontier
- 1:40 Performance of Soil Electrical Conductivity and Different Interpolation Methods for-Mapping Soil Data from a Small Dataset

 S.E. Delin and M. Söderström
- 2:00 Exploring the Structure of Multivariate Spatial Soil Information in Two Soil Types Using Factorial Kriging Analysis

 H. Bourennane, B. Nicoullaud, A. Couturier, and D. King
- 2:20 Numeric Assessment of Soil Mapping Value V.I. Adamchuk and D.B. Marx
- 2:40 Discussion

GRAND BALLROOM WEST

Natural Resources Variability (Electrical Conductivity, Sampling, and Modeling)

ELECTRICAL CONDUCTIVITY

- Chair: D. Humburg, South Dakota State University
- 8:00 Influence of Microtopography and Soil Electrical Conductivity on Soil Quality and Crop Yields

 1. Perron, M. Nolin, D. Cluis, and M.L. Leclerc
- 8:20 Use of SSURGO to Identify Potentially K-fixing Soils B. Rasmussen, D.G. McGahan, G.S. Pettygrove, M. Meese, and R.J. Southard
- 8:40 Characterizing Field-Scale Soil Variability across the Midwest with Electrical Conductivity

 K.A. Sudduth, N.R. Kitchen, W.D. Batchelor, G.A. Bollero, D.G. Bullock, D.E. Clay, H.L. Palm, F.J. Pierce, R.T. Schuler, K. Thelen, and W.J. Wiebold
- 9:00 Variable Seeding Rate and Variable Nitrogen Rate Effects on Corn. Part 2. Variable Nitrogen and Seeding S.A. Ebelhar, E.C. Varsa, T.D. Wyciskalla, K. Robertson, T. Fehrenbacher, and C.D. Hart

SAMPLING

- Chair: F. Pierce, Washington State University
- 9:20 Soil Mapping Strategy Using Real-Time Soil Spectrophotometer S. Shibusawa, I.M.A. Sutrisna Wijaya, A. Sasao, and S. Hirako
- 9:40 Accuracy of Soil Sampling Methods and Implications for Fertility Management and Crop Production in Michigan N.R. Miller, A.M. Kravchenko, and S. Swinton
- 10:00 In-Field Coarse Fragments Variability for Vine Fields in "Graves" Area: Relationship with Elevation and Geophysical Data
 P. Chéry, M. Dabas, E. Saby, and G. Grenier
- 10:20 Break

MODELING

- 10:40 Neural Network Analysis of Site-Specific Soil, Landscape and Yield Data
 S.T. Drummond, K.A. Sudduth, N.R. Kitchen, W.D.
 Batchelor, G.A. Bollero, D.G. Bullock, D.E. Clay, H.L. Palm, F.J. Pierce, R.T. Schuler, K. Thelen, and W.J. Wiebold
- 11:00 Development of a Yield Prediction Model for the Site-Specific Management of Herbicide and Fertilizer N.C. Wagner, B. Maxwell, and D. Goodman
- 11:20 Assessing and Simulating Soil Water and Nitrogen
 Effects on Spatial Variability of Yield and Grain Quality
 of Durum Wheat

 B.Basso and P. De Vita
- 11:40 Georeferenced Soybean Yield, Nutritional Status and Soil Fertility Evaluation under No Till System in Southern A.Bernardi, C.A. Silva, P.L.O.A. Machado, C.A.F.S. Carmo, and S.A. Oliveira

Profitability (Nitrogen and Yield)

Chair: S. Swinton, Michigan State University

NITROGEN

- 1:30 An Economic Assessment of the Whole-Farm Impact of Precision Agriculture

 K.D. Olson
- 1:50 Economic and Environmental Impact of Site Specific N-Application - Based on Different Weather Conditions and Crop Rotations S.M. Pedersen
- 2:10 Economics of Nitrogen Response Variability over Space and over Time: Results from the 1999-2001 Field Trials in Argentina

 R. Bongiovanni and J. Lowenberg-DeBoer
- 2:30 Technical-Economical Feasibility of Site Specific Nitrogen Management in Traditional Crops in Chile R.A. Ortega and J.A. Ortega
- 2:50 Break

YIELD

- 3:10 Cost Analysis of a Cotton Yield Monitoring Information System

 J.A. Larson, R.L. Cochran, R.K. Roberts, and B.C. English
- 3:30 Converting Yield Data into Return on Investment Data *J.K. Curless, L.K. Binning, and J. Norman*

EDINA ROOM

Technology (Guidance Systems and Yield)

Chair: T. Colvin, USDA-ARS-NSTL, Iowa State University

GUIDANCE SYSTEMS

- 8:00 Evaluation of a DGPS RTK Based Agricultural Vehicle Guidance System

 M.A. Tucker, S. Pocknee, G. Vellidis, D. Thomas, C. Perry, and C. Kvien
- 8:20 Application of RTK GPS Based Auto-Guidance System in Agricultural Production

 B.C. Heidman, Z. Abdelaziz, S.K. Upadhyaya, and D. Hills
- 8:40 Evaluating Operator Feedback Accuracy of Row-Guidance Systems with GPS W.E. Hart, J.B. Wilkerson, T.F. Morrow, and T.S. Stombauah
- 9:00 Electrical Conductivity Mapping to Characterize the Spatial Variability within Large Fields *E. Lück*
- 9:20 A New System for Fast Mapping of ER (A.R.P.):
 Field Application
 M. Dabas, C. Perrard, A. Favard, and D. Rouiller
- 9:40 Soil Nitrogen Estimation from Corn Canopy Reflectance and Soil Electrical Conductivity

 W.C. Bausch, J.A. Delgado, G. Buchleiter, H. Farahani, and K. Diker

ORAL PRESENTATIONS — TUESDAY, JULY 16

10:00	Applying Nitrogen Site-Specifically Using Soil Electrical
	Conductivity Date and Other Geo-Referenced Information
	E.D. Lund, M.C. Wolcott, and G.P. Hanson

10:20 Break

YIELD

- 10:40 Grain Circulation Model for Monitoring Yield in Head-Feeding Combine Harvesters T. Chosa, Y. Shibata, and M. Omine
- 11:00 Assessment of Yield Monitor Accuracy Using the ASAE X-587 Draft Test
 T.F. Burks, S.A. Shearer, J.P. Fulton, and T. Stombaugh
- 11:20 "As-Applied" Model Validation for Variable-Rate Application of Granular Materials J.P. Fulton, S.A. Shearer, T.S. Stombaugh, C. Dillon, and S.F. Higgins
- 11:40 Discussion
- 12:00 Lunch

New Applications from around the World

Chair: L. Tian, University of Illinois

- 1:30 Precision Viticulture Tools to Optimize Winegrape Production in a Difficult Landscape R. Bramley
- 1:50 Precision Agricultural for Coffee in Brazil
 J.P. Molin, S. Sartori, L.E. Shiraisi, A.C. Ribeiro Filho,
 F.P. Torres, J.F.M. Fava, and E.L. Domingues
- 2:10 The Use of Remote Sensing to Manage Spatial Variability in Sweet Potato Production

 M.W. Shankle and J.L. Main
- 2:30 Research in Rice Precision Farming at the Modernized City of Shanghai G. Xie, S. Cheng, W. Qi, and X. Yang
- 2:50 Break
- 3:10 Spatial Variability of Selected Soil Properties as Influenced by Topography in a South Sumatran Oil Palm S.K. Balasundram and P.C. Robert
- 3:30 The Development of a Fuzzy Logic Model to Predict Winegrape Quality from Multiple Must Properties J.A. Taylor, A.B. McBratney, R. Ciavarella, and B.M. Whelan

GRAND BALLROOM CENTER

Remote Sensor/Pest Management

Chair: S. Pocknee, NESPAL, University of Georgia

- 8:00 Weed Detection and Delineation Using Remotely Sensed Imagery

 K.L. Copenhaver, C. Sprague, and J. Bunting
- 8:20 Weed Detection Using Data Fusion from Spatial and Spectral Information

 J.B. Vioix, J.P. Douzals, F. Truchetet, L. Assemat, and I.P. Guillemin

- 8:40 Development of Fungus Infestation Risk Maps by Means of Airborne Radar-Data and a Digital Elevation Model E. Zillmann, H. Lilienthal, and E. Schnug,
- 9:00 Spectral Characteristics of Rice Canopy Infested with Rice Leaf Folder

 C-M. Yana, C.H. Cheng, and J.Z. Yu
- 9:20 Estimation of Percent Infection of Leaf Blast in Rice Plants from Canopy Spectral Characteristics *C-M. Yan and Y.C. Chana.*
- 9:40 Ground Based Remote Sensing A New Tool for Agricultural Monitoring

 H. Lilienthal and E. Schnug
- 10:00 Break

TECHNOLOGY TRANSFER

Chair: J. G. Davis, University of Missouri

- 10:40 Precision Agriculture Technology Diffusion: Current Status and Future Prospects S.G. Daberkow, J. Fernandez-Cornejo, and M. Padgitt
- 11:00 Management Guidelines for Precision Farming: An Operational Framework for Cereal Production in the U.K. *J.C. Taylor, R.J. Godwin, and G.A. Wood*
- 11:20 Motivations for Undertaking or Expectations of French Farmers Regarding Precision Agriculture

 P. Bequyot
- 11:40 Using Advanced Spreadsheet Features for Agricultural GIS Applications

 T.L. Righetti and M.D. Halbleib

Crop Quality

Chair: J. Sadler, USDA-ARS, Coastal Plains Research Center

- 1:30 The Biophysical Basis for Spatial Variability of Yield and Quality in a Cotton Production System G.F. Sassenrath-Cole, H.C. Pringle, and S.J. Thomson
- 1:50 Spatial Variability of Corn Oil, Protein, and Starch Y. Miao and P.C. Robert
- 2:10 Landscape Position Influence on Soybean Quality D.E. Clay, J. Chang, C. Reese, and S. Christopherson
- 2:30 Precision Management for Improving Crop Quality in Peanut and Cotton

 C. Kvien, G. Vellidis, T. Wells, S. Pocknee, G. Rains, G. Hart, C. Perry, and D. Thomas
- 2:50 Gross Value of Spring Wheat under Precision Nitrogen Management in Relation to Protein Premiums D.S. Long, G.R. Carlson, and R.E. Engel
- 3:10 Break
- 3:30 Using Protein and 13C Discrimination to Determine the Influence of Nitrogen and Water Stress on Wheat Yields C.L. Reese, D. Clay, D. Long, C.G. Carlson, and D. Beck
- 3:50 Temporal Changes in Grain Yield and Protein in Northern Australia

 R.M. Kelly, W. Strong, T. Jensen, D. Butler, and B. Town
- 4:10 Predicting Variations in Dry Matter Yield and Feeding Values in Temporary Grasslands

 A.K. Nyberg

BLOOMINGTON ROOM

Precision Agriculture Management Systems

- Chair: R. Heiniger, North Carolina State University
- 8:00 In-Season Nitrogen Based Site-Specific Management in Winter Wheat

 M.D. Flowers, R. Weisz, and R. Heiniger
- 8:20 Management Guidelines for Precision Farming: Nitrogen G.A. Wood, J. Taylor, and D. Godwin
- 8:40 Probability of Response of No-Till Corn to In-Row Fertilization: Role of Topography in a Karst Landscape *E.M. Pena-Yewtukhiw, J.H. Grove, and J.A. Thompson*
- 9:00 Use of Variable-Rate Technology for Agronomic and Environmental Phosphorus-Based Liquid Swine Manure Management

 D.J. Wittry and A.P. Mallarino,
- 9:20 Temporal Changes in Spatial Variability of Soil Parameters within a Small Paddy and Forage Field I.M.A. Sutrisna Wijaya, S. Shibuswa, and A. Sasao
- 9:40 Precision Management of Alleviating the Micronutrient Deficiency in Specific Soils under Different Cropping Situations

 K.R. Kumaresan
- 10:00 Variability of Soil Fertility Parameters and Spacialization of Liming and Fertilizer Requirements of a No-Tillage Soybean Area

 C.A. Silva, A.C. de C. Bernardi, J.B. Tomé Jr., and P.L.O. de A. Machado
- 10:20 Break
- 10:40 Methods and Algorithms for Site-Specific Nitrogen Fertilization of Several Crops and N-Fertilization Strategies K.O. Wenkel, S. Brozio, and R.I.G. Gebbers
- 11:00 Development of Site Specific Management for Reclamation of Salt Affected Soil Utilizing Em-38 and Core Soil

 R.D. Horney, B. Taylor, B.A. Roberts, D.S. Munk, and R.E. Plant
- 11:20 The Unpredictability of Soil Fertility across Space and Time

 R.L. Hoskinson, D. Pokrajac, Z. Obradovic, and
 A. Lazarevic
- 11:40 Utilizing Site-Specific Integrated Information Systems in Commercial Agribusiness

 M.K. Beatty

Precision Agriculture (Management Zones and Tillage)

Chair: T. Peterson, Pioneer Hi-Bred International, Inc.

MANAGEMENT ZONES

- 1:30 Definition and Interpretation of Potential Management Zones in Australian Dryland Cropping B.M. Whelan, J. Cuppit, and A. McBratney
- 1:50 Deriving Productivity Management Zones for Corn-Soybean Crop Systems Using Soil Electrical Conductivity and Topography
 N.R. Kitchen, K. Sudduth, W. Batchelor, G. Bollero, D. Bullock, D. Clay, H. Palm, F. Pierce, R. Schuler, K. Thelen, and W. Wiebold,
- 2:10 Evaluating Two Methods of Developing Management Zones for Precision Farming

 K.L. Fleming and G.W. Buchleiter
- 2:30 Management Zone Delineation Methods D.W. Franzen and T. Nanna
- 2:50 The Influence of Different Classification Approaches on N and P Fertilizer Recommendations

 J. Chang, D.E. Clay, C.G. Carlson, S.A. Clay, and D.D. Malo
- 3:10 Break

TILLAGE

- 3:30 Spatial and Temporal Variability in Corn Yield Grown with Different Tillage Systems

 M. Tapela, T.S. Colvin, and D.L. Karlen
- 3:50 Evaluation of a Variable Depth Tillage System and Simulation of Tillage Effects on Yield and Soil Physical Properties

 L. Sartori, M. Bertocco, G. Oliviero and B. Basso



BLOOMINGTON ROOM

Information Management

Chair: R. Ferguson, University of Nebraska

- 8:00 Combining Farm and University/Industry Information in Yield Models for Optimal Fertilizer Decisions

 T.L. Kastens, J.P. Schmidt, and K.C. Dhuyvetter
- 8:20 A New Methodology for Decision Analysis on Precision Farming Based on Users' Experience S. Fountas, S.M. Pederson, and B.S. Blackmore
- 8:40 Comparison of Techniques for Defining Management Zones in an Iowa Field

 D.B. Jaynes, T.C. Kaspar, and T.S. Colvin
- 9:00 Targeting Forages to Farming Systems at Farm Scale Using GIS, Socio-Economic Data and Expert Knowledge R. O'Brien, R. Corner, and S. Cook
- 9:20 Spatial-Temporal Techniques for Prediction and Compression of Soil Fertility Data

 D.M. Pokrajac, R. Hoskinson, A. Lazarevic, and Z. Obradovic
- 9:40 Information Sources for Decision Making on Precision Farming

 C.G. S⁻rensen, S. Fountas, H.H. Pedersen, and S. Blackmore

GRAND BALLROOM CENTER

Technology Transfer (Outreach and Curriculum)

Chair: H. Reetz, Potash and Phosphate Institute

OUTREACH

- 8:00 Determining the Optimal and Preferred Methods of Delivery for Aerial Imagery to Growers to Facilitate its Adoption as a Crop Management Tool

 A.N. Csinos, R. Rohs, C. Kvien, C. Langone, T. Wells, and S. Pocknee
- 8:20 Developing an Active and Effective Learning Group: A Montanan Example L.J. Rew, J. Nielsen, C. Sommers-Austin, A. Bussan, C. Merja, G. Arnst, C. Mattson, J. Mattson, S. Raska, D. Heiken, B. Wright, and D. Keil



- 8:40 On-farm Trials with Grower Learning Groups C.J. Iremonger, K.L. Sullivan, and P.C. Robert
- 9:00 Teaching Farmers to Use Remote Sensing D.E. Clay, K. Dalsted, M. O'Neill, C. Reese, and P. Thanupura

CURRICULUM

- 9:20 Precision Ag Course & Curriculum at Colorado State University R. Khosla and T. Shaver
- 9:40 Field Testing a Precision Agriculture Educational Curriculum

 J.G. Davis and D.K. Shannon
- 10:00 Precision Agriculture Technology: A Private Research Institute in Brazil Studies its Potential

 M.L. Valentini, L.M. Gimenez, D. Schmidlin, A.V. Torres, and J.P. Molin

GRAND BALLROOM WEST

Profitability/ New Applications/ Environment

Chair: J. Lowenberg-DeBoer, Purdue University

- 8:00 Site-Specific Versus Whole-Field Fertility and Lime Management in Michigan Soybean and Corn S.M. Swinton, K.Q. Jones, N.R. Miller, O. Schabenberger, R.C. Brook, and D.D. Warncke
- 8:20 The Value of Innovative Seed Coatings to Delay Germination under Field Average and Variable Rate Technology

 C.R. Dillon, T.G. Mueller, and S.A. Shearer
- 8:40 Economical Aspects of Sorting Grain into Different Fractions

 L. Thylén and H. Rosenquist
- 9:00 Measurement of Grass Yield and Feeding Values with Hyperspectral Imaging Spectroscopy
 A. Lokhorst, A.G.T Schut, M.M.W.B. Hendriks, J.G. Kornet, and G.J. Kaaper
- 9:20 Integrating GPS-Enabled Spray Equipment into Mosquito Control

 N. Read and C. Stevens
- 9:40 Spatial Analysis of Soil Nitrate or Grain N Removal for Phytoremediation of Post-Harvest Soil Nitrate

 J.H. Grove and E.M. Pena-Yewtukhiw
- 10:00 A Perspective on Precision Agriculture Progress and Prospects
 K. Betteridge, A. Gillingham, S. Haneklaus, and E. Schnug

The A to Z track presents "field ready" information in interactive sessions designed for growers and the agribusiness community. It will showcase emerging technologies and information management strategies for production agriculture. The A to Z track is one of five session tracks open to all participants at the Conference.

ALL SESSIONS HELD IN ATRIUM 6 EXCEPT TUESDAY'S CONCURRENT WORKSHOPS AND TECHNOLOGY TRANSFER DISCUSSION GROUP

MONDAY, JULY 15

8:30-10:00 General Sessions

10:20 Welcome; Kellen Sullivan, Precision Agriculture

Center, University of Minnesota

Precision Management Strategies for Growers

Moderator: Grant Mangold, @gINNOVATOR

10:25 - 12:00 PM

Growers from across the country will discuss their information management strategies and use of technology in crop production. Panelists include: Chuck Merja, Sun River, Montana; Lannie Mielke, North Mellette, South Dakota; Pat Duncanson, Mapleton, Minnesota; and Tony Smith, Arlington, Georgia.

Information Acquisition and Analysis 1:00-5:00 PM

Moderator: Harold Reetz, Potash and Phosphate Institute

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1:00	Getting Started: File Structure and Data Cleaning Techniques Adam Sekely, University of Minnesota
1:20	Use of GPS-Time/Date Stamp and Bar Codes Todd Peterson, Pioneer Hi-Bred International, Inc.
2:00	Strategies for Analyzing Multi-year Yield Data Jon Kleinjan, South Dakota State University
2:40	Break
3:00	Making Site-specific Nutrient Recommendations: A Case Study from Minnesota Gary Malzer, University of Minnesota
3:40	Simple Ways to Assess the Value of Changing Managemer Practices: A Case Study from Georgia Stuart Pocknee, NESPAL/University of Georgia

4:20 Profit Center Analysis: The Interaction between Agronomics and Simplified Economics

Greag Carlson, South Dakota State University

3:40-6:00 Poster and Visual Image Contest Displays

10:00 AM **Exhibits** -6:00 PM

5:00 PM Social hour and cash bar

Technology Transfer Discussion Group
6:308:30 PM

Bloomington Room

Educators and industry personnel will give short presentations summarizing the activities of their outreach programs. The group will break into roundtable discussions to share strategies for facilitating technology transfer. Cash buffet and cash bar.

TUESDAY, JULY 16

Analytical Tools and Methods

Moderator: Christopher Iremonger, University of Minnesota Learn helpful techniques for deriving value from existing datasets and collateral information.

8:00	Management Zone Analyst Software Newell Kitchen, USDA-ARS Cropping Systems and Water Quality Research Unit
8:30	Extracting Meaning from Site-specific Soil Test Data Scott Murrell, Potash and Phosphate Institute and Lance Murrell, The Andersons
9:20	Simple Techniques for Analyzing and Interpreting Aerial Images Tasha Wells, NESPAL/University of Georgia
9:40	Digital Orthorectification of County Soil Surveys for GIS Application Kari Geurts, University of Minnesota
10:20	Break

Precision Services

Moderator: Don Lamker, Precision Partners

Business processes any entrepreneur should use before starting a new line of business or service.

10:40	Precision Agriculture Adoption in the US Paul Schrimpf, CropLife $^{\text{TM}}$
11:00	Strategic Planning for New Te <mark>chnolog</mark> y Adoption Bob Walker, CHS Cooperatives-Land O'Lakes
11:30	Financial Benchmarks for New Service Offerings <i>John Ahlrichs, DigitalGlobe, Inc.</i>
12.00	Lunch

Strategies to Improve Production Efficiency

Moderator: Quentin Rund, PAQ Interactive

Profitability comes from managing the relationship between revenue and expenses. This session will look at several approaches for optimizing inputs.

1:30	Hand-held computers and GPS to automate field
	data collection
	Kent Shannon, University of Missouri
2:05	Determining the Value of Precise Planting
	Tom Doerge, Pioneer Hi-Bred International, Inc.
2:40	Break

Emerging Technologies

Moderator: Jeff Keiser, EarthScan Network, Inc.

3:00	Precision Design and Installation of Subsurface Drainage Systems Leon J. Boler, University of Minnesota
3:30	Reliable Methods for Using Pivot Irrigation to Variably Apply Water Stuart Pocknee, NESPAL/University of Georgia
4:00	GPS Guidance Systems - How to Get the Most From Your GPS Guidance System Erik Arvesen and Roz Buick, Trimble Navigation
4:30	New Developments in Precision Technologies for Specialty Crops Shrini Upadhyaya, University of California at Davis

TUESDAY'S WORKSHOPS

Using Descriptive Statistics to Explore Data Plaza 1

9:40-12:00 AM

Presented by: Scott Murrell and Harold Reetz, Potash and Phosphate Institute; Lance Murrell, The Andersons; and Quentin Rund, PAQ Interactive.

This hands-on workshop provides introductory level instruction on using descriptive statistics available in Microsoft® Excel® 2000 to summarize and characterize a set of data. Simple ways of statistically comparing two sets of data will also be provided, as well as a procedure for analyzing on-farm experiments.

Profit Center Analysis Plaza 1

Presented by: Gregg Carlson, South Dakota State University. 1:30-3:00 PM

A hands-on workshop designed to guide the audience through the process of evaluating farm profitability on a site-specific basis. Each field is considered a profit center and associated production costs are analyzed using an Excel® spreadsheet.

Digital Orthorectification of County Soil Surveys for GIS Application Plaza 1

Presented by: Kari Geurts, University of Minnesota.

3:00-5:00 PM

Research at the Soil Landscape Analysis Laboratory focused on developing and implementing a semi-automated and cost-effective methodology to correct the spatial errors associated with County Soil Surveys in Minnesota. MAPLE SYRUP (Mostly-Automated Procedure for Line-Extraction/Simple Yet Robust Universal Parametric-Orthorectification) is the result of this work. MAPLE SYRUP is an orthorectification software extension and procedure that uses photogrammetric principles to remove existing soil survey base map errors. The orthorectification software extension uses a statistical model to produce a geometrically correct soil survey map base.

10:00 AM -6:00 PM	Exhibits	
5:30 PM	Social Hour	
6:30 PM	Banquet	

WEDNESDAY, JULY 17

8:00-10:20 **Visual Images Panel** *Moderator: Nyle Wollenhaupt. SOILTEQ*

Presentations will include the following topics and will be followed with a panel discussion:

8:00	Scouting with Drones Damien Lepoutre, GEOSYS, Inc.
8:25	Using Satellite Imagery to Create Management Zone: Ron Olson, Cargill
8:50	Aerial Photos: Where We Have Seen Value and How Southeastern US Growers Want that Information Delivered Craig Kvien, NESPAL/University of Georgia
9:15	Satellite Imagery: New Systems for Production Agriculture John Ahlrichs, DigitalGlobe, Inc.
9:40	Incorporating Digital Imagery into Maps Carol Snyder, Red Hen Systems, Inc.

Posters are grouped by theme within each track

NATURAL RESOURCES VARIABILITY

BOARD NO.

TITLE

- Spatial Variability of Select Soil Physical Properties in Response to Forest Harvest Disturbances E.A. Carter and J. Shaw
- 2 Evaluation of Crop and Soil Spatial Variability in Louisiana Sugarcane Production Systems
 R.M. Johnson and E.P. Richard
- 3 Spatial Dynamics of the Potato Leafhopper in Relation to Forage Quality in Alfalfa Fields
 R.H. Leep, J.D. De Young, S. Kravchenko, T.S. Dietz, and T.J. Boring
- 4 Increased Incidence of Extended Diapause in Northern Corn Rootworm as Evidenced by Georeferenced Adult Emergence
 M.M. Ellsbury, S.A. Clay, D.E. Clay, D.D. Malo, and C.G. Carlson
- 5 Spatial Distribution of Soil Properties and the Field Dissipation of Herbicides
 C.D. Graff, W.C. Koskinen, J.L. Anderson, T.R. Halbach, and R.H. Dowdy
- 6 Landform, Soil Morphology, and Tillage Effects on Soybean Root Growth in Claypan Soils
 D.B. Myers, N.R. Kitchen, and K.A. Sudduth
- 7 Spatial Associations of Soil Properties with Soil Map Units and Previous Crops in a Coastal Plain Field H. Li, J.G. White, R. Weisz, C. Crozier, R. Heiniger, and D.A. Crouse
- 8 Soil-Landscape Modeling for Defining Landform Management Segments Transferable across a Physiographic Region
 J.A. Thompson, J.H. Grove, E.M. Pena-Yewtukhiw, and C.E. Kiger
- 9 Influence of Pedodiversity and Past Land Use on the Within-Field Spatial Variability of Selected Soil and Forage Quality Indicators

 M.C. Nolin, B. Gagnon, R.R. Simard, M.L. Leclerc,
 A.N. Cambouris, and G. Bélange
- 10 Predicting the Heterogeneity of Soil Profiles from Dual Dipole Electromagnetic Induction Measurements

 M. Meul, M. Van Meirvenne, B. De Vos, and A. Lobo Sánchez,
- Assessment of Soil Quality for Site-Specific Management of Drainage Water Re-Use
 D.L. Corwin, S.R. Kaffka, J.D. Oster, J.W. Hopmans, Y. Mori, J-W. Groenigen, C. van Kessel, and S.M. Lesch

BOARD

TITLE

- 12 Characterizing the Spatial Variability of Water Stress in Corn
 - A.D. Meijer, R.W. Heiniger, K.R. Gurganus, and M.D. Sain
- 13 Estimating Corn Grain Yield from Temporal Variations of Soil Moisture
 T.J. Cish, P. Buss, C.S.T. Daughtry, W.P. Dulaney, and C.L. Walthall
- 14 Impact of Subsurface Water Dynamics on Corn Grain Yield
 W.P. Dulaney, T.J. Gish, C.S.T. Daughtry, C.L. Walthall, K-J.S. Kung, and G. McCarty

REMOTE SENSING

- 15 Remote Sensing Leaf ChlorophyllConcentrations in Corn Fields

 C. Daughtry, E.R. Hunt, Jr., J.E. McMurtrey III, T.J. Gish, and C.L. Walthall
- 16 Development of a Spectrally Based Canopy Pigment Index for Nitrogen Needs in Corn Crops

 J.E. McMurtrey, C.S.T. Daughtry, P.C. Doraiswamy,
 C.L. Walthall, E.R. Hunt, and L.A. Corp
- 17 The Coincidental Pattern in Spatial Nitrogen Fertilization Requirement of Winter Wheat and/ or Barley M.F. Mohd Noor and E. Schnug
- 18 Detecting Spatially Variable Corn Nitrogen Needs Using Aerial Photography
 J.D. Williams, N. Kitchen, P. Scharf, and G. Steven
- 19 Uniform and Site-Specific Variable Rate Nitrogen Management of Winter Wheat Based on Aerial Color Infrared Photography H. Li, R. Weisz, J.G. White, C. Crozier, R. Heiniger, and D.A. Crouse
- 20 Aerial Color Infrared Photography for Determining In-Season Nitrogen Requirements for Corn R.P. Sripada, R.W. Heiniger, J.G. White, J.M. Burleson, C.R. Crozier, and R. Weisz
- 21 Early Detection of Potato Growth and Yield Limiting Nutrients from Canopy Spectral Reflectance D. Wang, C.J. Rosen, and M. McNearney
- Variable Rate Application of Post-Emergence
 Herbicide to Soybeans Using Remotely Sensed
 Imagery
 K.L. Copenhaver, C. Sprague, and D. Alderks
- 23 Characterizing Spectral Reflectance Patterns of Weeds Using Hyperspectral Imagery J.M. Prince, T.F. Peeper, and J.B. Solie

BOARD NO. TITLE

- 24 Remote Sensing of Barley Yellow Dwarf and Wheat Streak Mosaic Disease in Winter Wheat W.E. Riedell, M. Langham, S. Osborne, and L. Hesler
- 25 Characterization of Wheat Growing Conditions by Spectroscopic Measurements Between 400-1100 nm M. Raz, A. Karnieli, and D. Bonfil
- **26** Alfalfa Yield Prediction Through Remote Sensing S.R. South, J. Qi, R.H. Leep, and J. De Young
- 27 Remote Sensing for Estimating Corn Biomass, Yield and N Content S.L. Osborne, J.S. Schepers, D.D. Francis, and M.R. Schlemmmer
- 28 Landscape-Scale Spatial Characterization of Soil Properties and Peanut Yield K.F. Bronson, C.L. Trostle, A.M. Schubert, J.D. Booker, and T.T. Chua
- 29 Using Aerial Imagery to Aid Management Decisions for Peanut

 J.S. Wells, C. Kvien, G. Vellidis, C. Holbrook, N. Wells,
 S. Pocknee, D. Kissel, G. Rains, G. Har, B. Buchanan,
 C. Perry, and D. Thomas
- 30 Enhancing Soil Survey Quality with Hyperspectral Imagery
 T.G. Mueller, H. Cetin, A.D. Karathanasis, and P.L. Cornelius
- 31 Delineation of Tile Drainage Using Remotely Sensed Imagery

 B. Varner and T. Gress
- 32 Tractor-Mounted Multispectral Scanner for Remote Field Investigation
 S. Reusch, A. Link, M. Panitzki, and J. Lammel

PRECISION MANAGEMENT

- 33 The Critical Period of Weed Control in Rainfed Chickpea (cicer arietinum I.)

 G.H. Ahmadi and H.R. Mashhadi
- 34 Growth and Yield Mapping of Rice for Precision Agriculture in Paddy Field
 H.J. Lee, J.H. Seo, J.H. Chung, and A. Chun
- Applications of Site Specific Pest Management in Mississippi Delta Cotton
 D.L. Sudbrink Jr., F.A. Harris, J.A. Hanks, P.J. English, J.L. Willers, and J.T. Robbins
- 36 The Zones Projects: Understanding Soybean Yield Variability

 H.L. Palm, W.J. Wiebold, W.D. Batchelor, G. Bollero, D.G. Bullock, D.E. Clay, N.R. Kitchen, R. Schule, K.A. Sudduth, and K. Thelen

BOARD NO. TITLE

- 37 Utilizing Site Specific Technology to Monitor Changes in Selected Variables that Impact Arkansas Soybean Production
 J.D. Beaty, R.A. Klerk, L.O. Ashlock, J.W. Haynes, T.E. Windham, and J.A. Lafferty
- 38 Ecological Friendly DragÈe Technique to Precision Plant Production under Tropical Climate Conditions

 A.B. Jose, F. Ruy, and L. Márton
- 39 Utilizing Precision Farming Technologies to Implement and Monitor Management Intensive Grazing Systems
 T.W. Griffin, S.P. Evans, and D.R. Oswald
- **40** Optimization of Corn Seeding Rates Based on Clay Content

 A.N. Cambouris, M.C. Nolin, and R.R. Simard
- 41 Variable Seeding Rate and Variable Nitrogen Rate Effects on Corn. Part 1. Variable Seeding
 T.D. Wyciskalla, S.A. Ebelhar, E.C. Varsa, K. Robertson,
 T. Fehrenbacher, and C.D. Hart
- 42 Variable N and Seeding Rates Using Yield and N Mineralization Indicator Maps in Corn Production N. Ziadi, A.N. Cambouris, M.C. Nolin, and R.R. Simard
- Spatial Variability of Soil Fertility in Relation to Crop Yield Zones on Hummocky Terrain A.P. Moulin, D. Derksen, D. McLaren, and C. Grant
- 44 Evaluation and Effectiveness of Nutrient Management Zone Determination Methods in North Central North Dakota M.A. Halvorson, D.W. Franzen, and V.L. Hoffman
- 45 Sweet Potato Yield as Influenced by Secondary and Micro Nutrient Foliar Applications

 J.L. Main, M.W. Shankle, and P.G. Thompson
- 46 Comparing Conventional and Variable Rate Methods for Determining Fertilizer and Lime Needs for Grain Production in Arkansas M.B. Daniels, L. Ashlock, and B. Baker
- 47 Site Specific Management Versus Whole Field Management of Soil Fertility Aspects in Alfalfa D.R. Pennington, R. Leep, S. Kravchenko, J. De Young, and T. Dietz
- 48 Soil Surface Nitrogen Balance for Paddy Field, County and National Level in Korea Y. Lee, P.J. Kim, S.C. Kim, and Y.H. Park
- 49 Site-Specific Corn Response to Soil Spatial Variability in Different Fertilizer Treatments
 C. Hache, S. Shibuswa, I.M.A. Sutrisna Wijaya, Y. Kato, and A. Sasao
- **Exploring Cause and Effect Relationships of Soil Fertility on Corn Yield Variability** *J.W. Doran, D.G. Watts, and J.S. Schepers*

CROP QUALITY

BOARD NO. TITLE

- 51 Study of the Effects of Kernel Protein Content on Expression of Quality Attributes in Bread Wheat Related to High Molecular Weight Glutenin Subunits, G. Najafian
- 52 Interactive Effects of Phosphorus, Compost and Poultry Manure on the Growth and Chemical Composition of Spinach
 F. Moshiri, M. Maftoun, N. Karimian, and A. Ronagh
- 53 Effects of Phosphorus, Compost and Poultry Manure on the Growth and Chemical Composition of Rice F. Moshiri, M. Maftoun, N. Karimian, and A. Ronaghi

PROFITABILITY

- 54 Analysis of the Profitability of Production Based on Yield Maps

 D.C. Wild and T.S. Colvin
- Using Spatial Yield Data to Make Strategic Decisions for Profitability and Risk Management C.R. Dillon and S.A. Shearer
- 56 Boundary-Condition Analyses to Identify Spatial Factors Limiting Profit in d'Anjou Pears
 T.L. Righetti and M.D. Halbleib

GEOSTATISTICS/SAMPLING

- 57 Sampling Scheme Based on Homogenous Units: An Approach for Data Acquisition on Precision Agriculture

 E.A. Da Silva, N.N. Imai, M. De Lourdes, and V.M. Tachibana
- Spatial Analysis of Weed Populations Integrating GPS Weed Seedbank and Survey within a Soybean Crop Production System E.A. Da Silva, E. Voll, N.N. Imai, U.R. Antuniassi, and V.M. Tachibana

ENGINEERING/TECHNOLOGY

- 59 Standards for Comparison of GPS Receiver Performance
 T.S. Stombaugh, S.A. Shearer, and J.P. Fulton
 - Can a \$300 GPS Receiver Be Used for Yield Mapping?

 C. Ellis and G. Hoette
- 61 Use of GPS without Differential Correction on Yield Mapping

 J.P. Molin and L.M. Gimenez
- 62 Mississippi Cotton Yield Monitor: Three Years of Field Test Results

 R. Sui
- **Development of a Compaction Profile Sensor** *P. Andrade, S.K. Upadhyaya, U.A. Rosa, and B. Jenkins*

BOARD NO.

TITLE

- 64 Soil Treatment and Analysis for Calibration Date to the Spectrophotometer
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