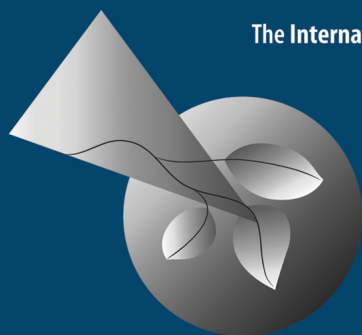




The International Society of Precision Agriculture presents the

11th International Conference on

Precision Agriculture

JULY 15 - 18, 2012 • Hyatt Regency
Indianapolis, Indiana USA

www.ispag.org/icpa

Conference Program

Colorado
State
University



International Society of Precision Agriculture

www.ispag.org

Conference Chairperson

Dr. Rajiv Khosla, President, ISPA
Colorado State University
ICPA@Colostate.edu

Organizing Committee

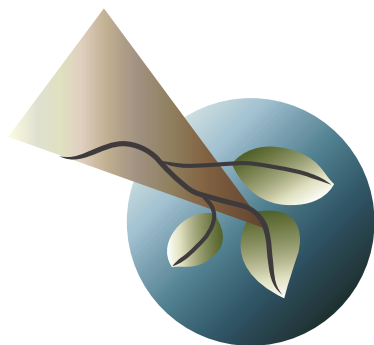
Dr. John Stafford, President-Elect, ISPA
Dr. Nicolas Tremblay, Secretary, ISPA
Dr. Steve Phillips, International Plant Nutrition Institute
Dr. Dwayne Westfall, Colorado State University
Mr. Quentin Rund, PAQ Interactive

Executive Director, ISPA

Dr. Harold Reetz

Conference Coordination

PAQ Interactive



11th International Conference on

Precision Agriculture

JULY 15-18, 2012 • Hyatt Regency
Indianapolis, Indiana USA

The 11th International Conference on Precision Agriculture 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 a discussion and exchange of information in various aspects of precision agriculture. The dedicated sessions on Precision A to Z tracks will offer information on key topics for practitioners, crop consultants, advisors, extension personnel, agronomists, producers and other practitioners.

The 11th ICPA is brought to you by the International Society of Precision Agriculture, Colorado State University and International Plant Nutrition Institute.



Program Committee

Conference Chairperson:

Dr. Rajiv Khosla, President, ISPA
Professor of Precision Agriculture
Colorado State University, Fort Collins , CO, USA

Organizing Committee:

Dr. John Stafford, President-Elect, ISPA
Silsoe Solutions, 197, Oliver Street, Ampthill, Bedford MK45 2SG, UK

Dr. Nicolas Tremblay, Secretary, ISPA
Research Scientist
Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, QC, Canada

Dr. Dwayne Westfall, Professor of Soil Fertility
Colorado State University, Fort Collins, CO, USA

Mr. Quentin Rund, ICPA Secretary
PAQ Interactive, Monticello IL, USA

A to Z Track Chair:

Dr. Steve Phillips, Director, Southeast United States
International Plant Nutrition Institute, Owens Cross Roads, AL, USA

Executive Director:

Dr. Harold Reetz, Executive Director, ISPA
Reetz Agronomics, Monticello, IL USA

Theme Session Chairs:

Machine Vision and Imaging Applications to Precision Agriculture

Dr. Daniel Lee Won Suk, Associate Professor
Agricultural & Biological Engineering Dept.
University of Florida, Gainesville, FL, USA

Precision Conservation and Carbon Management

Dr. Jorge A. Delgado, Soil Scientist
Soil Plant Nutrient Research Unit
USDA, Agricultural Research Service, Fort Collins, CO, USA

Precision Horticulture

Dr. Reza Eshani, Associate Professor of Agricultural & Biological Engineering
Citrus Research & Education Center (CREC)
University of Florida, Lake Alfred, FL, USA

Award Committee Chair:

Dr. Bruno Basso
Associate Professor, Dept. Crop Systems, Forest and Env. Sci. Systems
University of Basilicata, Italy

Award Committee Members:

Dr. Ian Yule
Professor in Precision Agriculture Soil and Earth Sciences PN 432, Institute of Natural Resources
Massey University, Private Bag 11222, Palmerston North, New Zealand

Dr. David Franzen
Professor of Soil Science & Extension Specialist
North Dakota State University, USA

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Information Management in Precision Agriculture - I	13
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Precision A to Z for Practitioners - II.....	13

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Machine Vision and Imaging Applications to Precision Agriculture - II .	14
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Emerging Issues in Precision Agriculture	23
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PROGRAM: WEDNESDAY, JULY 18, 2012

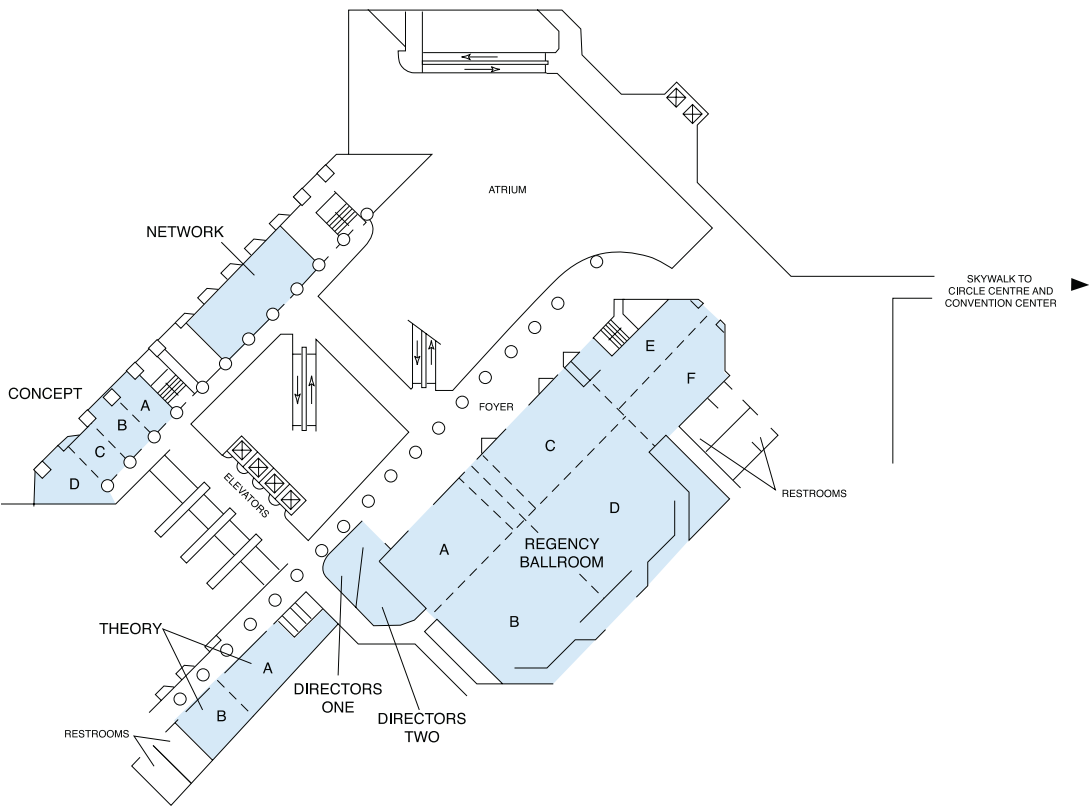
Concurrent Sessions – Morning

Proximal Sensing for Soil Properties	24
Global Proliferation of Precision Agriculture and Its Applications	24
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Hotel Floor Plans

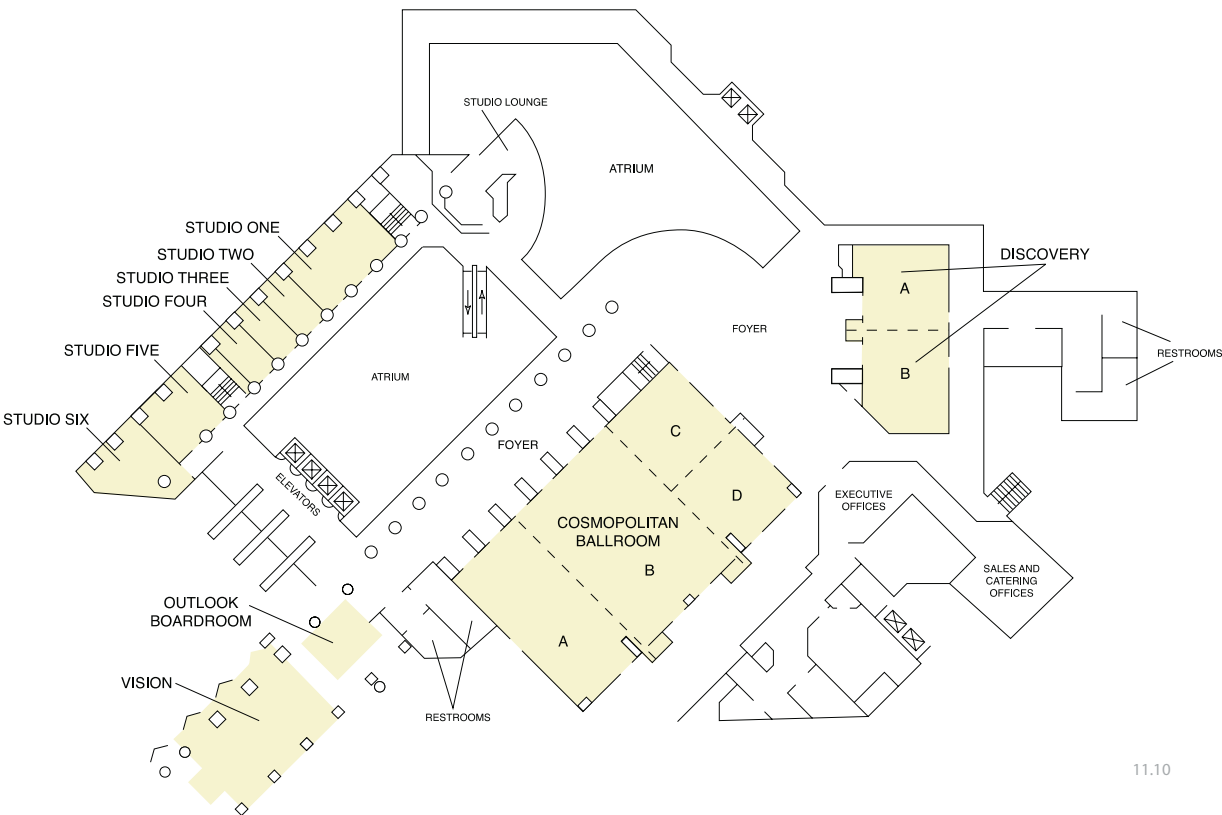
SECOND LEVEL



HYATT™

Hyatt Regency
Indianapolis, IN
USA

THIRD LEVEL



Exhibitor List

AgIntegrated Inc.

State College, PA, USA
(814) 237-5617
www.agintegrated.com

Ag Renaissance Software LLC

Raleigh, NC, USA
(919)-518-8030
www.agrenaissance.com

Agrian Inc.

Fresno, CA, USA
(559) 437-5700
www.agrian.com

Ag Sense LLC

Blaine, MN, USA
(605) 352-8350
www.agsense.net

AMMO Ag

Clarendon Hills, IL, USA
(312) 786-4201
www.ammoag.com

ASD Inc.

Boulder, CO, USA
(303) 444-6522
www.asdi.com

AquaCheck

Perry, IA, USA
(515) 465-5681
www.aquachecktech.com

DMCii Ltd.

Guildford, Surrey, Australia
+44 (0)1483 804299
www.dmcii.com

Farmers Edge Precision Consulting

Overland Park, KS, USA
(913) 710-8596
www.farmersedgeusa.com

Farm Works a Division of Trimble

Westminster, CO, USA
(800) 282-4103
www.trimble.com

Force-A

Orsay, France
+ 33 1 69 35 87 47
www.force-a.com

Geonics Limited

Mississauga, ON, Canada
(905) 670-9580
www.geonics.com



GEOSYS Inc.

Plymouth, MN, USA
+33 (0)5 62 47 80 80
www.geosys.com

John Deere

Urbandale, IA, USA
(866) 404-9057
www.johndeere.com

Lindsay Corporation

Omaha, NE, USA
(402) 829-6800
www.lindsay.com

MapShots Inc

Cumming, GA, USA
(678) 513-6093
www.mapshots.com

National Geodetic Survey - NOAA

Silver Spring, MD, USA
(301) 713-3242
www.geodesy.noaa.gov

OmniSTAR

Houston, Texas, USA
(888)-666-4782
www.omnistar.com

Outback Guidance by Hemisphere GPS/AgJunction

Hiawatha, KS, USA
(800) 247-3808
www.outbackguidance.com

PrecisionAg

Willoughby, OH, USA
(440)-942-2000
www.precisionag.com

Precision Earth / CropTrak

Tucson, AZ, USA
(800)-787-8046
www.cropttrak.com

PROGIS

Villach, Austria
(+43) 4242 263 32-0
www.progis.com

Raven Industries

Sioux Falls, SD, USA
(800) 243-5435
www.ravenprecision.com

Satshot

IA, ND, USA
(701) 235-5767
www.satshot.com

Solum Inc.

Mountain View, CA, USA
(650) 963-9775
www.solumtech.com

Spectrum Technologies

Plainfield, IL, USA
(815) 436-4440
www.specmeters.com

Springer

Dordrecht, AA, The Netherlands
(+31) 78 657 60 00
www.springer.com

SST Software

Stillwater, OK, USA
(405) 377-5334
www.sstsoftware.com

Topcon Precision Agriculture

Livermore, CA, USA
(925) 245-8300
www.global.topcon.com

Trimble

Westminster, CO, USA
(408) 481-8000
www.trimble.com

United Soils INC

Fairbury, IL, USA
(815) 692-2626
www.unitedsoilsinc.com

Veris Technologies

Salina, KS, USA
(785) 825-1978
www.veristech.com

Program Overview

Sunday, July 15

3:00 pm-6:00 pm

Registration

Atrium 3rd Floor

6:00 pm-9:00 pm

Evening Welcome Reception

The Eagle's Nest (Top Floor)

Monday, July 16

6:30 am-9:30 am

Exhibit Hall Setup

Cosmopolitan Ballroom

7:00 am-5:00 pm

Registration Open

Atrium 3rd Floor

9:50 am-5:00 pm

Exhibit Hall Open

Cosmopolitan Ballroom

8:00 am-9:50 am

Opening Plenary Session

Regency Ballroom A-D

9:50 am-10:20 am

Break in Exhibit Hall

Cosmopolitan Ballroom

10:20 am-12:00 pm

Concurrent Sessions

Managing In-Season Crop Variability
Concept

Precision Nutrient Management
Network

Machine Vision and Imaging Applications to Precision Agriculture - I
Regency E&F

Remote Sensing Applications in Precision Agriculture - I
Vision

Modeling and Geostatistics - I
Studio One

Precision A to Z for Practitioners - I
Discovery

12:00 pm-1:30 pm

Luncheon

Regency Ballroom A-D

1:30 pm-3:30 pm

Concurrent Sessions

Engineering Technologies and Advances: Equipment - I
Concept

Managing Spatial Variability in Soils
Network

Remote Sensing Applications for Field Crops
Regency E&F

Information Management in Precision Agriculture - I
Vision

Profitability, Sustainability and Adoption of Precision Agriculture
Studio One

Precision A to Z for Practitioners - II
Discovery

3:30 pm-4:00 pm

Break in Exhibit Hall
Cosmopolitan Ballroom

4:00 pm-5:00 pm

Concurrent Sessions

Engineering Technologies and Advances: Equipment - II
Concept

Sensor Applications in Managing In-Season Crop Variability
Network

Machine Vision and Imaging Applications to Precision Agriculture - II
Regency E&F

Global Proliferation of Precision Agriculture and Its Applications - I
Vision

Modeling and Geostatistics - II
Studio One

5:00 pm-6:30 pm

Poster Session and Cash Bar
3rd Floor Foyer

Program Overview

Tuesday, July 17

7:00 am-5:00 pm

Registration Open

Atrium 3rd Floor

8:00 am-5:00 pm

Exhibit Hall Open

Cosmopolitan Ballroom

8:00 am-10:00 am

Concurrent Sessions

Engineering Technologies and Advances: Sensors

Concept

Guidance, Robotics and Automation - I

Network

Canopy Sensing for Crop Management - I

Regency E&F

Spatial Water Management

Vision

Precision Horticulture - I

Studio One

Precision A to Z for Practitioners - III

Discovery

10:00 am-10:30 am

Break in Exhibit Hall

Cosmopolitan Ballroom

10:30 am-11:30 am

Concurrent Sessions

Precision Conservation and Carbon Management

Concept

Spatial Variability in Soil

Network

Precision Laser Leveling Applications

Regency E&F

Information Management in Precision Agriculture - II

Vision

Precision Horticulture - II

Studio One

Precision A to Z for Practitioners - IV

Discovery

11:30 am-1:50 pm

Luncheon, Awards and Entertainment Presentation of Pierre C. Robert Precision Agriculture Award(s) and Graduate Student Award(s)

Regency Ballroom A-D

1:50 pm-3:30 pm

Concurrent Sessions

Engineering Technologies and Advances: Water

Concept

Guidance, Robotics and Automation - II

Network

Canopy Sensing for Crop Management - II

Regency E&F

Precision Crop Protection - I

Vision

Remote Sensing Applications in Precision Agriculture - II

Studio One

Precision A to Z for Practitioners - V

Discovery

3:30 pm-4:00 pm

Break in Exhibit Hall

Cosmopolitan Ballroom

4:00 pm-5:00 pm

Concurrent Sessions

Proximal Sensing for Crop Parameters

Concept

Soil Analysis for Precision Nutrient Management

Network

Fluoresensing for Crop Management

Regency E&F

Emerging Issue in Precision Agriculture

Vision

Hyperspectral Remote-Sensing Applications in Agriculture

Studio One

5:00 pm-6:00 pm

Poster Session and Cash Bar

3rd Floor Foyer

Wednesday, July 18

7:00 am-10:30 am	Registration Open <i>Atrium 3rd Floor</i>
8:00 am-10:30 am	Exhibit Hall Open <i>Cosmopolitan Ballroom</i>
8:00 am-10:00 am	Concurrent Sessions Proximal Sensing for Soil Properties <i>Concept</i> Global Proliferation of Precision Agriculture and Its Applications - II <i>Network</i> Precision Dairy and Livestock Management <i>Regency E&F</i> Precision Crop Protection - II <i>Vision</i> Precision Horticulture - III <i>Studio One</i>
10:00 am-10:30 am	Break in Exhibit Hall <i>Cosmopolitan Ballroom</i>
10:30 am-12:00 pm	Closing Plenary Session <i>Regency Ballroom A-D</i>

Opening Plenary Session

Monday, July 16, 2012, 8:00 am

REGENCY BALLROOM A-D

Session Chair: Dr. Rajiv Khosla

Keynote Speakers

Key Advances and Remaining Knowledge Gaps in Remote Sensing for Precision Agriculture

Dr. David Mulla



Dr. Mulla received a Ph.D. degree in Agronomy from Purdue University with emphasis in soil physics (1983). From 1983 to 1995 he was Assistant to Full Professor in the Dept. of Crop and Soil Sciences at Washington State Univ. Since 1995 he has been Professor and Larson Chair for Soil & Water Resources in the Dept. of Soil, Water, and Climate at the Univ.

of Minnesota. Since January, 2004 he has been the Director of the Precision Agriculture Center at the Univ. of Minnesota and organized the 7th and 8th International Conferences on Precision Agriculture. In 2007 he was appointed a Founding Fellow in the Univ. of Minnesota's Institute on Environment. In 2011 he was appointed to a National Academy of Sciences committee on water quality standards.

Dr. Mulla and his coauthors (including 40 MS and PhD students) have produced over 200 publications, and have received funding of over \$16 million. Dr. Mulla and his colleagues have extensive experience in applying geostatistics, remote sensing and GIS terrain analysis in agricultural, biological and ecological systems, including applications for development of targeted BMP placement and "management zones" in precision agriculture and precision conservation. Broadly speaking, Dr. Mulla's pioneering research on precision agriculture contributed significantly to its adoption in the US and around the world, fostering business opportunities, job growth and greater economic and environmental efficiency in agriculture.

Dr. Mulla is an internationally recognized researcher and scholar. His research has taken him to over 20 countries. He is currently a consultant to the Millennium Challenge Corporation for a project to install erosion control practices and plant 8 million olive trees on 90,000 ha in Morocco. His peers elected him as a Fellow in the Soil Science Society of America (SSSA), and as a Fellow in the Agronomy Society of America. He has served as Associate and Technical Editor for the Soil Science Society of America Journal, and as Associate Editor for the Journal of Precision Agriculture.

From Poking Holes to Precision Sensing: Options Growing for Nutrient Management

Dr. Newell Kitchen



Newell Kitchen is a Soil Scientist with USDA ARS and Adjunct Associate Professor at the University of Missouri. He received his B.Sc. (1984) degree from Brigham Young University, his M.Sc (1986) degree from University of Missouri, and his Ph.D. (1990) degree in Agronomy from Colorado State University. His research focuses on applying new

technologies for collecting high-resolution soil and crop information, thereby enabling improved crop production management decisions. He also investigates the impact of various grain and bioenergy cropping systems on soil and water quality. His research is documented in >200 technical publications (including 75 peer-reviewed journal articles, 8 book chapters, and >30 invited papers). He has been active in organizing meeting symposia, editorial service, and currently serves as the Past President of the American Society of Agronomy.

Oral Presentations

Monday, July 16, Morning

<u>Concept</u>	<u>Network</u>	<u>Regency E&F</u>
Managing In-Season Crop Variability	Precision Nutrient Management	Machine Vision and Imaging Applications to Precision Agriculture - I
<i>Moderator: Dr. Bodo Mistele, Technical University Munich, Germany</i>	<i>Moderator: Dr. Richard Ferguson, University of Nebraska Lincoln</i>	<i>Theme Chair: Dr. Daniel Lee Won Suk, University of Florida</i>
10:20 Use of Corn Height to Improve the Relationship Between Active Optical Sensor Readings and Yield Estimates <i>D.W. Franzen, L. Sharma</i>	10:20 Precision Nitrogen Management and Global Nitrogen Use Efficiency <i>M. L. Gupta, R. Khosla</i>	10:20 A Method for Combining Spatial and Hyperspectral Information for Delineation of Homogenous Management Zones <i>S. Cohen, O. Levi, Y. Cohen, V. Alchanatis</i>
10:40 Estimation of Nitrogen of Rice in Different Growth Stages Using Tetracam Agriculture Digital Camera <i>M. Saberioon, M.S.M. Amin, A. Gholizadeh</i>	10:40 Developing an Integrated Rice Management System for Improved Yield and Nitrogen Use Efficiency in Northeast China <i>G. Zhao, Y. Miao, F. Zhang, M. Fan</i>	10:40 Spectral Angle Mapper (SAM) Based Citrus Greening Disease Detection Using Airborne Hyperspectral Imaging <i>H. Li, W. S. Lee, K. Wang, R. Ehsani, C. Yang</i>
11:00 Use of Active Crop Canopy Reflectance Sensor for Nitrogen Sugarcane Fertilization <i>L.R. Amaral, G. Portz, H.J.A. Rosa, J.P. Molin</i>	11:00 Determination of Optimal Number of Management Zones <i>A. Melnitchouck</i>	11:00 An Adaptive Vision Algorithm for Navigation of an Autonomous Pepper Greenhouse Sprayer <i>A. Bechar, I. Dar, Y. Edan</i>
11:20 Development of Ground Based Multi-source Crop Information Collection System <i>M. S. Makkar, A. Sharma, S. Gupta</i>	11:20 Site-Specific Evaluations of Nitrification Inhibitor with Fall Applications of Liquid Swine Manure <i>P. M. Kyveryga, T. M. Blackmer</i>	11:20 Evaluation of the Sensor Suite for Detection of Plant Water Stress in Orchard and Vineyard Crops <i>R. Dhillon, V. Udompetaikul, F. Rojo, S. Upadhyaya, D. Slaughter, B. Lampinen, K. Shackel</i>
11:40 Discussion	11:40 Discussion	11:40 Discussion

12:00 - 1:30 Luncheon
Regency Ballroom A-D

Monday, July 16, Morning

<u>Vision</u>		<u>Studio One</u>		<u>Discovery</u>	
Remote Sensing Applications in Precision Agriculture - I		Modeling and Geostatistics - I		Precision A to Z for Practitioners I	
<i>Moderator : Dr. Chenghai Yang, USDA-ARS, Texas</i>		<i>Moderator: Dr. David Mulla, University of Minnesota</i>		<i>Moderator: Dr. Steve Phillips, IPNI</i>	
10:20	Automatic Remote Image Processing For Agriculture Uses Through Specific Software <i>L. García-Torres, D. Gómez-Candón, J. J. Caballero-Novella, M. Jurado-Expósito, A. de Castro, J.M. Peña-Barragán, F. López-Granados</i>	10:20	I-SALUS: New Web Based Spatial Systems for Simulating Crop Yield and Environmental Impact <i>B. Basso, T.-Y. Chou, C. Chien, M. Yeh</i>	10:20	Exploiting the DMC Satellite Constellation for Applications in Precision Agriculture <i>G. Holmes, P. Stephens, S. Mackin</i>
10:40	Remote Sensing Imagery Based Agricultural Land Pattern Extraction around Miyajimanuma Wetland <i>B. Su, R. Mochizuk, I. Han-ya, K. Ishii, N. Noguchi</i>	10:40	Performance Evaluation of STICS Crop Model to Simulate Corn Growth Attributes in Response to N Rate and Climate Variations <i>J. Sansoulet, E. Pattey, B.L. Ma, G. Jégo, N. Tremblay, C. Drury, N. Beaudoin</i>	10:40	The Map - Supported By New NPK-Sensors - Is Intelligent, Not the Tractor <i>W. H. Mayer</i>
11:00	Evaluating Water Status in Potato Fields Using Combined Information from RGB and Thermal Aerial Images <i>R. Rud, Y. Cohen, V. Alchanatis, A. Cohen, M. Sprintsin, A. Levi, R. Brikman, B. Heuer, J. H. Lemcoff, T. Markovits, Z. Dar, C. Rosen, D. Mulla, T. Nigon</i>	11:00	Assessing the Potential of an Algorithm Based On Mean Climatic Data to Predict Wheat Yield <i>B. Dumont, V. Leemans, S. Ferrandis, F. Vancutsem, B. Seutin, B. Bodson, M.-F. Destain, J.-P. Destain</i>	11:00	A New Approach to Yield Map Creation <i>C. Romier, M. Hyrien, D. Lamker</i>
11:20	Monitoring Drought Stress Index in Wheat Field of Mongolia Using Remote Sensing <i>B.Erdenee, B.Batbayar, D.Nasandulam</i>	11:20	Statistical Procedure to Compare Farming Procedures with the Observation of Spatial Trends and Correlations in On-Farm Research <i>M. Langrock, P. Wagner</i>	11:20	Evaluation of PRS(TM) Probe Technology and Model for Variable Rate Fertilizer Application in Hummocky Fields in Saskatchewan <i>K. Greer, E. Bremer, J. Burns</i>
11:40	Discussion	11:40	Discussion	11:40	The Use of Crop Sensors Beyond Nitrogen and Improving the Right to Farm <i>C.H. Mackenzie</i>

12:00 - 1:30 Luncheon
Regency Ballroom A-D

Monday, July 16, Afternoon

<u>Concept</u>		<u>Network</u>		<u>Regency E&F</u>	
Engineering Technologies and Advances: Equipment - I		Managing Spatial Variability in Soils		Remote Sensing Applications for Field Crops	
Moderator: Dr. Tim Stombaugh, University of Kentucky		Moderator: Dr. David Bonfill, Institute of Plant Sciences, Israel		Moderator: Dr. David Franzen, North Dakota State University	
1:30	Maximizing Agriculture Equipment Capacity Using Precision Agriculture Technologies <i>A.M. Poncet, J.P. Fulton, T.P. McDonald, G. Pate, B. Tisseyre</i>	1:30	Digital Aerial Imagery Guides a Statewide Nutrient Management Benchmarking Survey <i>T.M. Blackmer, P.M. Kyveryga</i>	1:30	Understanding Spatial and Temporal Variability of Wheat Yield: An Integrated System Approach <i>B. Basso, C. Fiorentino, A. D’Errico, D. Cammarano</i>
1:50	Implementation of ECU For Agricultural Machines Based On IsoAgLib Open Source <i>W. Ham , T. Enkhbaatar, B. Luubaatar, K. Hyeokjae</i>	1:50	Soil pH maps Derived from On-The-Go pH-Measurements as Basis for Variable Lime Application under German Conditions: Concept Development and Evaluation in Field Trials <i>H.-W. Olf, A. Borchert, D. Trautz</i>	1:50	Estimation of Leaf Nitrogen Concentration in Barley with In Situ Hyperspectral Measurements <i>X. Xu, J. Wang, C. Li, X. Yang, H. Yang</i>
2:10	Spray Pattern and Droplet Spectra Characteristics from an Actively Controlled Variable-Orifice Nozzle <i>J.D. Luck, M.P. Sama, S.A. Shearer</i>	2:10	Comparison of Algorithms for Delineating Management Zones <i>R. T. Santos, A. M. Saraiva, J. P. Molin</i>	2:10	Deriving Nitrogen Indicators of Maize Using the Canopy Chlorophyll Content Index <i>F. Li, Y. Miao, G. Feng, S. Yue, X. Chen, B. Liu</i>
2:30	Study on Monitoring System of Wheat Sowing <i>W. Fu, Z. Meng, G. Wu, J. Dong, H. Mei, C. Zhao</i>	2:30	Categorization of Districts Based on Nonexchangeable Potassium: Generation GIS Maps and Implications in Efficient K Fertility Management in Indian Agriculture <i>Ch. Srinivasa Rao, A. Subba Rao, H. Magen, K. V. Rao, B.Venkateswarlu</i>	2:30	Spectral Models for Estimation of Chlorophyll Content, Nitrogen, Moisture Stress and Growth of Wheat Crop <i>M. Singh, B. Singh, A. Sharma, J. Mukherjee, S. K. Thind, R. Kaur</i>
2:50	Optimization of Forage Harvesting By Automatic Speed Control and Additive Application <i>A. Kunnas, J. Backman, A. Visala, A. Suokannas</i>				
3:10	An RFID-Based Variable Rate Technology Fertilizer Applicator for Plantation Tree Crops <i>T. A. Ishola, A. Yahya, A. R. M. Shariff, S. A. Aziz</i>	2:50	Discussion	2:50	Discussion

**3:30 - 4:00 Break in Exhibit Hall
Cosmopolitan Ballroom**

Monday, July 16, Afternoon

Vision

Information Management in Precision Agriculture - I

Moderator: Dr. Sakae Shibusawa, Tokyo University of Agriculture and Technology

- 1:30 **Using Electronic Technology to Remotely Monitor Conditions, Transfer the Data, and Display Data Real-time on the Internet**
J. Nowatzki, R. Ashley
- 1:50 **A Model to Analyze "As-Applied" Reports of Variable Rate Applications**
A. F. Colaço, H. J. Rosa, J. P. Molin
- 2:10 **Towards a Multi-Source Record Keeping System for Agricultural Product Traceability**
X. Yang, C. Sun, Z. Ji, L. Zhao, W. Li, C. Zhou, X. Du, J. Xie, T. Wu, L. Qu, L. Hao
- 2:30 **Aggregating Precision Agriculture Data Across Regions**
T. Griffin
- 2:50 **Discussion**

Studio One

Profitability, Sustainability and Adoption of Precision Agriculture

Moderator: Dr. Bruce Erickson, American Society of Agronomy

- 1:30 **Using Crop Budgeting Spreadsheets Can Assist Producers In Evaluating The Cost Effectiveness Of Adoption Of The Various Precision Agriculture Technologies**
R.N. Klein, R.K. Wilson
- 1:50 **The Use of Artificial Neuronal Networks to Generate Decision Rules for Site-Specific Nitrogen Fertilization**
P. Wagner
- 2:10 **On-Farm Trials Using Precision Ag in Northeast Louisiana**
D. Burns, S. Blanche, R.L. Frazier, J. Kruse, C. Overstreet
- 2:30 **The Adoption of Information Technologies and Subsequent Changes in Input Use in Cotton Production**
N.M. Thompson, J.A. Larson, B.C. English, D.M. Lambert, R.K. Roberts, M.M. Velandia, C. Wang
- 2:50 **Adoption and Non-Adoption of Precision Farming Technologies by Cotton Farmers**
M. Pandit, K. P. Paudel, A.K. Mishra, E. Segarra
- 3:10 **Discussion**

Discovery

Precision A to Z for Practitioners II

Moderator: Dr. Steve Phillips, IPNI

- 1:30 **A New Sensing System for Immediate and Direct Measurements of Soil Nitrate**
M. Preiner
- 1:50 **Field Moist Processing for Soil Analysis: Precision Measurement is Required for Precision Management**
M. Preiner
- 2:10 **Raising Awareness of the Potential of Crop Sensing Technologies to Improve Environmental Stewardship**
B. Ortiz
- 2:30 **...continuation of Raising Awareness...**
B. Ortiz

**3:30 - 4:00 Break in Exhibit Hall
Cosmopolitan Ballroom**

Monday, July 16, Late Afternoon

<u>Concept</u>		<u>Network</u>	<u>Regency E&F</u>
Engineering Technologies and Advances: Equipment - II		Sensor Applications in Managing In-Season Crop Variability	Machine Vision and Imaging Applications to Precision Agriculture - II
<i>Moderator: Dr. Victor Alchanatis, Agricultural Research Organization, Israel</i>		<i>Moderator: Dr. Yafit Cohen, Agricultural Research Organization, Israel</i>	
4:00	Spot-Application of Pre-Emergence Herbicide Using a Variable Rate Sprayer in Wild Blueberry <i>T. J. Esau, Q. U. Zaman, Y. K. Chang, A. A. Farooque, M. A. Cheema, A. W. Schumann, D. C. Percival</i>	4:00	In-Field Corn Stalk Location Using Rapid Line-Scan Technique <i>Y. Shi, N. Wang, R. K. Taylor</i>
4:20	Development of Variable Rate Applicators Using Real-Time Machine Vision Sensing and Control System for Spot-Application of Agrochemicals <i>Q. Zaman</i>	4:20	Winter Wheat Growth Uniformity Monitoring Through Remote Sensed Images <i>X.Y. Song, C.J. Zhao, L.P. Chen, W.J. Huang, B. Cui</i>
4:40	Computer Aided Engineering Analysis and Design Optimization for Precision Manufacturing of Tillage Tool :Sweep Cultivator <i>G. U. Shinde, V. M. Salokhe, P. D. Badgujar</i>	4:40	Discussion
		4:00	Evaluating Spectral Measures Derived From Airborne Multispectral Imagery for Detecting Cotton Root Rot <i>C. Yang, G.N. Odvody, C.J. Fernandez, J.A. Landivar, R.L. Nichols</i>
		4:20	A 3-D Stereovision Simulator for Centrifugal Fertilizer Granule Spreading <i>B. Hijazi, J. Vangeyte, F. Cointault, M. Paindavoine, J. Pieters</i>
		4:40	Validation of Modicovi - Monocot and Dicot Coverage Ratio Vision Based Method for Real Time Estimation Canopy Coverage Ratio between Cereal Crops and Dicotyledon Weeds <i>M.S. Laursen, H.S. Midtiby, R.N. Jørgensen, N. Krüger</i>

5:00 - 6:30 Poster Session and Cash Bar
3rd Floor Foyer

Monday, July 16, Late Afternoon

Vision

Studio One

Global Proliferation of Precision Agriculture and Its Applications - I

Modeling and Geostatistics - II

*Moderator: Dr. Nicolas Tremblay,
Agriculture and Agri-Food Canada*

Moderator: Dr. Terry Griffin, Cresco Ag, USA

4:00 Precision Agriculture Initiative for Karnataka – A New Direction for Strengthening Farming Community

*U.K. Shanwad, M.B. Patil, H. Veeresh,
B.G. Mastan Reddy, R. Pandit Rathod,
N.L. Rajesh, S. Shailendrakumar, R.
Khosla, V.C. Patil*

4:00 Multi-objective Optimization Analysis Model for County Range Soil Nutrients Sampling Point Layout Based on Improved Genetic Algorithm

C. Tian'en, C. Liping, D. Jing, C. Dong

4:20 Bayesian Methods for Predicting LAI and Soil Moisture

M. Mansouri, B. Dumont, M.-F. Destain

4:20 Spatial Variability Index Based On Soil Properties for Notill and Pasture Site-Specific Management in Brazil

*R.P. de Oliveira, V. de M. Benites, A.C. de
C. Bernardi, L.M. Rabello, R.Y. Inamasu*

4:40 Discussion

4:40 Factors Influencing the Timing of Precision Agriculture Technology Adoption in Southern U.S. Cotton Production

*P. Watcharaanantapong, R.K. Roberts,
D.M. Lambert, M. Velandia, J.A. Larson,
B.C. English, R.M. Rejesus,
M.C. Marra, A.K. Mishra, C. Wang*

5:00 - 6:30 Poster Session and Cash Bar
3rd Floor Foyer

Tuesday, July 17, Morning

<u>Concept</u> Engineering Technologies and Advances: Sensors	<u>Network</u> Guidance, Robotics and Automation - I	<u>Regency E&F</u> Canopy Sensing for Crop Management - I
<i>Moderator: Dr. John Fulton, Auburn University</i>	<i>Moderator: Dr. Daniel Schmoldt, USDA-NIFA, Washington, D.C.</i>	<i>Moderator: Dr. Ken Sudduth, USDA-ARS, Missouri</i>
8:00 Probabilistic Relational Model-based Scheduling Approach for Farmland Soil Sensor Network <i>R. Zhang, C. Liping, X. Gang</i>	8:00 Research on Straight-Line Path Tracking Control Methods in an Agricultural Vehicle Navigation System <i>T. Li, J. Hu, L. Gao, H. Hu, X. Bai, X. Liu</i>	8:00 Measuring Sugarcane Height in Complement to Biomass Sensor for Nitrogen Management <i>G. Portz, L. R. Amaral, J. P. Molin</i>
8:20 3D Acquisition System Applied to Agronomic Scenes <i>B. Billiot, P. Gouton, F. Cointault</i>	8:20 Path Tracking Control of Tractors and Steerable Towed Implements Based On Kinematic and Dynamic Modeling <i>R. Werner, S. Mueller, G. Kormann</i>	8:20 Can Active Sensor Based NDVI Consistently Classify Wheat Genotypes? <i>M. A. Naser, R. Khosla, L. Longchamps, M. Moragues, S. Haley, R. Reich, G. S. McMaster, G. W. Buchleiter</i>
8:40 Development of Sensing System Using Digital Photography Technique for Spot-Application of Herbicide in Wild Blueberry Fields <i>Y. Chang, Q. Zaman, T. Esau, A. Farooque, A. Schumann, D. Percival</i>	8:40 Optimizing Path Planning By Avoiding Short Corner Tracks <i>M. Spekken, J.P. Molin</i>	8:40 Comparison of Active and Passive Spectral Sensors in Discriminating Biomass Parameters and Nitrogen Status in Wheat Cultivars <i>K. Erdle, B. Mistele, U. Schmidhalter</i>
9:00 Adaptive Sensor Fusion Method for Agricultural and Environmental Monitoring <i>M. A. Dota, C. E. Cugnasca</i>	9:00 Improvement Precision Agricultural Communication Schema agroXML Based on Multi-Agents System's Deliberation and Decision Making Processes <i>A. Gailums, A. Pentjuss</i>	9:00 Optimum Sugarcane Growth Stage for Canopy Reflectance Sensor to Predict Biomass and Nitrogen Uptake <i>G. Portz, L. R. Amaral, J. P. Molin, J. Jasper</i>
9:20 An Approach to Selection of Soil Water Content Monitoring Locations within Fields <i>L. Pan, V.I. Adamchuk, R. Ferguson</i>	9:20 Path Generation Method with Steering Rate Constraint <i>J. Backman, T. Oksanen, A. Visala</i>	9:20 Evaluation of Differences in Corn Biomass and Nitrogen Uptake at Various Growth Stages Using Spectral Vegetation Indices <i>M. S. Torino, B.V. Ortiz, J. P. Fulton, K. Balkcom</i>
9:40 Discussion	9:40 Design and Implementation of Virtual Terminal Based On ISO11783 Standard for Agricultural Tractors <i>W. Ham, T. Enkhbaatar, B. Luubaatar, K. Hyeokjae</i>	9:40 Discussion

**10:00 - 10:30 Break in Exhibit Hall
Cosmopolitan Ballroom**

Tuesday, July 17, Morning

Vision

Spatial Water Management

Moderator: Dr. Ian Yule, Massey University, New Zealand

- 8:00 **Spatial Apparent Electrical Conductivity (ECa), Soil Moisture and Water Use Efficiency in Vertosol Soils**
J.N. Stanley, D.A. Schneider, D.W. Lamb
- 8:20 **Precision Tools to Evaluate Benefits of Tile Drainage in a Corn and Soybean Rotation in Iowa**
P.R. Reeg, T.M. Blackmer, P.M. Kyveryga
- 8:40 **Precision Fertigation in Wheat for Sustainable Agriculture in Saudi Arabia**
V.C. Patil, K.A. Al-Gaadi
- 9:00 **Transient Water Flow Model in a Soil-Plant System for Subsurface Precision Irrigation**
M. Shukri B. Z. A., S. Shibusawa, M. Ohaba, L. Qichen, M. Kodaira, M. Khalid
- 9:20 **A High-Reliability Database-Supported Modular Precision Irrigation System**
N. Kamel, S. Sharaf, D. Yousef, A. El-Shafei
- 9:40 **The Effect of Scheduling Irrigation on Yield, Concentration and Uptake of Nutrient in Zero Tilled Wheat (*Triticum Aestivum* L.)**
H. Singh, H.K. Sachan, D. Krishna

Studio One

Precision Horticulture - I

Theme Chair: Dr. Reza Eshani, University of Florida

- 8:00 **Affordable Multi-Rotor Remote Sensing Platform for Applications In Precision Horticulture**
R. Ehsani, S. Sankaran, J. M. Maja, J. C. Neto
- 8:20 **Early Detection of Oil Palm Fungal Disease Infestation Using A Mid Infrared Spectroscopy Technique**
S. Liaghat, S.B. Mansor, H.Z.M. Shafri, S. Meon, R. Ehsani, S.H.M.N. Azam, N.M. Noh
- 8:40 **Variable Rate Fertilization for Citrus**
A. F. Colaço, J. P. Molin
- 9:00 **Remote Control System for Greenhouse Environment Using Mobile Devices**
S.-W. Kang, S.-O. Chung, K.-D. Kim, H.-J Kim, J.-Y. Choi, Y.-S. Zhang, K.-H. Han, S.-O. Hur
- 9:20 **Determination of Sensor Locations for Monitoring of Soil Water Content in Greenhouse**
D.-K. Ryu, S.-O. Chung, K.-D. Kim, Y.-K Huh, J.-Y. Choi, H.-J. Kim, H.-H. Kim
- 9:40 **OptiThin - Precision Fruiculture by Tree-Specific Mechanical Thinning**
R. Gebbers, M. Pflanz, M. Zude, A. Betz, B. Hille, J. Mattner, T. Rachow-Autrum, M. Özyurtlu, A. Schischmanow, M. Scheele, J. Schrenk, L. Schrenk

Discovery

Precision A to Z for Practitioners III

Moderator: Dr. Steve Phillips, IPNI

- 8:00 **AMMO Ag: Agricultural Marketing & Merchandising Optimizer**
D. Dempsey
- 8:20 **...continuation of AMMO Sponsor Presentation**
D. Dempsey
- 8:40 **John Deere FarmSight™**
M. Stelford
- 9:00 **...continuation of John Deere FarmSight™**
M. Stelford
- 9:20 **Real-Time Fluorescence Sensors for Precision Agriculture**
J.-L. Ayral
- 9:40 **...continuation of Real-Time Fluorescence Sensors...**
J.-L. Ayral

**10:00 - 10:30 Break in Exhibit Hall
Cosmopolitan Ballroom**

Tuesday, July 17, Mid-morning

<u>Concept</u>	<u>Network</u>	<u>Regency E&F</u>
Precision Conservation and Carbon Management	Spatial Variability in Soil	Precision Laser Leveling Applications
<i>Theme Chair: Dr. Tom Mueller, University of Kentucky</i>	<i>Moderator: Dr. Siva Balasundram, University of Putra, Malaysia</i>	<i>Moderator: Dr. Alex Melnitchouck, Canada</i>
10:30 Cloud Computing, Web-Based GIS, Terrain Analysis, Data Fusion, and Multivariate Statistics for Precision Conservation in the 21st Century <i>T. Mueller, S. Neelakantan, E. Rienzi, B. Mijatovic, A. Castrignano, A. Pike, C. Bumgardner</i>	10:30 Landscape Influences on Soil Nitrogen Supply and Water Holding Capacity for Irrigated Corn <i>R. Ferguson, T. Shaver, N. Ward, S. Irmak, S. Van Donk, D. Rudnick, B. Wienhold, M. Schmer, V. Jin, D. Francis, V. I. Adamchuk, L. Hendrickson</i>	10:30 Evaluation of Application Effect of the Laser Land Leveling Technology in Typical Areas of China <i>W. Guangwei, M. Zhijun, C. Liping, F. Weiqiang, D. Jianjun</i>
10:50 A Scheme of Precision Carbon Farming for Paddy <i>S. Shibusawa, M. Kodaira, Y. Li, T. Oomori, B. Siti Noor Aliah</i>	10:50 Relationship of Soil Properties to Apparent Ground Conductivity in Wild Blueberry Fields <i>F.S. Khan, Q.U. Zaman, A.A. Farooque, S.R. Saleem, A.W. Schumann, A. Madani, D.C. Percival</i>	10:50 Impact of Precision Leveling On Spatial Variability of Moisture Conservation in Arid Zones of Karnataka <i>P. S. Kanannavar, P. Balakrishnan, B. T. Pujari, M.B. Patil, S. K. Upadhyaya</i>
11:10 A New Version of the Nitrogen Trading Tool (NTT) To Assess Nitrogen Management across the USA <i>J. A. Delgado, J. C. Ascough II</i>	11:10 Discussion	11:10 Laser Leveling Holds a Lot Of Promise in Water Conservation and Saving in Dry Zones (Drought Prone Areas) of Karnataka <i>P. S. Kanannavar, P. Balakrishnan, B. T. Pujari, M.B. Patil, S. K. Upadhyaya</i>

11:30 - 1:50 Luncheon, Awards and Entertainment
Regency Ballroom A-D

Tuesday, July 17, Mid-morning

Vision

Information Management in Precision Agriculture - II

Moderator: Dr. Ricardo Inamasu, Embrapa, Brazil

10:30 **Ontology for Data Representation in the Production of Cotton Fiber in Brazil**
C. J. Santos, A. R. Hirakawa

10:50 **Issues in Analysis of Soil-Landscape Effects in a Large Regional Yield Map Collection**
D. B. Myers, N. R. Kitchen, K. A. Sudduth

11:10 **Discussion**

Studio One

Precision Horticulture - II

Moderator: Dr. Reza Ehsani, University of Florida

10:30 **Validation of Variable Rate Spray Decision Rules in Intricate Micro-Metrological Conditions**
L. R. Khot, R. Ehsani, G. Albrigo, W. Swen, J. Camargo Neto, J. Campoy, C. Wellington

10:50 **Impact of Variable Rate Fertilization on Nutrients Losses in Surface Runoff for Wild Blueberry Fields**
S.R. Saleem, Q.U. Zaman, H.N. Ahmad, A.A. Farooque, F. Khan, A.W. Schumann, A. Madani, D.C. Percival

11:10 **Sensor Fusion on a Wild Blueberry Harvester for Fruit Yield, Plant Height and Topographic Features Mapping to Improve Crop Productivity Productivity**
A.A. Farooque, Y. K. Chang, Q. U. Zaman, T. J. Esau, D. Groulx, A.W. Schumann

Discovery

Precision A to Z for Practitioners IV

Moderator: Dr. Steve Phillips, IPNI

10:30 **Raven Sponsor Presentation: Slingshot Overview**
D. Schwiesow

10:50 **Precision Agriculture and Springer**
M. Walsh

11:30 - 1:50 Luncheon, Awards and Entertainment
Regency Ballroom A-D

Tuesday, July 17, Afternoon

Concept		Network		Regency E&F	
Engineering Technologies and Advances: Water		Guidance, Robotics and Automation - II		Canopy Sensing for Crop Management - II	
<i>Moderator: Dr. Bruno Basso, University of Basilicata, Italy</i>		<i>Moderator: Dr. Shrini Upadhyaya, University of California, Davis</i>		<i>Moderator: Dr. Jess Lowenberg-DeBoer, Purdue University</i>	
1:50	Farmer Uptake of Variable Rate Irrigation Technologies in New Zealand <i>C. Hedley, I. Yule</i>	1:50	Evaluation of The Advantages of Using GPS-Based Auto-Guidance on Rolling Terrain Peanut Fields <i>B. V. Ortiz, G. Vellidis, K. Balkcom, H. Stone, J. P. Fulton, E. van Santen</i>	1:50	Vegetation Indices from Active Crop Canopy Sensor and Their Potential Interference Factors on Sugarcane <i>L. Taubinger, L.R. Amaral, J.P. Molin</i>
2:10	Adaptive Control of Capillary Water Flow Under Modified Subsurface Irrigation Based on a SPAC Model <i>M. Ohaba, M. Shukri B. Z. A., L. Qichen, S. Shibusawa, M. Kodaira, K. Osato</i>	2:10	A Remote Interface for a Human-Robot Cooperative Vineyard Sprayer <i>R. Berenstein, I. B. Halevi, Y. Edan</i>	2:10	Performance of Two Active Canopy Sensors for Estimating Winter Wheat Nitrogen Status in North China Plain <i>Q. Cao, Y. Miao, X. Gao, G. Feng, B. Liu, R. Khosla</i>
2:30	Design Of A Data Acquisition System For Weighing Lysimeters <i>W. Huang, L. Chen, C. Zhang, X. Xue</i>	2:30	Compatible ISOBUS Applications Using a Computational Tool for Support the Phases of the Precision Agriculture Cycle <i>R. D. Pereira, W. C. Lopes, G. Domingues, A. J. V. Porto, R. Y. Inamasu, R. V. Sousa</i>	2:30	Appropriate Wavelengths for Winter Wheat Growth Status Based On Multi-Spectral Crop Reflectance Data <i>V. R. Sharabian, N. Noguchi, I. Han-ya, K. Ishii</i>
2:50	Water Distribution Response in a Soil-Root System for Subsurface Precision Irrigation <i>Q. Li, S. Shibusawa, M. Ohaba, M. Shukri B. Z. A., M. Kodaira</i>	2:50	A Low Cost, Modular Robotics Tool Carrier for Precision Agriculture Research <i>K. Jensen, S.H. Nielsen, R.N. Jørgensen, A. Bøgild, N.J. Jacobsen, O.J. Jørgensen, C.L. Jaeger-Hansen</i>	2:50	Impact of Nitrogen (N) Fertilization on the Reflectance of Cotton Plants at Different Spatial Scales <i>F.M. Muharam, S. Maas</i>
3:10	Study on Water Distribution Measurement in Sand Using Sound Vibration <i>T. Sugimoto, Y. Nakagawa, T. Shirakawa, M. Sano, M. Ohaba, S. Shibusawa</i>	3:10	Discussion	3:10	Discussion

**3:30 - 4:00 Break in Exhibit Hall
Cosmopolitan Ballroom**

Tuesday, July 17, Afternoon

Vision

Precision Crop Protection - I

*Moderator: Dr. Alexandre Escola,
Universitat de Lleida, Spain*

- 1:50 **A Non-Destructive Method of Estimating Red Tip Disease in Pineapple**
S. K. Balasundram, A. K. Faizah, G. Vadamalai, M. H. A. Husni
- 2:10 **Precision Tools to Evaluate Alternative Weed Management Systems in Soybean**
T. M. Blackmer, P. M. Kyveryga
- 2:30 **The Effect of Leaf Orientation on Spray Retention on Blackgrass**
M. Massinon, H.H. Boukhalfa, P.-Y. Maréchal, F. Lebeau
- 2:50 **BrainWeed - Teach-In System for Adaptive High Speed Crop / Weed Classification and Targeting**
T. M. Giselsson, H. S. Midtiby, R. N. Jørgensen
- 3:10 **Use of Non-Invasive Sensors to Detect Beneficial Effects of Fungicides on Wheat Physiology**
C. A. Berdugo, A.-K. Mahlein, U. Steiner, E.-C. Oerke, H.-W. Dehne

Studio One

Remote Sensing Applications in Precision Agriculture - II

*Moderator: Dr. Jose Molin, University of
Sao Paulo, Brazil*

- 1:50 **Position Error of Input Prescription Map Delineated From Remote Images**
L. García-Torres, D. Gómez-Candón, J.J. Caballero-Novella, J.M. Peña-Barragán, M. Jurado-Expósito, A. I. de Castro, F. López-Granados
- 2:10 **Maturity Grape Indicators Obtained By Means Of Earth Observation Techniques**
J. Sanz, J. L. Casanova, A. Romo, S. Fraile
- 2:30 **Application of RS, GPS & GIS in a National Monitoring System for Accurate Range Assessment**
H. Arzani, M. Farahpour, M. Azimi, H. Kaboli, H. Mirdavodi, M. Borhani, J. Abdollahi
- 2:50 **Potential of Visible and Near Infrared Spectroscopy for Prediction of Paddy Soil Physical Properties**
A. Gholizadeh, M.S.M. Amin, M. Saberioon
- 3:10 **Spectral Characterization to Discriminate Grass Weeds from Wheat Crop Using Remote Sensing and GIS for Precision Agriculture and Environmental Sustainability**
R. Randhawa, R.K. Mahey, J.S. Mahal, P.K. Kingra, K. Pukhraj

Discovery

Precision A to Z for Practitioners V

*Moderator: Dr. Brian Arnall, Oklahoma
State University*

- 1:50 **Use of Zone or Grid Soil Nutrient Management as Part of an Integrated Site-Specific Nutrient Strategy**
D. Franzen
- 2:10 **Davco's Journey Into Precision Sugarcane Farming**
D. Cox
- 2:30 **Making the Most of Precision Ag Data: Big Data in Farm Management**
T. Griffin
- 2:50 **Sensor Algorithms 101**
B. Arnall
- 3:10 **...continuation of Sensor Algorithms 101**
B. Arnall

**3:30 - 4:00 Break in Exhibit Hall
Cosmopolitan Ballroom**

Tuesday, July 17, Late Afternoon

	<u>Concept</u>	<u>Network</u>	<u>Regency E&F</u>
	Proximal Sensing for Crop Parameters	Soil Analysis for Precision Nutrient Management	Fluoresensing for Crop Management
	<i>Moderator: Dr. Yuxin Miao, China Agricultural University</i>	<i>Moderator: Dr. Chunjiang Zhao, NERCITA, Beijing, China</i>	<i>Moderator: Dr. Madan Gupta, University of Queensland, Australia</i>
4:00	Assessing Water Status in Wheat under Field Conditions Using Laser-Induced Chlorophyll Fluorescence and Hyperspectral Measurements <i>B. Misteale, S. Elsayed, U. Schmidhalter</i>	4:00 Stable Isotope N-15 as Precision Technique to Investigate Elemental Sulfur Effects on Fertilizer Nitrogen Use Efficiency of Corn Grown in Calcareous Sandy Soils <i>A. Soaud, M. Rahman, F. H. Al Darwish</i>	4:00 Early Detection of Corn N-Deficiency by Active Fluorescence Sensing in Maize <i>L. Longchamps, R. Khosla, D.G. Westfall</i>
4:20	Proximal Sensing Tools to Estimate Pasture Quality Parameters <i>R. Pullanagari, I. Yule, M. Tuohy, M. Hedley, W. King, R. Dynes</i>	4:20 Spatial Variability of Soil Properties in Intensively Managed Tropical Grassland in Brazil <i>A. C. C. Bernardi, G. M. Bettiol, P. P. A. Oliveira, M. Campana, L. M. Rabello, R. Y. Inamasu</i>	4:20 Using Multiplex® to Manage Nitrogen Variability in Champagne Vineyard <i>O. Garcia, S. Debusson, M. Morlet, C. Germain, L. Panigai, M. Le Moigne, El M. Fadaili, N. B. Ghazlen, Z. G. Cerovic</i>
4:40	Mapping the Leaf Area Index In Vineyard Using a Ground-Based LIDAR Scanner <i>J. Arnó, I. Del Moral, A. Escolà, J. Company, J. Masip, R. Sanz, J.R. Rosell, J.A. Martínez-Casasnovas</i>	4:40 Discussion	4:40 Potential Indicators Based On Leaf Flavonoids Content for the Evaluation of Potato Crop Nitrogen Status <i>F. B. Abdallah, J.P. Goffart</i>

5:00 - 6:00 Poster Session and Cash Bar
3rd Floor Foyer

Tuesday, July 17, Late Afternoon

Vision

**Emerging Issue in Precision
Agriculture**

*Moderator: Dr. M. B. Patil, University of
Agricultural Sciences, India*

- 4:40 **Using Soil Attributes To Model
Sugar Cane Quality Parameters**
*F. A. Rodrigues Junior, P. S. G.
Magalhães, H. C. J. Franco, D. G. P. Cerri*
- 4:00 **Evaluation of Photovoltaic
Modules at Different Installation
Angles and Times of the Day**
*K.-S. Bae, S.-O. Chung, J.-W. Kong, Y.-K.
Huh, Y.-S. Chae, S.-O. Hur, D.-H. Lee*
- 4:20 **Application of Information
Technologies in Precision
Apiculture**
A. Zacepins, E. Stalidzans, J. Meitalovs

Studio One

**Hyperspectral Remote-Sensing
Applications in Agriculture**

*Moderator: Dr. Yanbo Huang, USDA-ARS,
Mississippi*

- 4:00 **Ground Level Hyperspectral
Imagery for Weeds Detection in
Wheat Fields**
*I. Herrmann, U. Shapira, A. Karnieli, S.
Kinast, D.J. Bonfil*
- 4:20 **Hyperspectral Imagery for the
Detection of Nitrogen Stress in
Potato for In-season Management**
*T. Nigon, C. Rosen, D. Mulla, Y. Cohen, V.
Alchanatis, R. Rud*
- 4:40 **Model for Remote Estimation of
Nitrogen Contents of Corn Leaf
Using Hyper-Spectral Reflectance
under Semi-Arid Condition**
*M. N. Tahir, J. Li, B. Liu, G. Zhao, Y. Fuqi,
C. Chengfeng*

5:00 - 6:00 Poster Session and Cash Bar
3rd Floor Foyer

Wednesday, July 18, Morning

<u>Concept</u>	<u>Network</u>	<u>Regency E&F</u>
Proximal Sensing for Soil Properties <i>Moderator: Dr. Mats Soderstrom, Swedish University of Agricultural Sciences</i>	Global Proliferation of Precision Agriculture and Its Applications - II <i>Moderator: Mr. Marc Vanacht, Ag Business Consultant, Missouri</i>	Precision Dairy and Livestock Management <i>Moderator: Dr. Newell Kitchen, USDA-ARS, Missouri</i>
8:00 Estimating Soil Quality Indicators with Diffuse Reflectance Spectroscopy <i>K.A. Sudduth, R.J. Kremer, N.R. Kitchen, D.B. Myers</i>	8:00 The Opportunities to Implement Precision Agriculture Technology in Indonesia: A Review <i>S. Virgawati</i>	8:00 Challenges and Opportunities for Precision Dairy Farming in New Zealand <i>I. J. Yule, C.R. Eastwood</i>
8:20 The Ultimate Soil Survey in One Pass: Soil Texture, Organic Matter, pH, Elevation, Slope, and Curvature <i>G. Kweon, E. Lund, C. Maxton</i>	8:20 Brazilian Precision Agriculture Research Network <i>R. Y. Inamasu, J. M. Naime, E. P. Fragalle, L. R. Queiros, A. V. Resende, M. F. Vilela, L. H. Basso, N. B. Perez, A. C. C. Bernardi</i>	8:20 Field Evaluation of Automated Estrus Detection Systems - Meeting Farmers' Expectation <i>B. Dela Rue, C. Kamphuis, C Burke, J. Jago</i>
8:40 Improvement of the Quality of "On-The-Go" Recorded Soil pH <i>T. Leithold, P. Wagner, M. Schneider</i>	8:40 System Approach to Implementing Precision Agriculture in Ukraine <i>I. Boiko</i>	8:40 The Use of Sensing Technologies to Monitor and Track the Behaviour of Cows on a Commercial Dairy Farm <i>I.G. Draganova, I. Yule, M. Stevenson</i>
9:00 Nineteen-Soil-Parameter Calibration Models and Mapping for Upland Fields Using the Real-Time Soil Sensor <i>M. Kodaira, S. Shibusawa, K. Ninomiya</i>	9:00 Precision Nutrient Management in Cotton- A Case Study from India <i>M. Patil, U.K Shanwad, H. Veeresh, N.L Rajesh, P.S.Kanannavar, Shailendrakumar</i>	9:00 Two On-Farm Tests to Evaluate In-Line Sensors for Mastitis Detection <i>C. Kamphuis, B. Dela Rue, J. Jago</i>
9:20 Discussion	9:20 Discussion	9:20 Influence Of Phosphorus Application With Or Without Nitrogen On Oat (Avena Sativa) Grass Nutritive Value And In Situ Digestion Kinetics In Buffalo Bulls <i>M.A.Shahzad, M.Nisa, M.Sarwar, I. Babar, N.A.Tauqir</i>
		9:40 Discussion

10:00 - 10:30 Break in Exhibit Hall
Cosmopolitan Ballroom

10:30 - 12:00 Closing Plenary Session
Regency Ballroom A-D

Wednesday, July 18, Morning

Vision

Precision Crop Protection - II

*Moderator: Dr. Audun Korsaaeth,
Norwegian Institute for Agricultural and
Environmental Research*

- 8:00 **Estimating the Plant Stem
Emerging Points (PSEPS) of Sugar
Beets at Early Growth Stages**
*H. S. Midtiby, R. N. Jørgensen, T. M.
Giselsson*
- 8:20 **Comparison and Evaluation of
Spray Characteristics of Three
Types of Variable-Rate Spray**
W. Deng, C. Zhao, J. Zhou
- 8:40 **Thermography as Sensor for
Downy Mildew on Roses**
*S. Gómez, E.-C. Oerke, H.-W. Dehne, U.
Steiner*
- 9:00 **Modeling and Decision Support
System for Precision Cucumber
Protection in Greenhouses**
*M. Li, X. Yang, S. Qiao, C. Sun, J. Qian, Z.
Ji, M. Chen, C. Zhao*
- 9:20 **Spatial Econometric Approaches
to Develop Site-Specific
Nematode Management
Strategies in Cotton Production**
Z. Liu, T. Griffin, T. Kirkpatrick
- 9:40 **Pesticide Drift Control with
Wireless Sensor Networks**
I. M. Santos, C. E. Cugnasca

Studio One

Precision Horticulture - III

*Moderator: Dr. Michael Blanke, University
of Bonn, Germany*

- 8:00 **Young Leaf Detection for Spot
Spray Treatment of Citrus
Canopies to Control Psyllids**
*P.A. Larbi, R. Ehsani, M. Salyani, J.M.
Maja, A.R. Mishra*
- 8:20 **Determination of Sensor
Locations for Monitoring
of Greenhouse Ambient
Environment**
*M.-J. Ryu, S.-O. Chung, K.-D. Kim, Y.-K.
Huh, S.-O. Hur, S.-K. Ha, K.-H. Han, H.
H. Kim*
- 8:40 **Variability in Soil Water Content
and Sensor-Based Irrigation
Scheduling for Protected Ginseng
Production**
S.-O. Chung, B.-K. Cho, J.-W. Cho
- 9:00 **Recognition Algorithms for
Detection of Apple Fruit in an
Orchard for Early Yield Prediction**
R. Zhou, L. Damerow, M. Blanke
- 9:20 **Use of Cluster Regression for Yield
Prediction in Wine Grape**
R. A. Ortega, L. E. Acosta, L. A. Jara
- 9:40 **Discussion**

**10:00 - 10:30 Break in Exhibit Hall
Cosmopolitan Ballroom**

**10:30 - 12:00 Closing Plenary Session
Regency Ballroom A-D**

Poster Sessions, Monday

TOPIC	BOARD #	POSTER TITLE	AUTHOR(S)
PRECISION CROP PROTECTION	1	Development of a Quick Diagnosis Method to Target Fields with Better Potential for Site-Specific Weed Management	L. Longchamps, B. Panneton, M.-J. Simard, G.D. Leroux
	2	Monitoring Soybean Root Development under Till-System Management (TSM) at Dry-Farming Conditions	B. Sani, H. Aliabadi Farahani
PRECISION HORTICULTURE	3	Research on Nutrition and Quality Detection Technology of Soil, Leaf and Fruit of Citrus Based on and Digital Image Spectroscopic Techniques	S.L. Yi, L. Deng, S.L. He, Y.Q. Zheng
	4	Spatial Variability of Inceptisol and Entisol Soils and Their Effect on Merlot Grape Must Composition	A. Miele, C.A. Flores, J.M. Filippini-Alba
	5	Remote Sensing of Nitrogen and Water Status on Boston Lettuce Transplants in a Greenhouse Environment	M. Tempesta, G.P. Gianquinto, N. Tremblay, P. Vigneault, M.Y. Bouroubi, M. Dorais
PRECISION DAIRY AND LIVESTOCK MANAGEMENT	6	Remote Collection of Behavioral and Physiological Data to Detect Lame Cows	C. Kamphuis, J. Burke, J. Jago
PRECISION NUTRIENT MANAGEMENT	7	A Statistical and an Agronomic Approach for Definition of Management Zones in Corn and Soybean	C. L. Bazzi, E. G. Souza, R. Khosla, R. M. Reich
	8	Use of Chemical and Physical Attributes Of the Soil in Management Units Definition	C. L. Bazzi, E. G. Souza, M. A. Uribe-Opazo, L. H. P. Nobrega, D. M. Rocha
	9	Economic Evaluation of a Variable Lime Application Strategy Based on Soil pH Maps Derived from On-The-Go pH-Measurements under German Conditions	H.-W. Olf, A. Borchert, D. Dabbelt, G. Recke, D. Trautz
	10	Effect of Urea Application through Drip Irrigation on Yield, Water and Nitrogen Use Efficiency of Summer Bitter Gourd	S. B. Goswami, S. Saha
SENSOR APPLICATION IN MANAGING IN-SEASON CROP VARIABILITY	11	Active Sensor Performance – Dependence to Measuring Height, Light Intensity and Device Temperature	S. Kipp, B. Mistele, U. Schmidhalter
	12	A Comparison of Plant Temperatures as Measured By Thermal Imaging and Infrared Thermometry	H. Hackl, P. Baresel, B. Mistele, Y. Hu, U. Schmidhalter
	13	Assembly of an Ultrasound Sensors System for Mapping of Sugar Cane Height	M. J. Silva, A. H. S. Garcia, F. Rodrigues Júnior, A. Bastos, P. S. Graziano Magalhães
	14	In-season Diagnosis of Rice Nitrogen Status Using an Active Canopy Sensor	Y. Yao, Y. Miao, S. Huang, R. Jiang, S. Huang, M. Gnyp, G. Bareth, R. Khosla

Poster Sessions, Monday

TOPIC	BOARD #	POSTER TITLE	AUTHOR(S)
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	16	Ultra-low Altitude and Low Spraying Technology Research in Paddy	X. Xue, W. Qin, Y. Lan
REMOTE SENSING APPLICATION IN PRECISION AGRICULTURE	17	Variation in Nitrogen Use Efficiency for Multiple Wheat Genotypes across Dryland and Irrigated Cropping Systems	M. A. Naser, R. Khosla, L. Longchamps, M. Moragues, S. Haley, R. Reich, G. S. McMaster, G. W. Buchleiter
	18	Comparing Sensing Platforms for Crop Remote Sensing	L. Longchamps, R. Khosla
	19	Estimation of Soil Moisture from RADARSAT-2 Multi-Polarized SAR Data over Wheat Fields	G. Yang, C. Zhao, W. Huang, J. Wang
	20	Estimation of Rice Yield from MODIS Data in West Java, Indonesia	C. Hongo, T. Furukawa, G. Sigit, M. Maki and K. Honma, K. Yoshida, K. Oki, H. Shirakawa
	21	Applications for Precision Agriculture: the Italian Experience of SIRIUS Project	F. Altobelli, P. Nino, F. Vuolo, S. Vanino, F. Lupia, I. Namdarian, C. De Michele
	22	Assessment of Land Use Changes in Dirab Region of Saudi Arabia Using Remotely Sensed Imageries	K. A. Al-Gaadi
	23	Remote NIR-Sensor Fusion with Weather Data for Improved Prediction of Wheat Yield Models	S.I. Øvergaard, A. Korsæth, T. Isaksson
	24	Estimating Crop Leaf Area Index from Remotely Sensed Data: Scale Effects and Scaling Methods	Y.Y. Dong, J.H. Wang, C.J. Li, G.J. Yang, X.Y. Song, W.J. Huang, Y.Y. Dong, and J.H. Wang
PROFITABILITY, SUSTAINABILITY, AND ADOPTION	25	Adoption and Tendencies of Precision Agriculture Technologies in the Tocantins State, Brazil	C.A. Junior, L. Bortolon, E. Borghi, A.L. Junior, E.S.O. Bortolon, A. Aires de Freitas, R. Y. Inamasu
EMERGING ISSUES IN PRECISION AGRICULTURE (ENERGY, BIOFUELS, CLIMATE CHANGE)	26	Climatological Diagnostic Analysis: A Case Study for Parbhani District in Marathwada Region of India	M. S. Pendke, S. N. Pawar, A. K. Gore, G. U. Shinde

Poster Sessions, Tuesday

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Food Security	27	Microbial Contaminants in Cocoa Powder Samples in South – West Nigeria	O. Jayeola
	28	Enhancing Farmers' Indigenous Knowledge Management in Cassava Varietal Trial Using Agro Ecosystem Analysis, Farmers' Drama Group and Animations in Eastern part of Nigeria	R.N. Nwakwasi, C.C. Asiabaka, and F.N. Nnadi, J. Chikaire, O.M. Adesope, C.C. Ifeanyi-Obi
	29	Farmers Cooperatives in Georgia as Key Factor for Food Security	K. Nadiradze
SPATIAL VARIABILITY IN CROP, SOIL AND NATURAL RESOURCES	30	Local And Regional Soil Clay Mapping Using Gamma Ray Spectrometry	M. Söderström, H. Stadig
	31	Long Term Effects of Irrigation with Sewage Effluent on Some Soil Properties	Al-Omran A.M., M. Alwabel, S. Al-Sharani
	32	Natural Resources Management through Frontier Technologies - A Case Study from India	U. K. Shanwad, N. L. Rajesh, M. B. Patil
	33	Evaluation of Application Effect of the Laser Land Leveling Technology in Typical Areas of China	W. Guangwei, M. Zhijun, C. Liping, F. Weiqiang, D. Jianjun
	34	Soil Spatial Variability in the Everglades Agricultural Area in South Florida	J.L. Pantoja, S.H. Daroub, O.A. Diaz
	35	Precision Tools to Evaluate Benefits of Tile Drainage in a Corn and Soybean Rotation in Iowa	P.R. Reeg, T.M. Blackmer, P.M. Kyveryga
	36	Analysis of Spatial Variability of Key Soil Attributes In North-Central Ukraine	V.I. Adamchuk, Y.I. Boiko
	37	Spatial Variability of Sugarcane Yields in Relation to Soil Salinity in Louisiana	R. M. Johnson, R. P. Viator
	38	Spatial and Temporal Variability of Corn Grain Yield as a Function of Soil Parameters, and Climate Factors	M. S. Rodrigues, J. E. Corá, E. A. Rienzi, T. G. Mueller, A. Castrignanò
	39	On-The-Go pH Sensor: An Evaluation in a Kentucky Field	M. S. Rodrigues, E. M. Gianello, B. Mijatović, E. A. Rienzi, T. G. Mueller, A. Castrignanò
	40	Measurement of Systematic Errors in Crop Prediction	A.M. Denton, E.W. Momsen, J.X. Xu

Poster Sessions, Tuesday

TOPIC	BOARD #	POSTER TITLE	AUTHOR(S)
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	42	Indexes for Targeting Buffer Placement to Improve Water Quality	M.G. Dosskey, Z. Qiu
	43	Soil Organic Carbon Multivariate Predictions Based on Diffuse Spectral Reflectance: Impact of Soil Moisture	E. A. Rienzi, B. Mijatovic, T.G. Mueller, C.J. Matocha, F. J. Sikora
	44	Soil Salinity, Sand Encroachment and Erosion as Indicators of Land Degradation in Harad Center, Saudi Arabia	A.S. Modaihsh, Sallam, A. Sh., Mahjoub, M.O.
ENGINEERING TECHNOLOGIES AND ADVANCES	45	Measuring Error on Working Depth of Real-time Soil Sensor	R. Kanda, S. Shibusawa, M. Kodaira
	46	Developing a Human-Robot Collaborative System for Precision Agricultural Tasks	A. Bechar, J. Wachs, J. Lumkes, S. Nof
	47	Architecture and Model of Data Integration between Management Systems and Agricultural Machines for Precision Agriculture	W. C. Lopes, R. R. D. Pereira, M. L. Tronco, A. J. V. Porto, R. Y. Inamasu, R. V. Sousa
	48	Implementation of a Controller Unit Based on the ISO 11783 Standard for Automatic Measurement of the Electrical Conductivity of the Soil	R.V. Sousa, R.R.D. Pereira, W.C. Lopes, L.M. Rabello, R.Y. Inamasu
	49	An Approach to Making Non-Smell Composting System : Case Study in Fuchu	R. Fusamura, S. Shibusawa, S. Yagi, M. Kodaira
PROXIMAL SENSING IN PRECISION AGRICULTURE	50	Temporal N Status Evaluation Using Hyperspectral Vegetation Indices in a Potato Crop	T. Morier, A. N. Cambouris, K. Chokmani
	51	Integrated Crop Canopy Sensing System for Spatial Analysis of In-Season Crop Performance	V.I. Adamchuk, L.S. Shiratsuchi, C.C. Lutz, R.B. Ferguson
	52	Different Leaf Sensing Approaches for the Estimation of Winter Wheat Nitrogen Status	B. Liu, Y. Miao, G. Feng, X. Gao, S. Yue, F. Li
PRECISION AERIAL APPLICATION	53	Response and Positioning Accuracy of a Variable-Rate Aerial Application System and Use of Enhanced Imagery for Creation of Prescription Maps	S. J. Thomson, Y. Huang, R. Price
	54	Ground-Based Spectral Reflectance Measurements for Evaluating the Efficacy of Aerially-Applied Glyphosate Treatments	Y. Lan, W. C. Hoffmann, D. E. Martin, B. Fritz, J. Lopez Jr., H. Zhang, R. Lacey
	55	Differentiation of Cotton from Other Crops at Different Growth Stages Using Spectral Properties and Discriminant Analysis	Y. Lan, C. P. -C. Suh, J. K. Westbrook, W. C. Hoffmann, H. Zhang, R. Lacey
	56	Development of a PWM Precision Spraying Controller	H. Zhu, Y. Lan, W. Wu, W. C. Hoffmann, Y. Huang, X. Xue, J. Liang, B. Fritz
	57	Sampling Size Study for Canopy Spectral Reflectance Measurements	K. Pavuluri, W.E. Thomason
	58	Potential Applications of Low-Altitude Remote Sensing (LARS) with Radio-Controlled Helicopter Platforms: Case Studies on Nutrient and Pest Management under Agricultural Systems in Developing Countries	H. P. W. Jayasuriya, K. C. Swain, G. Samseemoung

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