The International Society of Precision Agriculture presents the

15th International Conference on Precision Agriculture

26–29 JUNE 2022

Minneapolis Marriott City Center | Minneapolis, Minnesota USA

ISPA
International Society of Precision Agriculture

Welcome to the 15th ICPA!

Thank you for attending the 15th International Conference on Precision Agriculture presented by the International Society of Precision Agriculture.

Join us for the Post-Conference Tour on Wednesday!

There is still space available – sign up at the registration desk in the 4th Floor Atrium.

The tour will begin with a visit to the **University of Minnesota's Robotics Institute (Shepherd Labs)** to learn about the Distributed Robotics Lab, the Robotic Sensor Network Lab, and the Drone Lab.

From there, we will go to the **University of Minnesota's Precision Ag Center** at the St. Paul Campus. We will learn about research being conducted at the center and see demonstrations from the university's partner companies, like PDMI, who will lead a demonstration on hyperspectral soil sensing.

SCAN HERE FOR TOUR DETAILS:

SCAN HERE FOR FULL PROGRAM DETAILS

Proceedings will be available ***after*** the conference at **ispag.org/Proceedings**

15th ICPA Program General Outline

Sunday, 26 June 2022		
12:00 pm-6:00 pm	On-Site Registration Open	4th Floor Atrium
1:00 pm-6:00 pm	**Pre-Conference Workshops**	St. Croix I & II
6:00 pm-8:00 pm	**Evening Welcome Reception**	6th Floor Terrace
Monday, 27 June 2022		
7:00 am-6:00 pm	On-Site Registration Open	4th Floor Atrium
8:00 am-8:30 am	**Opening General Session: Welcome and Review Program**	Ballrooms 1&2
8:30 am-9:30 am	**Keynote Address: Realising the Potential of Agricultural Robotics and AI: The Ethical Challenges** *Robert Sparrow*	Ballroom 1&2
9:30 am-10:00 am	**Summary of ISPA Survey**, *John Fulton*	Ballroom 1&2
10:00 am-10:30 am	Break in Exhibit Hall	
10:30 am-12:00 pm	**Concurrent Sessions**	
12:00 pm-1:45 pm	Lunch in 4th Floor Atrium	
1:45 pm-3:00 pm	**Concurrent Sessions**	
3:00 pm-3:30 pm	Break in Exhibit Hall	
3:30 pm-4:45 pm	**Concurrent Sessions**	
4:45 pm-6:30 pm	**Poster Session and Reception in Exhibit Hall**	
6:30 pm-8:00 pm	Community and Country/Region Meetings	
Tuesday, 28 June 2022		
7:00 am-6:00 pm	On-Site Registration Open	4th Floor Atrium
8:00 am-8:45 am	**Plenary Session: Past, Present, and Future of Precision Agriculture and Our Professional Society,** *Raj Khosla*	Ballrooms 1&2
8:45 am-9:30 am	**Plenary Session - Aspirations of the ISPA** *Panel Discussion*	Ballrooms 1&2
9:30 am-10:00 am	Break in Exhibit Hall	
10:00 am-11:45 am	**Concurrent Sessions**	
11:45 am-1:30 pm	Lunch in 4th Floor Atrium	
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3:00 pm-3:30 pm	Break in Exhibit Hall	
3:30 pm-4:45 pm	**Concurrent Sessions**	
4:45 pm-6:30 pm	**Poster Session and Reception in Exhibit Hall**	
6:30 pm-8:00 pm	Community and Country/Region Meetings	
Wednesday, 29 June 2022		
7:00 am-8:00 am	On-site registration open	4th Floor Atrium
8:00 am-9:30 am	**Concurrent Sessions**	
9:30 am-10:00 am	Break in 4th Floor Atrium	
10:00 am-12:00 pm	**Closing Plenary Session - Awards**	Ballrooms 1&2
12:45 pm-6:00 pm	**Technical Tour** Meet in 4th Floor Atrium	

Monday, 27 June

7:00 am-6:00 pm	**On-Site Registration Open,** 4th Floor Atrium			
8:00 am-8:30 am	**Opening General Session: Welcome and Review Program,** Ballroom 1&2			
8:30 am-9:30 am	**Keynote Address: Realising the Potential of Agricultural Robotics and AI: The Ethical Challenges, Robert Sparrow,** Ballroom 1&2			
9:30 am-10:00 am	**Summary of ISPA Survey, John Fulton,** Ballroom 1&2			
10:00 am-10:30 am	**BREAK IN EXHIBIT HALL**			
	Ballroom 1	**Ballroom 2**	**Deer - Elk Lake**	**Pine - Cedar - Birch Lake**
10:30 am-12:00 pm	**On Farm Experimentation with Site Specific Technologies** Modulated On-farm Response Surface Experiments with Image-based High Throughput Techniques for Evidence-based Precision Agronomy Is Row-unit Vibration Affected by Planter Speeds and Downforce? Limitations of Yield Monitor Data to Support Field-scale Research Precision Application of Seeding Rates for Weed and Nitrogen Management in Organic Grain Systems Where to Put Treatments for On-farm Experimentation Use of Remotely Measured Potato Canopy Characteristics As Indirect Yield Estimators	**Proximal and Remote Sensing of Soil and Crop (Including Phenotyping)** Employment of the SSEB and CROPWAT Models to Estimate the Water Footprint of Potato Grown in Hyper-arid Regions of Saudi Arabia Machine Learning Techniques for Early Identification of Nitrogen Variability in Maize Measuring Soil Carbon with Intensive Soil Sampling and Proximal Profile Sensing Impact of Cover Crop and Soil Apparent Electrical Conductivity on Cotton Development and Yield Diagnosis of Grapevine Nutrient Content Using Proximal Hyperspectral Imaging The Importance of Harmonization of Soil Analysis Methods in Precision Agriculture	**Precision Agriculture and Global Food Security** Agriculture Machine Guidance Systems: Performance Analysis of Professional GNSS Receivers Methodology for Assessing Nutrient Status of Nigeria Croplands: Nigeria Soil Information Service (NiSIS) Pilot Project - Pathway for Precision Agriculture Mapping Comparative Analysis of Light-weight Deep Learning Architectures for Soybean Yield Estimation Based on Pod Count from Proximal Sensing Data for Mobile and Embedded Vision Applications Variability in Yield Response of Maize to N, P and K Fertilization Towards Site-specific Nutrient Recommendations in Two Maize Belts in Togo The ISO Strategic Advisory Group for Smart Farming: a Multi-pronged Opportunity for Greater Global Interoperability A Bayesian Network Approach to Wheat Yield Prediction Using Topographic, Soil and Historical Data	**Smart Weather for Precision Agriculture/Drainage Optimization and Variable Rate Irrigation** Micro-climate Prediction System Using IoT Data and AutoML Spatial Analysis of Soil Moisture and Turfgrass Health to Determine Zones for Spatially Variable Irrigation Management Investigation of Automated Analysis of Snowmelt from Time-series Sentinel 2 Imagery to Inform Spatial Patterns of Spring Soil Moisture in the American Mountain West Can Topographic Indices Be Used for Irrigation Management Zone Delineation
12:00 pm-1:45 pm	**LUNCH IN 4th FLOOR ATRIUM**			
1:45 pm-3:00 pm	**On-Farm Experimentation, Wireless Sensors and Geospatial Data** Enhancing Ny State On-farm Experimentation with Digital Agronomy Use of Precision Technologies to Conduct Successful Within-field, On-farm Trials Constraint of Data Availability on the Predictive Ability of Crop Response Models Developed from On-farm Experimentation A Passive-RFID Wireless Sensor Node for Precision Agriculture Comparison of Different Aspatial and Spatial Indicators to Assess Performance of Spatialized Crop Models at Different Within-field Scales	**Proximal and Remote Sensing of Soil and Crop (Including Phenotyping)** Soil Variability Mapping with Airborne Gamma-ray Spectrometry and Magnetics Hay Yield Estimation Using UAV-based Imagery and a Convolutional Neural Network Analytical and Technological Advancements for Soybean Quality Mapping and Economic Differentiation Toward Smart Soybean Variety Selection Using UAV-based Imagery and Machine Learning A Hyperlocal Machine Learning Approach to Estimate NDVI from SAR Images for Agricultural Fields	**Industry Sponsors** MinnesotaCorn Growers Association #DigItAg Springer earthscout SoilView Pessl Instruments	**Precision Horticulture / Small Holders and Precision Agriculture** Assessing the Potential of Sentinel-1 in Retrieving Mango Phenology and Investigating Its Relation to Weather in Southern Ghana Digital Soil Sensing and Mapping for Crop Suitability Variable Rate Fertilization in a High-yielding Vineyard of Cv. Trebbiano Romagnolo May Reduce Nitrogen Application and Vigour Variability Without Loss of Crop Load Farmer Charlie - Low Cost Data Analytics for Farmers Accessible in the Field Evaluating How Operator Experience Level Affects Efficiency Gains for Precision Agricultural Tools
3:00 pm-3:30 pm	**BREAK IN EXHIBIT HALL,** *sponsored by* MinnesotaCorn Growers Association			
3:30 pm-4:45 pm	**Big Data, Data Mining and Deep Learning** Generation of Site-specific Nitrogen Response Curves for Winter Wheat Using Deep Learning Automated Lag Phase Detection in Wine Grapes Strawberry Pest Detection Using Deep Learning and Automatic Imaging System Identifying Key Factors Influencing Yield Spatial Pattern and Temporal Stability for Management Zone Delineation From Fragmented Data to Unified Insights: Leveraging Data Standardization Tools for Better Collaboration and Agronomic Big Data Analysis	**Proximal and Remote Sending of Soil and Crop (Including Phenotyping)** Comparison of Canopy Extraction Methods from UAV Thermal Images for Temperature Mapping: a Case Study from a Peach Orchard Printed Nitrate Sensors for In-soil Measurements Investigating the Potential of Visible and Near-infrared Spectroscopy (VNIR) for Detecting Phosphorus Status of Winter Wheat Leaves Grown in Long-term Trial Developing Empirical Method to Estimate Phosphorous in Potato Plants Using Spectroscopy-based Approach Gamma-ray Spectrometry to Determine Soil Properties for Soil Mapping in Precision Agriculture		**Success Stories in Precision Agriculture and Precision Crop Management** Scaling Precision Agriculture in West Africa Smallholder Irrigation and Water Management Systems You Can Not Manage What You Don't Measure Use of MLP Neural Networks for Sucrose Yield Prediction in Sugarbeet How Digital is Agriculture in South America? Adoption and Limitations Economic Potential of RoboWeedMaps - Use of Deep Learning for Production of Weed Maps and Herbicide Application Maps
4:45 pm-6:30 pm	**Poster Session and Reception in Exhibit Hall**			
6:30 pm-8:00 pm	**Community and Country/Region Meetings**			

7:00 am-6:00 pm	**On-Site Registration Open,** 4th Floor Atrium
8:00 am-8:45 am	**Plenary Session: Past, Present, and Future of Precision Agriculture and our Professional Society - Raj Khosla,** Ballroom 1&2
8:45 am-9:30 am	**Plenary Session: Aspirations of the ISPA - Panel Discussion,** Ballroom 1&2
9:30 am-10:00 am	**BREAK IN EXHIBIT HALL,** *sponsored by* #DigitAg

	Ballroom 1	Ballroom 2	Deer - Elk Lake	Pine - Cedar - Birch Lake
10:00 am-11:45 am	**Decision Support Systems** Optimizing Nitrogen Application to Maximize Yield and Reduce Environmental Impact in Winter Wheat Production Evaluating APSIM Model for Site-Specific N Management in Nebraska Impacts of Interpolating Methods on Soil Agri-environmental Phosphorus Maps Under Corn Production Economic Potential of IPMwise – a Generic Decision Support System for Integrated Weed Management in 4 Countries Modeling Spatial and Temporal Variability of Cotton Yield Using DSSAT for Decision Support in Precision Agriculture Evaluation of Crop Model Based Tools for Corn Site-specific N Management in Nebraska A Spatial Decision Support System for Medfly Control – from Research to Application	**Site-Specific Nutrient, Lime and Seed Management** Should We Increase or Decrease the Fertilization in the Zones with the Highest Crop Productivity Potential? Management Zone-specific N Mineralization Rate Estimation in Unamended Soil A Low-tech Approach to Manage Within Field Variability – Toward a Territorial Scale Application Soil, Landscape, and Weather Affect Spatial Distributions of Corn Population and Yield Predicting Corn Emergence Uniformity with On-the-go Furrow Sensing Technology Effectiveness of Different Precision Soil Sampling Strategies for Site-Specific Nutrient Management in Row-Crops Spatially Explicit Prediction of Soil Nutrients and Characteristics in Corn Fields Using Soil Electrical Conductivity Data and Terrain Attributes	**Robotics, Guidance and Automation** Agricultural Robots Classification Based on Clustering by Features and Function Possibilities for Improved Decision Making and Operating Efficiency Derived from the Predictability of Autonomous Farming Operations Agronomic Opportunities Highlighted by the Hands Free Hectare and Hands Free Farm Autonomous Farming Projects Synchronized Windrow Intelligent Perception System (SWIPE) Seed Localization System Suite with CNNs for Seed Spacing Estimation, Population Estimation and Doubles Economics of Field Size for Autonomous Crop Machines	**Economics, Land Improvement and Livestock Management** Determining the Marginal Value of Extra Precision in Precision Grazing Systems – an Ex Ante Analysis of Impacts on System Productivity, Sustainability and Economics Analysis of the Mapping Results Using SoilOptix TM Technology in Chile After Two Seasons Ecological Refugia As a Precision Conservation Practice in Agricultural Systems The Effect of Slope Gradient on the Modelling of Soil CO2 Emissions in Different Tillage Systems, at a Farm Using Precision Tillage Technology in Hungary Use of Watering Hole Data As a Decision Support Tool for the Management of a Grazing Herd of Cattle Detect Estrus in Sows Using a Lidar Sensor and Machine Learning Evaluation of Indwelling Rumen Temperature Monitoring System for Dairy Calf Illness Detection and Management
11:45 am-1:30 pm	**LUNCH IN 4th FLOOR ATRIUM**			
1:30 pm-3:00 pm	**Big Data, Data Mining and Deep Learning** Using Differential Architecture Search for Fast and Accurate Weed Identification on an Edge Device Spotweeds: a Multiclass UASs Acquired Weed Image Dataset to Facilitate Site-specific Aerial Spraying Application Using Deep Learning Meta Deep Learning Using Minimal Training Images for Weed Classification in Wild Blueberry Picking Point Detection Based on Deep Learning Models for Strawberry Harvesting A Generative Adversarial Network-based Method for High Fidelity Synthetic Data Augmentation Predicting Below and Above Ground Peanut Biomass and Maturity Using Multi-target Regression	**Proximal and Remote Sensing of Soil and Crop (including phenotyping) / ISPA Community: Nitrogen** Functional Soil Property Mapping with Electrical Conductivity, Spectral and Satellite Remote Sensors Sun Effect on the Estimation of Wheat Ear Density by Deep Learning Organ Scale Nitrogen Map: a Novel Approach for Leaf Nitrogen Concentration Estimation The Use of Spatial and Temporal Measures to Enhance the Sensitivity of Satellite-based Spectral Vegetation Indices to (Water) Stress in Maize Fields Predicting Secondary Soil Fertility Attributes Using XRF Sensor with Reduced Scanning Time in Samples with Different Moisture Content Developing a Machine Learning and Proximal Sensing-based In-season Site-specific Nitrogen Management Strategy for Corn in the US Midwest	**Applications of Unmanned Aerial Systems** Potential of UAS Multispectral Imagery for Predicting Yield Determining Physiological Parameters of Cotton Assessment of Goss Wilt Disease Severity Using Machine Learning Techniques Coupled with UAV Imagery Enhancing Spatial Resolution of Maize Grain Yield Data Estimation of Cotton Biomass Using Unmanned Aerial Systems and Satellite-based Remote Sensing Increasing the Accuracy of UAV-Based Remote Sensing Data for Strawberry Nitrogen and Water Stress Detection N-management Using Structural Data: UAV-derived Crop Height As an Estimator for Biomass, N Concentration, and N Uptake in Winter Wheat	**Factors Driving Adoption / Education and Outreach in Precision Agriculture** Assessment of the Impact of Precision Farming (P.F) on Economic Efficiency, Environmental Sustainability and Food Security Robot Safety Issues in Field Crops - EU Regulatory Issues and Technical Aspects Survey Shows Specialty and Commodity Crop Retailers Use Precision Agriculture Differently Overcoming Educational Barriers for Precision Agriculture Adoption: a University Diploma in Precision Agriculture in Argentina Teaching Mathematics Towards Precision Agriculture Through Data Analysis and Models Precision Agriculture Education in Africa: Perceptions, Opportunities and Challenges, and the Way Forward
3:00 pm-3:30 pm	**BREAK IN EXHIBIT HALL**			
3:30 pm-4:45 pm	**Decision Support Systems** An IoT-based Smart Real Time Sensing and Control of Heavy Metals to Ensure Optimal Growth of Plants in an Aquaponic Set-up Decision Support from On-field Precision Experiments Data Sources and Risk Management in Precision Agriculture Stem Characteristics and Local Environmental Variables for Alfalfa's Winter Assessment Soybean Variable Rate Planting Simulator Using Economic Scenarios	**In-Season Nitrogen Management** Variable Rate Nitrogen Approach in a Potato-wheat-wheat Cropping System In-season Diagnosis of Winter Wheat Nitrogen Status Based on Rapidscan Sensor Using Machine Learning Coupled with Weather Data Soil and Crop Factors to Site-specific Nitrogen Management on Sugarcane Fields Nitrogen Placement Considerations for Maize Production in the Eastern US Cornbelt Evaluation of Nitrogen Recommendation Tools for Winter Wheat in Nebraska	**Application of Unmanned Aerial Systems** Deep Learning-Based Corn Disease Tracking Using RTK Geolocated UAS Imagery Integration of Unmanned Aerial Systems Images and Yield Monitor in Improving Cotton Yield Estimation Knowledge-based Approach for Weed Detection Using RGB Imagery Evaluation of Image Acquisition Parameters and Data Extraction Methods on Plant Height Estimation with UAS Imagery	

4:45 pm-6:30 pm	**Poster Session and Reception in Exhibit Hall**
6:30 pm-8:00 pm	**Community and Country/Region Meetings**

Wednesday, 29 June

7:00 am-8:00 am	**On-Site Registration Open,** 4th Floor Atrium	
8:00 am-9:30 am	**Ballroom 1**	**Ballroom 2**
	Geospatial Data	**In-Season Nitrogen Management**
	Next in Precision Agriculture: Detecting and Correcting Pixels with Machinery Track Line Within Farms	In-season Nitrogen Management of Maize Based on Nitrogen Status and Lodging Risk Prediction
	Automated Geometrical Field Boundary Delineation Algorithm for Adjacent Job Sites	Nitrogen Status Prediction on Pasture Fields Can Be Reached Using Visible Light UAV Data Combined with Sentinel-2 Imagery
	Yield Estimation for Avocado Using Systematic Sampling Techniques	Evaluating the Potential of Improving In-season Nitrogen Status Diagnosis of Potato Using Leaf Fluorescence Sensors and Machine Learning
	Optimization of Batch Processing of High-density Anisotropic Distributed Proximal Soil Sensing Data for Precision Agriculture Purposes	Nitrogen Fertilization of Potato Using Management Zone in Prince Edward Island, Canada
	Comparison and Validation of Different Soil Survey Techniques to Support a Precision Agricultural System	Evaluating a Satellite Remote Sensing and Calibration Strip-based Precision Nitrogen Management Strategy for Corn in Minnesota and Indiana
	Scaling Up Window-based Regression for Crop-row Detection	Spatial and Temporal Factors Impacting Incremental Corn Nitrogen Fertilizer Use Efficiency
9:30 am-10:00 am	**BREAK IN 4th FLOOR ATRIUM**	
10:00 am-12:00 pm	**Closing Plenary Session - Awards,** Ballroom 1&2	
12:45 pm-6:00 pm	**Technical Tour,** Meet in 4th Floor Atrium	

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Poster Sessions

Posters will be on display Monday and Tuesday evenings from 4:45pm to 6:30pm in the Exhibit Hall.

TOPIC	#	TITLE	PRESENTER
Applications of Unmanned Aerial Systems	1	UAV-based Hyperspectral Monitoring of Peach Trees As Affected by Silicon Applications and Water Stress Status	*Ana de Castro*
	2	Cotton Boll Detection and Yield Estimation Using UAS Lidar Data and RGB Image	*Wenxuan Guo*
	3	Evaluation of Unmanned Aerial Vehicle Images in Estimating Cotton Nitrogen Content	*Rupak Karn*
	4	Application of Drone Data to Assess Damage Intensity of Bacterial Leaf Blight Disease on Rice Crop in Indonesia	*Chiharu Hongo*
	5	Establishment of a Canola Emergence Assessment Methodology Using Image-based Plant Count and Ground Cover Analysis	*Kaylie Krys*
	6	Utilization of UASs to Predict Sugarcane Yields in Louisiana Prior to Harvest	*Balaji Ramachandran & Richard Johnson*
	7	Precision Nitrogen and Water Management for Optimized Sugar Beet Yield and Sugar Content	*Olga S Walsh*
	8	Multispectral Assessment of Chickpea in the Northern Great Plains	*Justin M Vetch*
Big Data, Data Mining and Deep Learning	9	Coupling Machine Learning Algorithms and GIS for Crop Yield Predictions Based on Remote Sensing Imagery and Topographic Indices	*Mailson F Oliveira*
	10	A Framework for Imputation of Missing Parts in UAV Orthomosaics Using Planetscope and Sentinel-2 Data	*Francisco R Pereira*
	11	Supervised Feature Selection and Clustering for Equine Activity Recognition	*Timo De Waele*
	12	Increasing Precision Irrigation Efficacy for Row Crop Agriculture Through the Use of Artificial Intelligence	*Emily Bedwell*
Decision Support Systems	13	Fruit Fly Electronic Monitoring System	*Claudio L Bazzi*
	14	Yield Mapping in Fruit Farming	*Claudio L Bazzi*
	15	AgDataBox: Web Platform of Data Integration, Software, and Methodologies for Digital Agriculture	*Claudio L Bazzi*
	16	Web Application for Automatic Creation of Thematic Maps and Management Zones – AgDataBox-Fast Track	*Claudio L Bazzi*
	17	AgDataBox-IoT Application Development for Agrometeorogical Stations in Smart Farm	*Claudio L Bazzi*
	18	Delineation of Site-specific Management Zones with Proximal Data and Multi-spectral Imagery	*Wubengeda A Yilma*
	19	Integration of High Resolution Multitemporal Satellite Imagery for Improving Agricultural Crop Classification: a Case Study	*Usman Ali*
	20	Making Irrigator Pro an Adaptive Irrigation Decision Support System	*Ioannis Gallios*
	21	Developing a neural-network model for detecting Aflatoxin hotspots in peanut fields	*Sunaab Kukal*

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TOPIC	#	TITLE	PRESENTER
Drainage Optimization and Variable Rate Irrigation	22	Establishing the First Soil Water Characteristics Curve for the Soils of Prince Edward Island, Canada	*Saad J Cheema*
	23	Soil Moisture Variability on Golf Course Fairways Across the United States: an Opportunity for Water Conservation with Precision Irrigation	*Chase Straw*
	24	SmartAgriHubs FIE20 – Groundwater and Meteo Sensors and Earth Observation for Precision Agriculture	*Karel Charvat*
	25	Evaluating the Potential of Integrated Precision Irrigation and Nitrogen Management for Corn in Minnesota	*Andrea Elvir Flores*
Education and Outreach in Precision Agriculture	26	Survey of Pesticide Application Practices and Technologies in Georgia Agricultural Crops	*Simerjeet S Virk*
	27	Students' Perceptions of Learning Precision Agriculture through Cooperative Learning Groups.	*Oybek T Turayev*
Geospatial Data	28	Using On-the-Go Soil Sensors to Assess Spatial Variability within the KS Wheat Breeding Program	*Byron Evers*
	29	Changes in Soil Quality when Building Ridges for Fruit Plantation	*Hugo P Poblete*
	30	Cloud Correction of Sentinel-2 NDVI Using S2cloudless Package	*Madhumita Dash*
	31	Map Whiteboard As Collaboration Tool for Smart Farming Advisory Services	*Karel Charvat*
	32	Investigating Spatial Relationship of Apparent Electrical Conductivity with Turfgrass and Soil Characteristics in Sand-capped Golf Course Fairways	*Chase Straw*
In-Season Nitrogen Management	33	Assessment of Active Crop Canopy Sensor As a Tool for Optimal Nitrogen Management in Dryland Winter Wheat	*Deepak Ghimire*
Precision Agriculture and Global Food Security	34	Suitability of ML Algorithms to Predict Wild Blueberry Harvesting Losses	*Travis Esau*
	35	Enhancing PA Adoption Through Value Connections	*David W Lamb*
	36	Farmer Charlie – Low Cost Smart Local Data Available to Remote Farmers	*Betty Bonnardel*
	37	Smart Food Oases: Development of a Distributed Point-to-Point Urban Food Ecosystem in Food Desert Areas	*Jejung Lee*
Precision Horticulture	38	Temperature Effect on Wild Blueberry Fruit Quality During Mechanical Harvest	*Travis J Esau*
Proximal and Remote Sensing of Soil and Crop (including Phenotyping)	39	Estimating Soil Carbon Stocks with In-field Visible and Near-infrared Spectroscopy	*Curtis J Ransom*
	40	On-the-go Gamma Spectrometry: Really a Valuable Tool for Site-independent Soil Texture Prediction?	*Stefan Pätzold*
	41	Assessing Field Properties from Satellite Imagery	*Geetika Rathee*
	42	Snap-shot Hyperspectral Camera for Potassium Prediction of Peach Trees Using Multivariate Analysis	*Joe Mari J Maja*
	43	Multi-sensor Imagery Fusion for Pixel-by-pixel Water Stress Mapping	*Ran Pelta*
	44	Proximal Sensing of Penetration Resistance at a Permanent Grassland Site in Southern Finland	*Antti Lajunen*
	45	Mapping Soil Health and Grain Quality Variations Across a Corn Field in Texas	*Kabindra Adhikari*
Robotics, Guidance and Automation	46	Development of a Granular Herbicide Spot Applicator for Management of Hair Fescue (Festuca Filiformis) in Wild Blueberry (Vaccinium Angustifolium)	*Craig MacEachern*
	47	Using Prescription Maps for in Field Evaluations of Parameteres Affecting Spraying Accuracy of Self-propelled Sprayer	*Paulo Flores*
Site-Specific Pasture Management	48	Grassland System Impacts on Spatial Variability of Soil Phosphorus in Eastern Canada	*Jeff D Nze Memiaghe*
Small Holders and Precision Agriculture	49	Low Cost Smartphone Camera Accessory to Digitally Measure Leaf Color for Crop Nitrogen Status Assessment	*Gustavo Portz*