

Minutes of NCERA-180 (Site-Specific Management) Roseville, Minnesota January 9-11, 2008  
Host: David J. Mulla

The theme of this year's meeting was "Opportunities in Biofuel Production and Precision Agriculture. In light of that emphasis, members of the Committee spent January 9 touring POET ethanol and Soymor biodiesel plants near Albert Lea, Minnesota.

Thursday, January 10, 2008

Dr. David Mulla welcomed the participants and discussed the agenda covering various topics related to using site-specific management to enhance crop quality for biofuel production.

Dr. Mulla and Ryan Roggenbuck (University of Minnesota) presented research on "Spatial Variation in EONR for crop yield and quality in Southern Minnesota". They covered methods for determining economic optimum nitrogen rates (ENOR) and the relationships between ENOR, crop yield and crop quality. They discussed their observations that spatial variability in crop quality was often related to variability in soil properties and that managing crop quality using site-specific technologies was likely to result in significant gains in the efficiency of biofuel production.

Dr. Kurt Thelen (Michigan State University) presented information on "Spatial Variability in Energy Crop Quality Components: Does It Matter?". He showed data indicating the importance of spatial variability in soil properties in determining the amount of oils, sugars, and starch produced by various crops. Clearly, spatial variability in soil properties is an important factor in regulating the amount of energy produced by an acre of land. He then discussed methods for using site-specific management to enhance crop yield and quality.

Dr. Newell Kitchen (USDA-ARS, Columbia Mo.) then presented an overview of the emerging technologies for land energy production on marginal soils. While many of these technologies are still years away from fruition there appears to be a good opportunity to use site-specific management practices in conjunction with these technologies to improve energy production.

The focus of the sessions then shifted to using site-specific management to improve carbon sequestration and enhancing that aspect of biofuel production. Dr. Brian Wienhold (USDA-ARS, Lincoln, NE) presented research on the effects of crop residues on soil properties in a spatially variable field. Differences in soil texture, nutrient status, and topography were shown to influence the effectiveness of crop residues in improving soil carbon and structure. Dr. David Clay (South Dakota State University) then talked about determining site-specific carbon requirements for spatially variable fields. He detailed site-specific methods for measuring soil carbon.

The final presentations of the day covered crop performance at different landscape positions and the role of precision agriculture in the future of biofuels. Dr. Gregg Johnson (University of Minnesota) presented his research on crop yield at different landscape positions. His findings indicate that different crops would be better suited to different landscape positions and that a diversity of biofuel crops is needed to maximize energy production. Dr. Paul Fixen (International Plant Nutrition Institute) then summarized the current research in biofuels and precision agriculture and presented his thoughts on the role that precision agriculture could play in improving the efficiency of energy production from biofuels.

Friday, January 11, 2008

K. C. Ting (University of Illinois) gave the Administrator's Report. He encouraged the participants to highlight the pieces of the NCERA-180 mission that are important. In particular, need to emphasize the education, extension, and research mission with a focus on information exchange. Within 60 days of meeting (March 11) the SAES-442 form must be

submitted to the NIMSS online system and that the impact statement must be revised for the mid-term review. He also spoke about funding for specialty crop research and BP grants covering chemical transformations in bioscience and energy solutions from field to processing.

Dr. Ronnie Heiniger (North Carolina State University) lead a group discussion on the upcoming plans for the 2009 meeting which will be held in Portsmouth, VA. The focus of that meeting will be on using precision agriculture to mitigate the impact of global climate change.

An election was held to select the Chair for the 2010 NCERA-180 meeting. Tim Stombach of the University of Kentucky was unanimously elected, and agreed to hold the 2010 meeting of NCERA-180.

Raj Khosla (Colorado State University) discussed the upcoming 2008 International Conference on Precision Agriculture (ICPA). The venue for the conference is being changed to Colorado and will be held at the Hyatt Regency Tech Center in Denver, Co. Over 300 abstracts from 25 countries have been received and are being processed. The conference has been organized by theme areas including traceability, robotics, precision conservation, education, and a possible area to include biofuels. There will be graduate student awards to encourage their participation at the conference. The A to Z portion of the conference will continue with stronger support and speakers. NCERA-180 is assisting in the process of putting on the ICPA by being a strong part of the conference planning committee and will be staffing the conference sessions.

Dr. Fran Pierce (Washington State University) finished editing the publication on GIS in Precision Agriculture by CRC Press. This is the first in a series of books on GIS in agriculture. It is envisioned to have 1-2 volumes each year, on topics such as invasive species, IPM, precision conservation, agribusiness, etc. The next volume on GIS applications in agriculture will focus on invasive species with Sharon Clay as the lead author. Fran asked about other topics. The group identified several topics including Conservation Planning, Nutrient Management, Integrated Pest Management, GIS Applications in Agriculture Businesses, and Biofuels. NCERA-180 will provide the leadership with Dr. Pierce in developing these additional books.

Dr. Bruce Ericson from Purdue talked about the NCERA-180 taking leadership in developing connections with NRCS to work on guidelines for using EQUIP funds for precision technologies. He suggested that the NRCS program used in Missouri could be used as a model for efforts in this area. The group agreed to develop a team to work on guidelines for equip funds and to make contacts with NRCS to discuss implementing this program. It was suggested that an NRCS representative be at the 2009 meeting to present their side of the story.

Dr. Adamchuk (University of Nebraska) presented a demonstration on using GIS to understand the principals of precision farming. The current problem in implementing site-specific management practices lies in the high cost of GIS software that is not adequate for farm situations. He showed how programs presented over the internet could be used to train growers in the use of GIS applications using the software Manifold 7x Personal and Surface Tools. Currently, the University of Nebraska offers five lessons in GIS Applications in Farming including 1) How to download data, 2) putting boundary data into a project, 3) processing yield data (including the use of yield editor and yield check), 4) visualization of soil data, and 5) prescription map development. The site is located under the University of Nebraska

Eric Lund (Veris Tech) talked about two instruments under development the first being the Veris MSP-ph which is a unit that measures pH in real-time. This unit has been improved with a continuing improvement in accuracy. The other unit is the Veris VIS-NIR a Near Infrared (NIR) spectrophotometer that collects data in 8 nm bands from 500-900 nm and from 1100-2200 nm. Light and dark references are collected automatically. NIR is used to estimate soil organic carbon, N, C/N, pH, Ca, Mg, P, K, CEC and moisture. This unit is being used in a USDA stover removal project to measure carbon sequestration and other soil properties. This unit

could provide the data needed to quantify the impact of using various management practices on carbon accumulation.

William Rudolph (TeeJet Tech) talked about Centerline Guidance Devices and Field Pilot Automatic Steering Systems. He also talked about Swath Manager to turn on and off boom sections depending on whether the area was previously sprayed. TeeJet is developing a controller area network (CAN) based on ISO BUS ISO 11783 open standard to control all these devices.

Dr. Newell Kitchen (USDA-ARS, Missouri) talked about Division A-8 Integrated Ag Systems as a venue for symposia and papers on precision agriculture at the annual meetings of the Agronomy Society of America (ASA). Div. A-8. The focus topic is using precision agriculture to balance the impacts of rising demand for food, fiber, and fuel and crop production practices. The Div. A3 session on crop and soil modeling using remote sensing, A4 on sensor technology, A9 on fertilizer maps, S4 on nutrient management, and S6 on water issues in biofuel and plant rooting and soil carbon in the profile are also a possible venues for research from the NCERA-180 group.

Dr. Tim Stombaugh (University of Kentucky) talked about the next meeting of ASABE in Providence, RI. Possible sessions included GPS testing and accuracy, tractor guidance performance guidelines and application accuracy. All of these would welcome input from the NCERA-180 group.

David Mulla then lead a discussion on future activities of the NCERA-180 group. One key issue was the need for a website to communicate what the group is doing and to provide information about research, extension and outreach projects that the group is involved in. Bruce Ericson from Purdue University will develop a website for the group and host it. There was discussion about a funding source to support Dr. Ericson's efforts and the decision was made to contact CERESS about E-extension funding. This item will be discussed at Portsmouth, VA in 2009. The group asked for more information on the adoption of precision agriculture in the United States and other parts of the world. What is limiting adoption and how can these limitations be overcome so that farmers can benefit from precision technologies? Dr. Ericson presented some information from the SSMC group a Purdue showing the rate of adoption. It was decided that more on-line education information was needed. There will be a short course on spatial variability presented on the extension website at the University of Nebraska in February that could be used as a template for other efforts in education and extension.

Dr. David Mulla thanked everyone for coming and officially adjourned the 2008 annual meeting of NCERA-180.