

**North Central Extension and Research Activity (NCERA) 217 and  
Agricultural Drainage Management Systems Task Force (ADMS TF) Meeting**

April 9-11, 2013, Sioux Falls, SD

## **Tuesday**

**Chris Hay** welcomed everyone to South Dakota, and opened the meeting with introductions.

**Jane Frankenberger** presented research in Indiana, including results from the multi-state CIG published last fall in the special issue of Journal of Soil and Water Conservation along with several other papers from ADMS Task Force members, current instrumentation at the Davis Purdue Ag Center, and a preliminary study of the effect of drainage water management on time for water table to recover.

**Matt Helmers** discussed drainage activities in Iowa, including cover crops that are being implemented across the region. They reduce nitrate-N concentration, but produce a yield reduction at one site.

**Gary Sands** talked about work in Minnesota to identify optimal ways to design subsurface drainage systems to meet both profitability and environmental goals. He pointed out that although management can vary from year to year, there is only one chance to do design right. DRAINMOD is the best tool for that, combined with economic tools. He presented two indices that combine profitability, drainage volume (a proxy for nitrate loss), and surface runoff.

**NCERA 217 Business Meeting.** The [North Central Extension Research and Extension Activity 217](#) “Drainage Design and Management Practices to Improve Water Quality”, which often meets simultaneously with the ADMS Task Force, approved minutes from last year, and heard from Ramesh Kanwar, Administrative Advisor and Mary Ann Rozum of NIFA (by telephone from Washington DC). The group decided to write a new proposal, due this fall. Writing group is Matt Helmers, Gary Sands, Chris Hay, Mohamed Youssef, Xinhua Jia. Mohamed Youssef of NC State was elected Secretary (future Chair).

## **Wednesday**

**Mohamed Youssef** gave an update on drainage research in North Carolina.

**Xinhua Jia** presented research in North Dakota, especially extensive research on subirrigation sites.

**Roxanne Johnson** and **Tom Scherer** talked about water quality and flow monitoring of field-size systems. Implemented in 2008, focused on saline-affected drains in 2009.

(A power outage delayed the scheduled South Dakota presentation until Thursday morning.)

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### **Mini-Symposium: Hydrologic Impacts of Subsurface Drainage**

- **Matt Helmers**, Iowa State University discussed Field to Drainage District Scale Hydrologic Impacts of Drainage, a modeling study using MIKE-SHE on the drainage district scale.

- **Brandon Sloan**, University of Iowa, presented his work on Hydrologic Impacts of Agricultural Tile Drainage in Iowa. The goal of his project is to look at policy in terms of hydrology, and he is examining effects of soil type, tile spacing, rainfall on hydrologic impacts of drainage in several ways.
  - **Gary Sands**, University of Minnesota presented Modeling Drainage Hydrologic Impacts in the Red River of the North Basin. This field-scale analysis using DRAINMOD studied drainage and surface runoff interactions.
  - **Satish Gupta**, University of Minnesota, gave a presentation on Climate and Tile Drainage Impacts on River Discharge and Baseflow that refuted several recent papers suggesting that land use and/or switch from perennials to soybeans is the cause of flow increases. He showed that precipitation increase is primary cause of the increase in stream flows.
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#### **Saturated Buffers:**

**Nathan Utt** reported on the Saturated Buffers Conservation Innovation Grant project. The ADMS is installing 4 saturated buffers in each of 4 states (MN, IA, IL, IN), and monitoring flow, N, P, soil parameters, stream bank movement. Flow is monitored using the 3-chambered control structure as a weir. Farmers or SWCD take bi-monthly grab samples at structure and 3 or 4 groundwater well transects, and the samples are shipped the same day to Ames, IA for analysis.

**Dan Jaynes** discussed the saturated buffer they (USDA-ARS) have been monitoring, in which drainage from about 25 acres is diverted into the buffer. Well measurements suggest that all nitrate is denitrified from the water that moves through the buffer, and that that they diverted 105 kg N in one year.

Considerations:

- Ideal sites slope from field into the buffer then into a shallow ditch. In that situation, the water table could be raised year round, and there wouldn't even need to be a structure accessible from above ground. However most sites are in a flat landscape, so outlet needs to be managed like drainage water management. Other non-ideal sites have a deeply incised channel which risks increasing instability from saturated buffers.
- More research is needed on what kinds of grasses do better in the wet soils. More water-loving grasses might be better than the typical grass mix.

**Anna Bramblett** presented the new 799 conservation activity standard, which provides detailed guidance on edge-of-field monitoring. It will be implemented this year in many watersheds included in NRCS initiatives.

**Paul Sweeney** presented activities of the NRCS Agricultural Water Management Team (AGWAM). Outreach is being conducted together with the Sand County Foundation, attending meetings of at least 6 different groups. The Training team is focusing on training NRCS staff across the region to first understand drainage, then also DWM. The team is also working on a number of program requirements that could be changed to make it more efficient to do DWM. For example, CAP 130 should be able to be implemented together with implementation of the practice. Also a team is working with FSA to make it possible to apply on CRP land. (Currently, the rule that the same area can't have two practices with

federal cost share means that people have to pay back money plus penalty for removal if they install water control structure, bioreactors, or saturated buffers. He provided updates of various drainage water management practices and plans.

He initiated a discussion of how we might capture information on practices not put in by NRCS. The drainage industry might be able to contribute to the discussion of how much has been adopted. *More discussion of this idea is needed.*

He then led a discussion of the possibility of *grouping NRCS drainage management practices under a system or umbrella called something like "Agricultural Drainage Management System"*, similar to Conservation Cropping Systems which includes tillage, nutrient management, etc. It may be analogous to a Comprehensive Nutrient Management Plan which includes a lot of different practices. A question was also raised about the difference between an Agricultural Drainage Management System and a Resource Management Systems applied to drained land with a resource concern.

This brought up a more general discussion of terminology. Is "drainage water management" a system or just a practice? For NRCS, saturated buffers may fall under another practice. Is "woodchip denitrifying bioreactor" the best word? ADMS may be able to help by discussing and determining consistent terms.

## Thursday

**Anna Bramblett** presented results of a study by Richard Cooke's student of buried water control structures (head differential devices that can be buried). They do perform at holding the water table 1 foot, especially at low flows. However they may restrict flow. NRCS treats those as other structures nationally, but state engineers can make other decisions.

### Agricultural Drainage Management Coalition Report

- **Leonard Binstock** said that ADMC has had a busy year, with installation of saturated buffers, including a field day held in Illinois. The Agriculture Outlook Forum had a session on drainage water management, with Deputy Under Secretary Ann Mills as host. TSP training has been a major activity; Jeanne Hansen coordinates it, with recent successful sessions in Indianapolis and Moorhead, and another one planned in Ohio. About 100 people have been trained. They are also working on training for NRCS people in local offices. He encouraged the group to take a look at how the drainage industry operates today, which is very different than 5 years ago. There are professional sales teams and employees, which provide new opportunities and challenges.
- **Phil Algreen**, AgriDrain reported that Richard Cooke will be doing additional testing of the Watergate, especially on how trash or sediment will affect it. (It is recommended that no surface water be allowed in tiles because of this issue.) A 12-inch version is available, although testing is still being done. He also talked about the "water quality inlet" which is the straws designed to replace surface inlets that have larger holes. People ask about how deep they should be installed, which varies by application. A new water level control structure is in process that will be a lower cost alternative, called the "round guy". It is made from SDR-35 pipe, with a different type of stop log that is injection molded plastic with hooks built in and tracks made out of PVC.
- **Nathan Utt** reported that Dave White, former Chief of NRCS, was recently named President Ecosystem Services Exchange. Nathan is developing CAP 130 plans and also subirrigation designs. He helped NRCS engineers develop the interim standard for saturated buffers, along with Matt Helmers

and Dan Jaynes. The standard will not only be for stream banks, but can be any place that there is a hydraulic gradient to pull water into a water body, like a wetland.

**Bill Kuenstler** announced the 6<sup>th</sup> World Conference of Conservation Agriculture that will be held in Winnipeg, June 2014, hosted by the Conservation Agriculture Systems Alliance (CASA). He suggested that some of the work we are doing would fit in this conference. Karen Scanlon is the Executive Director of the CASA, and Jerry Hatfield is Program Chair of the conference, with people in Canada leading local arrangements. Conservation Agriculture is a term developed by the UN Food and Agriculture Organization, and in North America focuses on as little soil disturbance as possible, diverse agriculture (including cover crops), and maintaining cover year-round.

**Bruce Shewfelt** talked about numerous drainage-related projects in Canada. He described a new controlled drainage and subirrigation field site where they are measuring water table, soil moisture, and they plan to model using Hydrus, DRAINMOD, AIMM (irrigation management model). They are installing a saturated buffer and will test various tree species, and will install a bioreactor, following Iowa State design guidelines. They also did laboratory tests of woodchips. He showed an existing bioreactor in eastern Canada, as well as two sites where water is recycled (stored in a pond, then used for irrigation). The tile has a sock (typical in Manitoba), so they are filtering irrigation water to get rid of algae and fines.

**Andry Ranaivoson** discussed results from research on three bioreactors in Minnesota.

**Jeppe Kjaersgaard and Chris Hay** showed information on two bioreactors that were installed last year in South Dakota, including one at the AgPhD field day site, and discussed the use of remote sensing for estimating evapotranspiration from multiple fields with cover crops. Plans for drainage research plots were shared as were pictures of tabletop drainage water management and bioreactor models used in outreach activities.

### **Bioreactor discussion**

- Jeppe Kjaersgaard introduced the discussion by presenting an overview of other groups working on bioreactors and similar technologies, including the N sink community of American Society of Agronomy, and the “Artificial N Sinks” project (<http://www.artificialnsinks.org/>). We discussed opportunities for interacting with them, including writing the next NCERA proposal to include broader expertise, encouraging them to attend parts of future meetings, having an official “liaison” in each group, and attending their meetings.
- We would like to examine the cost per pound of N removed.
- We need to make sure we’re not adding other problems. New CIG is examining methyl mercury and greenhouse gas issues.
- A publication similar to the “Questions and Answers” publication on drainage water management would be helpful.

**Mark Dittrich** presented the conservation drainage focus groups and other new initiatives in Minnesota.

### **Drainage water management education materials discussion**

- [Questions and Answers publication](#): Jane Frankenberger reminded the group that this publication was written in 2006 and 80,000 copies have been printed. Group members felt that the format was still the most effective, but we should update the content where appropriate.
- A new publication on Planning a Drainage Water Management System has been reviewed and will be published soon.

- Another publication called “Ten Ways to Reduce Nitrogen Loads from Drained Cropland in the Midwest” is nearly ready to be sent out for review.

**Closing discussion:** How can we encourage all contractors to accept that installing drainage on the contour is better, even if drainage water management is not implemented at installation? The industry would like to have a clearer statement from researchers, so that they could say “Here is what land-grant universities are recommending”. We could develop and promote a minimum design standard for drainage systems that should be on the contour. ASABE could potentially have this in the standard.

**Next meeting** should be in one year unless there is a reason to meet earlier.

- NCERA 217 suggested North Carolina, Iowa, or Ohio
- Iowa might get more industry people there.
- Missouri is a good location – lots of practices installed.

**Attendees** (Note: Many others were registered, but travel conditions prevented them from attending.)

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