



SERA-17 Annual Meeting, Marriott Waterside Hotel, Tampa, FL - November 7, 2013

Priorities in the science and management of P in artificially drained systems

8:00 Reflections and discussion from the ASA/SSSA symposium on P in drainage, Peter Kleinman, Doug Smith and Carl Bolster ARS

9:00 Break out groups - SERA-17 input and initiatives on P and drainage

9:35 Reporting from break out groups and prioritizing initiatives

9:50-10:05 Break

Phosphorus Drawdown Strategies

10:05 Introduction, Andrew Sharpley, University of Arkansas (moderator)

10:10 Industry perspective on phosphorus, Tom Bruulsema, IPNI

10:25 Agronomic and water quality evaluation of the phosphorus draw-down approach in tile drained soils, Zhang, T.Q., Tan, C.S., and Welacky T. – GPCRC, AAFC

10:40 Long-term phosphorus drawdown studies on three soil types in North Carolina, Deanna Osmond, NC State University

10:55 Long-term phosphorus drawdown studies from the Mid-Atlantic, Frank Coale and/or Amy Shober

11:10 Survey of P drawdown studies, Tom Sims, University of Delaware

11:25 SERA-17 Activities for 2013 relative to phosphorus drawdown, Tom Sims

12:00 Lunch

1:00 – 2:15 Business Meeting

Introduction to incoming Chair of SERA-17

Overview of 2014 SERA-17 meeting (Mallarino)

Approval of SERA-17 (Osmond)

Policy update (Lory)

Discuss need for new fact sheet effort (Walker)

Discussion on potential SERA-17 efforts working with RCN (Sharpley)

Discuss working relationships with European group (Sims)

Web site status

Open floor to suggestions and comments

2:15 Irish Agricultural Catchments Programme: An Overview. Ger Shortle, Teagasc, Wexford, Ireland

2:45 Break

Phosphorus Loss Assessments (CIG project)

3:00 Introduction, Deanna Osmond (moderator), NC State University

3:05 Report from the Mid-Atlantic CIG, Peter Kleinman, ARS

3:20 Report from the Southern CIG, David Radcliffe, University of Georgia

3:35 Report from the Heartland CIG, John Lory, University of Missouri

3:50 Report from Ohio CIG, Libby Dayton, Ohio State University or Kevin King, ARS

4:05 Report from Wisconsin CIG, Laura Good, University of Wisconsin

4:20 Synthesis CIG, Andrew Sharpley, University of Arkansas

4:35 Discussion, Deanna Osmond (moderator), NC State University

November 8: SERA-17 Half-day Field Trip, 7:45am – 1:00pm



MINUTES 2013 SERA-17 MEETING, TAMPA, FL, NOVEMBER 6 TO 8TH

Meeting Initiated by Deanna Osmond, current chair at 8:00 AM.

Deanna Osmond welcomed the participants to this year's meeting.

Peter Kleinman, Carl Bolster and Doug Smith reported on the previous days' Symposium – **Phosphorus Fate, Management and Modeling in Artificially Drained Systems**, which was co-sponsored by ASA-Environmental Quality Division; ASA-Nutrient Use and Assessment Community; SSSA-S11 division; SSSA-S6 division; and **SERA-17**.

Participants broke into the four breakout groups for discussion and then reported back to the collective participants. There was extensive discussion on risk/reward of tillage to address high STP on surface of soil. Ray Bryant noted that NRCS approached byproducts Tri-Society community to develop a new National Standard for using these products to ameliorate soil P. Comments about significant questions about processes related to controlled drainage systems. Do reducing conditions necessarily lead to release of P?

Participants then separated into five groups to determine action items on this topic:

1. Modeling Group – led by Keith Reed, Zach Easton, and Nathan Nelson
2. Agriculture production practices – led by Peter Kleinman
3. Karst landscapes - led by Carl Bolster
4. Extension – led by Deanna Osmond
5. Filtration/amendments – led by Ray Bryant

Below are reports from each of those groups.

Modeling Group

Working group will produce a review paper for JEQ. Also, David Radcliffe is working to get put together a review of models handling drainage; focus: **Applicability of Current Models to Prediction of P Losses through Artificially Drained Systems**.

Deadline to submit a review paper for this special section of JEQ is March 14, 2014, so a draft needs to be ready by late January. We should look to the recent paper in Soil Use and Management on P models (Vadas et al. 2013) and an earlier paper on modeling and P (Radcliffe et al., 2009) as possible templates for the paper.



Models that could be discussed:	Person responsible:
Hydrus	David Radcliffe
SWAT	Zachary Easton
DRAINMOD, RZWQM, ADAPT	Mohamed Youssef, Nathan Nelson
APEX	Wendy Francesconi, Nathan Nelson
MACRO	
ICECREAM	Karin Blombäck
PLEASE	John Avila
P Indexes	Keith Reid
Other Issues:	
Data requirements for sharing	Dan Fuka
Experiments to support model development and calibration	Dan Harmel
Uncertainty in Model Outputs	Carl Bolster

David and Keith will work together to develop an outline for the paper, and a template for information regarding each model:

- Hydrological Processes
- Physical Processes
- Bio-Geochemical Processes
- Spatial and Temporal Scale the model operates at
- Ability of the model to represent processes transporting P to drains under different conditions

Radcliffe, D.E. J. Freer, and O. Schoumans. 2009. Diffuse phosphorus models in the United States and Europe: Their usages, scales, and uncertainties. *J. Environ. Qual.* 38:1956-1967.

Vadas, P. A., Bolster, C. H. and Good, L. W. 2013. Critical evaluation of models used to study agricultural phosphorus and water quality. *Soil Use and Management* 29:36-44.

Agriculture production practices group

This group included 17 participants with discussion focused on the role of tillage, vertical P stratification, and macropore transport on the management of P loss in tile and ditch drainage waters. Topics included how to sample (depth, location relative to drain), extraction protocols (is soil P sorption saturation really better?), and trade-offs associated with tillage (curtailing bypass flow vs. exacerbating particulate P losses; benefits to drainage water quality vs. impact on erosion and overland flow; effects on immobilization/mineralization and P transformation).



The group decided to develop an annotated bibliography to examine the state of the science and organize subject matter (PRODUCT 1). From this, a review article will be developed (PRODUCT 2), a two-page position piece proposed for the editorial section of the Journal of Soil and Water Conservation (pending approval by Sharpley's Science and Policy Committee; PRODUCT 3), and a one-page research funding recommendation piece developed for NIFA, EPA and other granting agencies (PRODUCT 4).

The group requests formal recognition as a workgroup and a web page under the (to be developed) SERA-17 web site (to be developed by Fuka and Easton).

Interest was also raised in controlled drainage by TQ Zhang and Chin Tan. They will need to solicit the broader SERA-17 community to determine whether sufficient expertise and interest exists to develop an initiative around this important topic.

Workgroup members

Pete Kleinman (USDA-ARS) – point of contact for the time being
TQ Zhang (Agri Food Canada)
James Coover (Kansas State)
Jerry Lemunyon (retired godfather)
Stephanie Kulesza (Virginia Tech)
Chris Gross (USDA-NRCS)
Emileigh Rosso Lucas (Univ. Maryland)
Chin Tan (Agri Food Canada)
Katie Clark (Univ. Delaware)
Annika Svanback (Swedish Agricultural University – SLU)
Patrick Forrestal (Teagasc)
Barbara Cade-Menum (Agri Food Canada)
Tom Sims (Univ. Delaware)
Casey Kennedy (USDA-ARS)
Tom Bruulsema (IPNI)
Doug Beegle (Penn State Univ.)
Antonio Mallarino (Iowa State Univ.)
Doug Smith (USDA-ARS)
Carl Bolster (USDA-ARS)
Dan Fuka (Virginia Tech)
Zach Easton (Virginia Tech)
Andrew Sharpley (Univ. Arkansas)

Karst landscapes group

This group included 6 participants, with discussion focused on the vulnerability of karst aquifers to contamination. Due to their thin soils, direct connections between surface and ground waters, and high flow rates through dissolution conduits, karst aquifers are particularly vulnerable to contamination from



human activities, including agriculture. While highly vulnerable, recent research in Ireland has shown that agricultural activities do not necessarily result in groundwater contamination.

Most of those attending the breakout session noted that karst was an important landscape feature at their location but these areas tended to be underexplored or ignored. The reasons for this are varied but include the general reticence of many researchers (including those in the breakout session) to investigate such a complex environment. Because agriculture will continue to occur on these landscapes, there is a need for the development of guidelines for managing agricultural activities in karst terrains.

The group is pursuing additional input from other researchers and MAY decide to work on a fact sheet detailing vulnerabilities of karst landscapes to nutrient contamination provided there is enough interest to obtain commitments from people to contribute to the fact sheet.

Workgroup Members

Tony Buda, USDA-ARS

Emily Duncan, Penn State Univ.

Laura Good, Univ. of Wisconsin

Rich McDowell, AgResearch

Karl Richards, Teagasc

Carl Bolster, USDA-ARS

Extension group

Participants: Karl Czymmek, Luciano Gatiboni, Chris Kessel, Quirine Ketterings, John Lory, Rory Maguire, Larry Oldham, Amy Shober, Ger Shortle, Dan Sullivan, Forbes Walker, Hailin Zhang

The group discussed ways to get information into circulation on P leaching. The group is requesting three slides from the Wednesday Drainage Symposium to build a slide set that can be used to educate CCAs (nationally) and others; this slide set would serve as a basic primer. Once developed, the extension group will begin to hold regional webinars focused at practitioners and extension agents. These regional webinars may be run through ASA or SSSA or they may simply be run through individual universities. As part of the outreach, the group will develop a fact sheet on P losses through drainage to be part of SERA17's publications.

Filtration/amendments group

The group identified the following priority research areas/topics that require further investigation;

- In-field sequestration of excess P and controlled release (desorption and recovery) under future conditions of limited P availability.
- Better understanding of reductive dissolution processes and P release in saturated soils.



- Cost/benefit metrics for evaluating filtration or in-field sequestration strategies.
- P credit for fertilizer replacement value as a part of nutrient management planning. Is there a need for starter fertilizer?
- Paired strategies for P filtration and denitrification structures.

There was broad support for the development of a conservation practice standard for the use of FGD gypsum and other soil amendments. Efforts to develop a standard should initially include the broad scope of uses and topics identified above, thereby advancing our knowledge in these areas. The resulting standard may have to be limited in scope, but the assimilation of existing knowledge in all of these areas will benefit the scientific community.

2014 Business Meeting

Deanna Osmond introduced Joan Dusky, Associate Dean for Extension, Agricultural Programs Leader in the Institute of Food and Agricultural Sciences (IFAS) at the University of Florida. Dr. Dusky oversees the SERA information exchange groups and told us that SERA-17 was by far the most productive and impactful of all the SERA activities. She mentioned that she was both surprised and impressed by the attendance, the breadth of attendees and the vigor of discussion and involvement my members.

Antonio Mallarino presented an update on the 2014 SERA-17 meeting, which will be independent of ASA-SSSA-CSSA next year and will be held in Des Moines, IA. More information will be posted on the SERA-17 website in the very near future. We hope that as many people will be able to attend that meeting as possible. The meeting is scheduled for July 23rd, 24th, and 25th, 2014.

SERA-17 was approved by the SERA Administration for renewal for another 5 years in October 2013. Thanks go to Deanna Osmond for leading this effort with help from several members of SERA-17, in rewriting the groups' objectives and outcomes.

John Lory gave an update on policy activities. He is leading a "Listening group" that meets monthly via conference call with key people from EPA and NRCS to present and discuss items that are of interest to those interests. Topics for discussion are raised by EPA and NRCS along with SERA-17. The group has been very active and very successful in getting science-based solutions and options to EPA and NRCS personnel, who might otherwise not be exposed to this information. The Listening group has been well received by EPA and will continue through 2014. The group did have a short (afternoon) face-to-face meeting in Washington, DC in the spring of 2013. Some ideas for the Policy group to discuss that were raised during discussion were the use of MAP and DAP and whether there were other formulations that might be appropriate.

Forbes Walker will renew efforts to add several new BMP fact sheets to those that were created, as well as updating existing ones as and where needed. Ideas and authors were solicited and include but will not be limited to;

1. Tillage effects on P losses



2. Use of gypsum to retard P
3. Use of byproduct materials to retard P
4. Use and placement of byproducts to bind P in surface and subsurface flows
5. Use of fertilizer P + additives
6. Effects of controlled drainage on decreasing P loss
7. Rationalizing tile drainage and leaching vs. surface runoff of nutrients

Other business discussion included;

1. The possibility of SERA-17 being more proactive in acting as third-party independent reviewers of BMPs and their efficiencies, in association with for example, the NRCS and IPNI **4R** programs, Chesapeake Bay Program restoration strategy.
2. Revisiting the response curves relating soil test P and fertilizer need recommendations. More states are reporting a lack of a yield response of crops to application of P to soils with soil test P levels below what are currently considered optimum.
3. Tom Sims will lead a group that will conduct a meta-analysis of legacy soil P. This follows on from a recent SERA-17 list-serve request.
4. Following the recent successful International Phosphorus Workgroup 7 Symposium in Uppsala, Sweden it was agreed to promote IPW members to join the SERA-17 list-serve, so that we would become truly international and would get input from and interaction with our international colleagues on science and policy issues on the list-serve.
5. Dan Fuka and Zach Easton agreed to take over management of the SERA-17 list-serve and to update the website. As Dan and Zach of with Virginia Tech, housing of the website address will not change.
6. Nenglong Chan, who is a P-RCN graduate students at Arizona State University with Jim Elser address the participants and explained the objectives and motives of the P-RCN.
7. Andrew Sharpley was introduced as the 2014 chair and Carl Bolster was introduced as the incoming chair (2014).

Ger Shortle gave an excellent overview presentation on the Irish Agricultural Catchments Programme

It is planned to eventually include the presentation on the SERA-17 website.

Phosphorus Loss Assessments (CIG project)

Each of the six regional, State and synthesis CIG projects reported on progress made towards evaluating and assessing P Indices. The names of those reporting are noted. Objectives of these proposal and research efforts can be found on our soon to be renovated SERA-17 website.

1. Chesapeake Bay – Pete Kleinman and Zach Easton



2. Southern Region – Deanna Osmond and David Radcliffe
3. Heartland Region – John Lory and Nathan Nelson
4. Ohio Project – Libby Dayton
5. Wisconsin Project – Laura Good
6. CIG Project Synthesis – Andrew Sharpley

Field Tour - Mosaic Four Corners Phosphate Mine

Friday morning saw an excellent half-day tour of the **Mosaic Four Corners Phosphate Mine** by nearly 30 workshop participants. The tour was organized and hosted by Gurpal Toor, with the Gulf Coast Research and Education Center, University of Florida.

Acknowledgements

A debt of gratitude and thanks go to Deanna Osmond, North Carolina State University for leading the organization of the 2013 SERA-17 Annual Meeting. A big thank you should also be given to Joni Tanner and Kathryn Luxford, both with North Carolina State University for handling all the logistics of the meeting registration and many other unseen tasks, which all helped to make the 2013 SERA-17 so successful.



Attendees at 2014 Meeting

Last Name	First Name	Title	Company	Address	City	State
Arriaga	Francisco	Assistant Professor	Univ. of Wisconsin-Madison	1525 Observatory Drive	Madison	WI
Beegle	Douglas	Professor	Penn State University	116 ASI Building	University Park	PA
Bhandari	Ammar			2011 D Throckmorton Plant Sciences	Manhattan	KS
Blombäck	Karin	PhD	Swedish Univ. of Agric. Sciences	Department of Soil and Environment	Uppsala,	Sweden
Bolster	Carl		USDA-ARS	618 Shetland Ave	Bowling Green	KY
Bruulsema	Tom		IPNI	18 Maplewood Drive	Guelph	ON
Bryant	Ray	Dr.	USDA-ARS	USDA-ARS-PSWMRU	University Park	PA
Buda	Anthony	Hydrologist	USDA-ARS	3702 Curtin Road	University Park	PA
Cabrera	Miguel	Professor	University of Georgia	3111 Miller Plant Sciences Bldg.	Athens	GA
Cade-Menun	Barbara		Agriculture & Agri-Food Canada	AAFC, SPARC	Swift Current	SK
Cela	Sebastian	Postdoctoral Associate	Cornell University	330 Morrison Hall	Ithaca	NY
Chan	Neng long		Arizona State Univ.	1223 South Dorsey Ln, Apt 103,	Tempe	AZ
Clark	Kathryn	Graduate Student	University of Delaware	152 Townsend Hall	Newark	DE
Coover	James		Kansas State University	2011A Throckmorton Hall	Manhattan	KS
Czymmek	Karl	Sr Extension Associate	Cornell University	328 Morrison Hall	Ithaca	NY
Dari	Biswanath	Graduate Student	University of Florida	298 Diamond Village	Gainesville	FL



Dayton	Elizabeth	Dr.	Ohio State University	SENR	Columbus	OH
Duncan	Emily		Penn State University	Building 3702 Curtin Rd	University Park	PA
Dusky	Joan	Associate Dean	University of Florida/IFAS Ext.	1038 McCarty Hall D	Gainesville	FL
Easton	Zach	Assistant Professor	Biological Systems Engineering, Virginia Tech	155 Ag Quad Lane	Blacksburg	VA
Elliott	Herschel	Professor	Penn State University	220 Agric. Engr. Bldg.	University Park	PA
Fenton	Owen		Teagasc	Johnstown Castle Research	Wexford	Ireland
Fiorellino	Nicole	PhD Student	University of Maryland	1109 HJ Patterson Hall	College Park	MD
Forrestal	Patrick		Teagasc	Johnstown Castle Research	Wexford	Ireland
Forsberg	Thomas	Graduate student	University of Georgia	3111 Miller Plant Sciences Building	Athens	GA
Foster	Wade	Manager, Scientific Programs	The Fertilizer Institute	425 Third Street, SW	Washington	DC
Franklin	Dorcas		Univ. of Georgia	3111 Miller Plant Science Bldg.	Athens	GA
Fuka	Daniel		Virginia Tech	PO Box 4102	Ithaca	NY
Gatiboni	Luciano	Dr.	NC State University	Box 7619 - Soil Science	Raleigh	NC
Good	Laura	Associate Scientist	University of Wisconsin- Madison	1525 Observatory Dr.	Madison	WI
Gross	Chris	Nutrient Management Specialist	USDA-NRCS	5601 Sunnyside Avenue, MS5420	Beltsville	MD
Hunolt	Alicia	Graduate Student	Virginia Tech	CSES 330 Smyth Hall	Blacksburg	VA
Ibrahim	Tristan		Teagasc Environment Research Centre	Johnstown Castle Research	Wexford	Ireland
Johnson	Keisha	GRADUATE STUDENT.	Penn State University	428 Thomas Building	University Park	PA



Kennedy	Casey	Research Hydrologist	USDA-ARS	1 State Bog Road	East Wareham	MA
Kessel	Christoph	Nutrition (Horticulture) Program Lead	Ontario Ministry of Agric. & Food	50 Stone Rd E., SES, Alexander Hall	Guelph	ON
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Kleinman	Peter	Soil Scientist	USDA-ARS	3702 CURTIN RD.	University Park	PA
Kleinman	Kelly			3702 Curtin Rd.	University Park	PA
Kovar	John	Research Soil Scientist	USDA-ARS	National Lab for Ag & Environment	Ames	IA
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Lee	Brad	Extension Specialist	University of Kentucky	Plant and Soil Sciences Department	Lexington	KY
Lemunyon	Jerry		USDA NRCS (ret)	501 West Felix Street	Fort Worth	TX
Lory	John		University of Missouri	108 waters Hall	Columbia	MO
Lucas	Emileigh		University of Maryland	1109 HJ Patterson Hall	College Park	MD
Maguire	Rory		Virginia Tech	428 Smyth Hall	Blacksburg	VA
Mallarino	Antonio		Iowa State University	3216 Agronomy Hall	Ames	IA
McClellan	Josiah	Director of Sustainability	United Soybean Board	16305 Swingley Ridge Road	Chesterfield	MO
McDowell	Rich		AgResearch	Invermay	Dunedin	New Zealand
Mulkey	Alisha			PO Box 1173	Greenbelt	MD
Nair	Vimala		University of Florida	PO Box 110490	Gainesville	FL
Nelson	Nathan	Associate Professor	Kansas State University	2004 Throckmorton Hall	Manhattan	KS
Oldham	Larry	Extension Professor - Soils	Mississippi State Univ. Extension	BOX 9555	Mississippi State	MS



Osmond	Deanna		NC State University	Box 7619	Raleigh	NC
Radcliffe	David		University of Georgia	Crop and Soil Sciences Dept.	Athens	GA
Ramirez-Avila	John	Postdoctoral Associate	Mississippi State University	235 Walker Hill Box 9546	Mississippi State	MS
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Reid	Keith	Soil Scientist	Agriculture and Agri Food Canada	174 Stone Road W	Guelph	ON
Richards	Karl		Teagasc	Johnstown Castle Research	Wexford	Ireland
Sharpley	Andrew	Professor	University of Arkansas	Dept. Crop, Soil & Environmental Science	Fayetteville	AR
Shober	Amy	Assistant Professor	University of Delaware	531 S. College Ave	Newark	DE
Shortle	Ger		Agricultural Catchments Programme	Johnstown Castle Research	Wexford	Ireland
Sims	Tom	Professor	University of Delaware	531 South College Avenue	Newark	DE
Smith	Douglas	Research Soil Scientist	USDA-ARS	275 S. Russell Street	West Lafayette	IN
Sullivan	Dan	Soil Scientist	Oregon State University	3017 ALS	Corvallis	OR
Svanbäck	Annika		Swedish Univ. of Agric. Sciences	Dep. of Soil & Environment	Uppsala	Sweden
Tan	Chin	Research Scientist	AAFC	RR#2, 2585 County Rd 20	Harrow	ON
Tanner	Joni		Soil Science Dept., NCSU	Campus Box 7619	Raleigh	NC
Toor	Gurpal	Assistant Professor	University of Florida	14625 CR 672	Wimauma	FL
Tuohy	Pat		Teagasc	Teagasc AGRIC	Cork	Ireland
Walker	Forbes	Associate Professor	University of Tennessee	2506 EJ Chapman Drive	Knoxville	TN
Williams	Candiss	Research Soil Scientist	USDA NRCS (Nat. Soil Survey Ctr.)	USDA NRCS National Soil Survey Center	Lincoln	NE
Young	Rebecca		University of Nebraska-Lincoln	248 Hardin Hall #56	Lincoln	NE



Youssef	Mohamed		NC State University	Campus Box 7625, BAE	Raleigh	NC
Zhang	Hailin	Professor	Oklahoma State University	368 Agriculture Hall	Stillwater	OK
Zhang	Tiequan	Research Scientist	Agriculture & Agri-Food Canada	2585 County Rd. 20 E	Harrow	ON
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