



APRIL 2016

The Newsletter of the Pennsylvania Association of Professional Soil Scientists
PO Box 871, Mechanicsburg, PA 17055

Erie Technical Tour, June 10-11

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Annual Meeting October 8

Pedon Ponderings


by Yuri Plowden, 2016 PAPSS President

It feels like spring has arrived, and one of our Board members reported that his broccoli and cauliflower seedlings have just popped up out of the soil. Meanwhile, PAPSS has been working this winter and I am happy to bring you some updates. The Association of Ohio Pedologists approached us when they heard about our upcoming Technical Session in Erie. As a result we are partnering with them for our June event, and we anticipate this will be an enriching and wonderful gathering of soil scientists from several states (soil scientists from WV, NY, and MD are interested). Alex Dado has planned an informative, jam-packed, tour. His quote was, "There's so much to see up here, the hard part will be choosing!" Sue Miller and Jackie Heintz are arranging local transportation, accommodations, and Friday night activities. (More information on tour specifics is included on page 2.)



Penn State will be hosting the 2016 Northeast Collegiate Soil Judging Competition and they will need PAPSS volunteers to help with pit monitoring, grading score cards, directing traffic, and the myriad of tasks needed to make a successful competition. Nancy Sansoni will be coordinating volunteers. To take advantage of this opportunity, PAPSS will hold its Annual Meeting in the area, Saturday, October 8th, the day after the competition. PSU Pedology Professor and PAPSS member, Patrick Drohan, will lead an afternoon tour of his research on gas drilling well pads. This will include a demonstration of Ground Penetrating Radar and Electro Magnetic Imaging technologies. We should also be able to browse a few of the competition's soil pits.


PAPSS is also investigating bringing the Soil Science Society of America's Dig It exhibit to Pennsylvania. In 2015, the exhibit was in North Carolina. Some of you may remember seeing its inaugural presentation at the Smithsonian in 2008. If you are interested in this, contact PAPSS Board member Matt Hostrander.

Other activities include updating our membership form and revamping the PAPSS scholarship process. Happy Spring, and hope to see many of you in Erie for our PAPSS-AOP Joint Technical Session, June 10th and 11th! 

Ag News

The United Nations declares 2016 the "International Year of Pulses." Pulses include beans, chickpeas, lentils and other grain legumes, and are a primary source of protein for much of the world's population. <http://iyp2016.org/>

The FDA plans to begin testing foods for glyphosate residue. Glyphosate was introduced in the 1970s as a foliar weed killer in the Monsanto product, Roundup, and is widely used by farmers and homeowners. <http://www.foxnews.com/health/2016/02/22/fda-to-begin-testing-foods-for-glyphosate-residue.html>

Ag Progress Days at Penn State – August 16-18, 2016 at the Russell E. Larson Agricultural Research Center. 



PAPSS
and
AOP



A Soil and Geomorphology Tour of Erie County, PA June 10-11, 2016

Friday, June 10, 2016

8:00 A.M. Meet at the offices of the Erie Conservation District
1927 Wager Road
Erie, PA 16509

There will be a one hour lecture/PowerPoint overview on the diverse geology/landforms of Erie County

9:00 A.M. Bus trip will begin covering the following:

- Harborcreek series on Penn State Erie grape research farm – new series established for relict beach ridges. Speaker to discuss the current grape research activities.
- Mardin Series on a drumlin landform
- Fremont/Orpark series. Speaker to discuss the Welch's cooperative and how Erie County's juice grape industry differs from the wine grape industry in other parts of the state.

Saturday, June 11, 2016

8:00 A.M. Meet at the offices of the Erie Conservation District
1927 Wager Road
Erie, PA 16509

Bus trip (including a bag lunch) will begin covering the following:

- Colonie series – eolian sand deposits with lamellae. A speaker from a large local nursery operation will discuss how the soils and microclimate influence the business.
- Platea series –example of fine textured till – fragic intergrade / fragipan discussion
- Conneaut series – silty lacustrine deposits over till. Hydric soil discussion.


Please see the flyer sent under separate cover, or consult the PAPSS webpage for more information and to register for this event.



Introducing Pennsylvania Conservation Explorer by Nancy Sansoni



In March 2016, the PNDI Environmental Review Tool was replaced with the PA Conservation Explorer. The PA Conservation Explorer includes both conservation planning and PNDI environmental review components, and provides improved access to visible conservation and species habitat information, leading to better project planning and fewer impacts on threatened and endangered species as well as special concern species and resources.

Link to an informational flyer regarding the PA Conservation Explorer:
http://www.naturalheritage.state.pa.us/docs/PNDI_Training_Flyer.pdf
<http://www.naturalheritage.state.pa.us/news.aspx#pacetool2> 

My Day at the Western PA Crops Day – Butler County, PA by Jackie Heini

It was back to basics for farmers (and one soil scientist) at the 2016 Western Pennsylvania Crop Days held in Prospect, Butler County in February. Dr. Doug Beegle and Dr. John Wheeler from Penn State were presenters at this year's conference and reminded all that a good liming program must be maintained on Pennsylvanian soils to boost yields.

As all here are aware, PA soils naturally try to become more acidic though a combination of plant decay, acid rain, and reactions with nitrogen fertilizers. This is particularly complicated in no-till systems where a condition called acid roof can develop within the top inch or two of the epipedon. This condition also reduces the effectiveness of herbicides often used in no-till operations. Lime also helps prevent the toxic effect of aluminum, increases the availability of nutrients, supplies plants with calcium and magnesium, improves soil conditions for microorganisms, and improves soil structure and root growth.

Dr. Beegle recommended using a quality product and reminded us that Pennsylvania law regulates lime specifications. If the product is labeled "fine-sized material," it should meet the state requirements. In general, the finer the product, the larger the surface area and the faster it will react with the soil. But if it is too fine, it can cause bridging problems in the spreader. The formula should have a ratio of between 3 and 4 parts of calcium to 1 part of magnesium. Dr. Beegle also recommends applying lime six months before planting, which means it should be applied in the fall for most Pennsylvania crops.

Dr. Wallace, a weed specialist, also presented information on herbicide resistant weeds at the conference. Most of this presentation was new material for me – I have had little exposure to herbicide issues (so to speak) since graduation and these issues do not typically come up in nutrient management planning for agriculture. Dr. Wallace stressed the need for diversity in crops as a method of control along with scouting, crop rotations, and cover crops in addition to chemical or mechanical controls.

For horseweed (*Equisetum arvense*), Dr. Wallace recommends a mixture of glyphosate and 2-4-D ester to control this difficult weed in addition to a fall cover crop. ▼



**PAPSS welcomes
new professional
member:
Paul D'Agostino**

Farmers are also watching for Palmer amaranth (*Amaranthus palmeri*) and Waterhemp (*Amaranthus rudis*) in the pigweed family. Unfortunately they are not responding to the chemical controls that other states have used to control these weeds. Palmer amaranth is a particular nuisance due to its fast growth, prodigious seed production, and long growing season. These two weeds are believed to have entered the state with feed supplements such as cottonseed, or perhaps on machinery brought in from the south.



(Note: Although Dr. Wallace did not address this, another possible route for all these weeds is on your boots, so keep them clean! In a changing climate, it is more important than ever to remember biosecurity!)

Another invasive weed, giant ragweed, (*Ambrosia trifida*) has appeared in Ohio and could cross the state line soon. Giant ragweed is similar to common ragweed but grows 5 to 10 feet tall. It will be a problem in all row crops if it gets into the state. If you see this in your travels, please inform Penn State Extension or the County Conservation District.

Lastly, at lunch, I had a brief conversation with Dr. Wallace on Atrazine (2-chloro-4-ethylamino-6-isopropyl-amino-s-triazine), another herbicide routinely used in agriculture, which was discussed at the conference and widely used by the farmers in attendance. I pointed out studies that concluded that the herbicide was an endocrine disruptor that caused the feminization of male organisms exposed to this agent, and that egg producing male fish have been found in Pennsylvania rivers. Since Dr. Wallace did not appear to be aware of these studies, I forwarded my citations for his review. (http://scholar.google.com/scholar?hl=en&as_sdt=0,39&as_ylo=2012&q=atrazine+endocrine+disruptor) I look forward to continuing our discussion when we met again.

In conclusion, many soil basics were covered at the conference, and much was learned about noxious weed control and herbicide usage on agricultural operations in Pennsylvania. In order to protect Pennsylvania agriculture, please be sure to practice biosecurity measures on and around farms, and to keep an eye out for and report invasive weeds.



Laser reveals water's secret life in soil

New research may be the “holy grail” to predict water movement through soil

by Susan V. Fisk, Public Relations Director, SSSA

Mar. 30, 2016 - Most of us think nothing of rainfall or where it goes, unless it leads to flooding or landslides. But soil scientists have been studying how water moves across or through soil for decades. Daniel Hirmas, a professor at University of Kansas, and his team may be taking the study of soil hydrology to some exciting new territory. Territory that may help soil scientists manage water resources better. Why is Hirmas trying to predict water movement in soil? “There are a number of reasons why more accurate predictions of water flow is important. Better management of water resources is one,” Hirmas says.



Hirmas uses his MLT scanner at night in a soil pit. Ambient daylight interferes with the detection of the pores. Cooler night temperatures also allow the scanner to stay cool and minimize the evaporation of water from the surface during the scanning procedure. Photo provided by D. Hirmas.

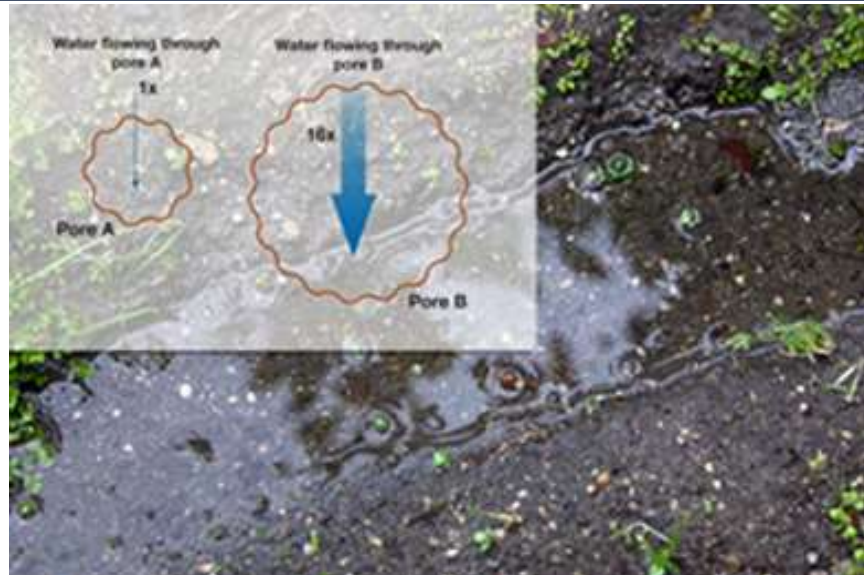
The flow of water in agriculture gives rise to many questions: Can we correctly predicting recharge rates of our aquifers in drought regions? Perhaps we can more efficiently use water for food production or predict how areas will react to climate change. Also, we could have better prediction of water runoff and soil erosion, deposition, and sedimentation of surface water reservoirs. Finally, we could predict how plant nutrients are transported in the soil environment. Soil is made up of particles of sand, silt, and clay. Also within the soil is organic matter – decomposed plant litter, soil microbes, other organisms, and root systems. Air and water make up the rest.

Hirmas has been researching the ease of water movement through soil, called conductivity. This happens in larger empty spaces, macropores, that help move water through the soil.

“The soil structure affects how easily water can be transported through the soil. This is called ‘hydraulic conductivity,’” says Hirmas. “Conductivity is a property of the soil. It affects how quickly water can be transported through the soil. Saturated hydraulic conductivity refers to the conductivity of the soil when the soil is fully saturated with water. In this case, all the soil pores are filled with water.”

Soil pore size is important to conductivity because of some complex geometry and scientific properties. Simply, a soil pore that is twice as large as another will conduct sixteen times the volume of water as the smaller pore in the same amount of time.

Soil scientists call this movement of water preferential flow. Hirmas explains, “Preferential in this case means that a significant portion of the water will be transported through a relatively few number of large pores. That is, a few large pores preferentially transport a majority of the water.” Hirmas has been using a special tool called a multistribe laser triangulation (MLT) scanner. The scanner was originally developed for engineering purposes. Hirmas adapted its use to study soil pores and preferential flow. ▼

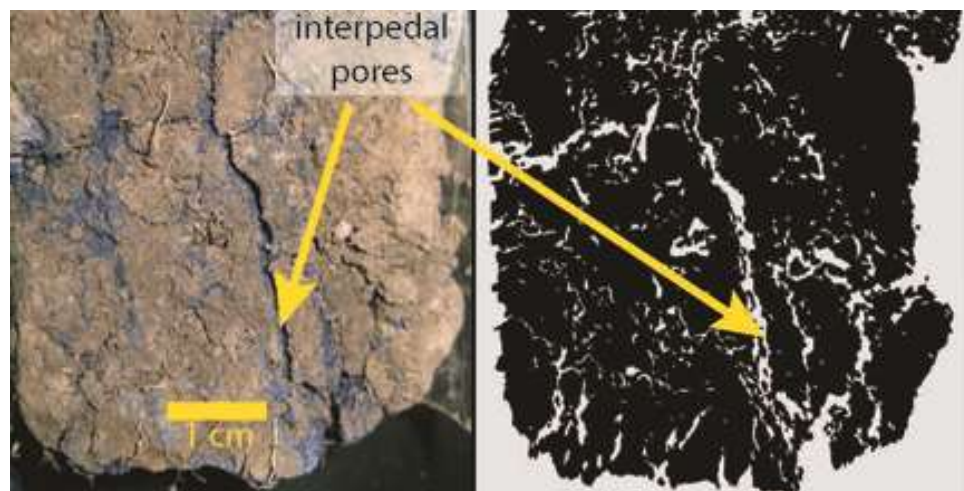


Pore size enlarged for illustration purposes. Soil pore B is twice the size of soil pore A. Water will flow through soil pore B at a volume 16 times greater than that of soil pore A. Illustration credit S. Fisk, P. Scullion.

To determine if the MLT scanner could be used to predict preferential flow, Hirmas designed a study. The research group took saturated soil and allowed blue dye to flow through the sample. An easily identifiable visible pattern developed. The areas of the soil that turned blue showed larger pores. These pores allowed the dyed water to pass through – a preferential flow pattern. Next, they took the same soil sample, and scanned it using MLT. The pattern from the laser significantly matched that of the dye pattern.

The MLT offers advantages to researchers in the field of soil hydrology. “The MLT scanner is better at detecting and mapping the soil macroporosity when the soil is dry versus when it is saturated with water,” Hirmas says. Using math to account for the difference between the two states of the soil, Hirmas can make predictions about water movement.

Hirmas’ work was recently published in *Vadose Zone Journal*. It is the product of teams from University of Kansas and Rutgers University. The University of Kansas General Research Fund, the University of Kansas Kollmorgen Fellowship Fund, and the CGIAR Research Program on Water, Land, and Ecosystems funded the work. The US-KFS Ameriflux site is sponsored by the USDOE.



Left: Soil saturated with water and later placed in dyed water that passed through the soil. The blue color shows where most of the water flowed during the experiment. This indicated that those pores acted as preferential pathways for water movement. Right: The MLT scanner was able to reasonably differentiate between those pathways (light gray) and smaller pores (black). Photo credit D. Hirmas.

Comments or Contributions?

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