

Crop & Soil Update

CROP SCIENCE • SOIL SCIENCE • TURFGRASS SCIENCE

Department of Crop & Soil Sciences Newsletter

2010 Edition

Message from David Sylvia Professor and Head

Greetings from the Department of Crop and Soil Sciences. I am pleased to report that we had a productive year fulfilling our mission of improving the understanding, design, and management of terrestrial ecosystems that are the foundation for food, fiber, and bio-energy production, sports and recreational activities, and environmental quality—see http://cropsoil.psu.edu/pdf/css_strategic_plan.pdf for our current strategic plan.

Over the past year our faculty generated nearly 80 peer reviewed publications and had more than \$3.5 million in external grants and contracts. We participated in three undergraduate majors (Agroecology, Environmental Soil Science, and Turfgrass Science), five graduate majors (Agronomy, Soil Science, Ecology, Plant Biology, and Genetics), and provided extension programs in field crop management, renewable and alternative energy, water resources, and agricultural sustainability.

This has also been a challenging year as the college and department come to grips with a looming budget shortfall. We are carefully considering what we do and how we do it, seeking to find efficiencies where possible and prioritizing our efforts as we move forward. There will be structural changes ahead that will allow us to live within our means. Nonetheless, the good news is that what we do is increasingly being recognized as critical to the future of society so I believe we will emerge

from this process as a strong and vibrant group. Here is just a sampling of some influential reports that cite the importance of our disciplines to meeting real world problems:

New Biology for the 21st Century

(www.nap.edu) stated that research should be organized around solving problems in sustainable food production, ecosystem function and biodiversity, and alternatives to fossil fuels.

National Institute for Food and Agriculture (www.nifa.usda.gov) prioritized problem-specific scientific disciplines that will allow breakthroughs in global food security and hunger, climate change, and sustainable energy.

Science Magazine, Special Issue on Food Security (www.sciencemag.org) noted that mankind must produce 50-100% more food by mid century within the context of increasing environmental constraints. This will require new research that integrates practices in diverse agricultural systems with research in genomics, systems biology, microbiology, and cell biology.

This is what we do and so we look forward with optimism to a bright future!

I trust you enjoy learning more about our activities and accomplishments on the following pages. And, please, if you have any comments or concerns



Dean McPheron and Dr. Sylvia at the CNH equipment test facility in New Holland, PA

about our programs, do not hesitate to contact me. Thank you.

Best regards,

Visit us on the web where an electronic version of this publication is available

<http://cropsoil.psu.edu>

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PENNSTATE



College of Agricultural Sciences

HIGHLIGHTS

Research



Professor **Dave Mortensen** conducts research on ecologically-based methods of weed management with the goal of improving our understanding of just how plant communities provide ecosystem services and disservices to managed lands.

One avenue of research explores how cultural practices like cover cropping and rotational crop diversity contribute to weed suppression while at the same time making crops more tolerant of weed competition. Several landmark papers were published out of his lab over the past year that document that crops managed using organic methods are more tolerant of weed competition than the same crops managed using conventional, non-organic methods. That work indicated that organically managed crops are able to carry surprisingly high weed loads without suffering significant yields. This finding evolved out of collaboration with scientists at Rodale Institute where he and his students had access to a comprehensive dataset from a 27-year-long rotation experiment. Mortensen's group then set out to understand why organically managed crops would be more tolerant of weeds. They recently published a paper in which they argue that existing data supports the hypothesis that soils with a high diversity of crops give rise to a greater diversity of resources in the soil which, in turn, supports a greater diversity and abundance of plants. In a recent 50th year anniversary issue of one international journal, this work was described by the journal editor as a "profound" finding. Work is underway to further understand the dynamics between plant competition and soil quality.

Mortensen's group also spends a great deal of time assessing the factors that control weedy plant dispersal and establishment and how management interacts with these dynamics to further shape landscape level floristic biodiversity. His groups' work on plant dispersal spans windborne seeds that carry herbicide resistance genes to gravity dispersed troublesome invasives. Novel methods of study characterize much of this work. For example, he and his team can be seen flying remote controlled airplanes to sample horseweed seed several hundred feet overhead one day and tracking the movement of invasive plant seed through the forest as it is pushed along by road grading equipment on another.

What these studies share in common is the need to understand how weedy plants move their offspring about and the factors that regulate their ability to germinate and become established.

Mortensen loves to work with students and loves working as the lead or member of teams to address complex problems. Mortensen derives the greatest sense of job satisfaction from the collaborations he's experienced along the way. He is particularly moved by the passion his team of undergraduate and graduate students, staff and post-doctoral scientists have for a more sustainable future. Whether returning to a family farm, starting a CSA or going on to teach and conduct research at a University, Mortensen's confidence in realizing a more sustainable future is lifted by the commitment he sees in the next generation of agroecologists.

Teaching



Instructor **Jeffrey Borger** says that teaching experiences are now more of a learning experience for instructors in comparison to the typical lecture format. Students today have been using technology most of their lives. When

we, as instructors, adapt our teaching methodology and tap into this tech world we can disseminate even more information faster and more completely. Today's student's mindset is "information on demand"; they want it now and in a complete and concise format that fits their lifestyles. Hence, technology is an avenue Jeffrey has chosen to explore.

Mr. Borger currently teaches seven classes in three areas: Turfgrass Science Major, Golf Course Turfgrass Management Program, and World Campus. He has challenged himself to incorporate technology into his teaching methodology. This has been an educational journey with many forks in the path. Some of the technology has been put in place through the university. For example, the use of ANGEL is now almost universal to students and instructors at Penn State. This program is the platform for instructors to process information about classes, communicate with students, and create a productive learning environment outside the walls of the classroom. Obviously, the student body has become proficient with this technology.

Jeffrey says that with this fork in the educational journey chosen, he realizes many advantages lay in wait. He now records his "lectures". He is not sure that lecture is even the best word to describe what happens in today's learning environment. Nevertheless, he records and posts all his classroom meetings with a program called "Camtasia". He now has his entire classroom meetings recorded and posted so students have access to the previous semester's rendering of classes (he does not post the current semester's classroom meetings in order to keep student coming to class to find out what is new).

In the classroom, he employs technologies such as the Personal Response System (PRS), nicknamed "clickers", which he finds can enhance the classroom experience. The clickers can be viewed as a paperless system to provide attendance records, low level quizzing of concepts, or in class subject matter reinforcement. Today the PRS software is seamless to use for both the students and instructors. It integrates with PowerPoint and the student inputs can be uploaded to the ANGEL grade book. Jeffrey finds that less vocal students will participate as there is a certain amount of anonymity with PRS.

High level testing can be conducted at the eTesting center through the ANGEL program. This facility provides an electronic version of the test that can be graded, and the grades posted to the ANGEL grade book if so desired. Student examinations through eTesting can now incorporate video, pictures, and graphs. No longer is a test just a piece of paper with questions, it can be much more.

One of Mr. Borger's classes gives people from outside the walls of the classroom the opportunity to participate in the learning objectives. How so? His students are required to give presentations of some type of turfgrass experience, typically an internship. The oral presentation is recorded via Camtasia and graded in the classroom via PRS by the student's peers. Subsequently, the oral presentation is processed and posted in ANGEL. Now, the student's supervisor of this turfgrass experience can watch the video and post a grade that goes to the grade book in ANGEL!

Can instruction and learning be an amalgamation of subject matter and technology? Jeffrey says "yes", but technology is only one of many tools available. His view of technology in the classroom is simple: an innovative teaching methodology creates innovative students.

HIGHLIGHTS

Extension



Greg Roth is spearheading a program in renewable energy extension and research. He states that biofuels continue to grow in importance in Pennsylvania with over 100 million gallons/year capacity now each for both biodiesel and ethanol, and a

growing market for biomass for heat and power applications. Pennsylvania has an opportunity to replace some of its dependency on fuel oil for heating purposes of over 600 million gallons/year with biomass. This is creating opportunities for crop and biomass producers throughout the state by providing some support for commodity prices and an opportunity to utilize some of the many acres of marginal land while maintaining our commitment to sustainable land and water use.

A focus of his program has been to develop lower cost biomass feedstocks to replace petroleum products used for heating. **Marvin Hall** and **Rick Stehouwer** conduct biomass feedstock studies and demonstration areas on reclaimed strip mines. They have also established field trials on our research farms of switchgrass and miscanthus to assess these crops, and are participating in a national study to assess the potential of corn stover for bioenergy. Another crop they are looking at is forage sorghum. It is very high yielding (6.5 T/acre), provides some crop rotation flexibility, and can be utilized as a biomass or sugar based feedstock for advanced biofuel production.

Greg is working with collaborators to help develop markets for biomass based community or institutional heating systems. One example is **Ed Johnstonbaugh**, an extension educator in Westmoreland County, who is helping a thermal plant operator develop a co-firing demonstration with switchgrass to provide heat to a state prison.

Another area of interest is development of oil seed feedstock for biodiesel production using alternative oilseed crops such as canola and camelina to supplement soybean oil, and trying to incorporate the potential of value added food grade oil or high omega-3 feed meals as part of the business model. **Heather Karsten** is leading a study to investigate how these oilseeds can be incorporated in dairy farm cropping systems.

This group has developed a web page and newsletter to keep everyone updated on renewable energy initiatives—please visit us at <http://extension.psu.edu/energy>.

Student Profiles



As a PhD candidate, **Matt Ryan** appreciates the diversity of expertise and the applied experience that he has gained. In addition to interacting with a broad array of ecologists as a member of the Intercollege Degree Program in

Ecology, Matt has also collaborated with several departmental faculty on a variety of projects. Learning outside of the classroom is one of the best things about his experience at Penn State.

Matt's research focuses on overcoming weed management challenges in organic cropping systems. He worked closely with his advisors **David Mortensen** and **William Curran** on evaluating the use of cover crops for weed suppression. In addition to weed management research, he also modeled energy usage and greenhouse gases in different cropping systems for his thesis.

Matt has attended numerous conferences both nationally and internationally. He has been engaged with professional societies and was the graduate student representative for the Northeastern Weed Science Society. He also collaborated with **Lammert Bastiaans** at Wageningen University in the Netherlands as part of an international exchange program. When he is not working on research, Matt enjoys outreach to farmers at field days and extension activities.



As an undergraduate student in Agroecology, **Alicia Spangler** values the education and work experience she has received through the Department of Crop and Soil Sciences. She states that the professors were both helpful and insight-

ful, and she appreciated their efforts in teaching.

In addition to her classroom studies, Alicia spent a summer working for the Department

at the Agronomy Research Farm. The hands on experience she gained at the research farm reinforced her classroom lectures. The internship allowed Alicia to have a better understanding and appreciation of the various agricultural innovations that are present in today's industry.

Alicia was very active in the Agronomy Club. In her time as treasurer and president, she encouraged students to become active members in the club. She also participated in multiple competitions and attended several conferences with the club. Alicia looks forward to continuing her education at Michigan State University to pursue a master's degree in Crop and Soil Sciences. Alicia says that the education acquired at Penn State University has provided a foundation for her success.

Agronomy Club

The Agronomy Club had another successful educational and competitive year. In June, **Alicia Spangler**, **Cory Chelko**, and **Curtis Frederick** placed second in the 2009 American Forage and Grassland Council Quiz Bowl held in Grand Rapids, MI. This competition challenges the students to understand plant growth,



Justin Dillon honored as Outstanding Advisor

Comments...

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DEPARTMENT HEAD: David Sylvia
EDITOR: Linda Spangler

ACTIVITIES

management, and storage/ensiling techniques in animal-based agricultural systems. In November, nine members of the club participated in the Quiz Bowl Competition, Poster Contest, and attended sessions at the ASA-CSSA-SSSA meeting in Pittsburgh. This quiz bowl competition encompasses agronomic practices, cropping systems, as well as soil principles that influence all forms of agriculture. In April, **Alicia Spangler, Cameron Shaffer, Cory Chelko, Kelly Patches, and Jessica Bussard** placed 8th out of 24 teams in the NACTA (North American Colleges and Teachers of Agriculture) Crops Competition held by Redlands Community College at El Reno, OK. This 4-hr competition challenged all the students' knowledge gained at Penn State as well as a new set of weeds, crops, cropping systems, and soils that were learned during weekly study sessions.

In March, the Agronomy Club toured the Mason-Dixon Farm located near Gettysburg. This forage-based dairy operation has learned to utilize the newest in technology to help maximize profits. From storage for over 150,000 tons of ensiled forages to robotic milking parlors, this family owned and operated farm was an education in both agronomic and economic principles.

Along with studying for classes and competitions, the Agronomy Club maintained its social calendar including the annual fall hayride and line dance as well as the end of spring semester barbeque held at the Agronomy Farm. Fundraising activities included Ornamental Popcorn Sales, Blue and White Popcorn, and Agronomy Club Apparel.

Club advisor, **Justin Dillon**, was selected as the 2009-2010 Ag Student Council's Advisor of the Year! Justin states that this recognition is much appreciated, and must be shared with **Kate Butler** and **Scott Harkcom** as well.

The Agronomy Club wishes the best to graduating seniors **Alicia Spangler, Cameron Shaffer, Jeremiah Zimmerman, Hunter Stambaugh, Tim Artman, and Rick Jones**. They would also like to recognize **Ryan Bates**, a graduate student who helped to mentor the students, as he starts his career with Pioneer Hi-bred based in Wisconsin.

Soil Judging Team

The **Soil Judging Team** participated in the North East Regional Collegiate Soil Judging

Contest this past fall, hosted by Ohio State. The team consisted of returning team member **Austin Young** and new comers **Ben Moorhead, Ryan Cornelius, and Clay Walker**, and was coached by **Patrick Drohan**. Penn State finished 8 out of 13 teams with **Ben**



Moorhead placing 15 out of 49 competitors. The students gained valuable hands-on experience and had the opportunity to study soils of Ohio derived largely from glacial till. They enjoyed interactions with NRCS professionals and students from other northeastern universities while improving their field skills. Highlights included seeing several Mollisols, soils with varying drainage conditions, and an impromptu hay ride. In Fall 2010, Penn State will be hosting the contest.

Weed Science Team



2009 Weed Science Team included, (1 to r, bottom) Franklin Egan, Renae DiPierre, Nelson DeBarros, Alicia Spangler; (top) Ben Crockett, Ryan Bates, Dwight Lingenfelter (coach), and Cory Chelko.

The Weed Science Team traveled to the Midwest and defended its title! The 2009 collegiate weed science contest was a combined venture between the Northeastern Weed Science Society (NEWSS) and North Central Weed Science Society (NCWSS). For the first

time, it brought together the two societies to compete in a combined challenge. The contest was hosted by ABG Ag Services near Indianapolis, IN. All total, 31 undergraduates and 54 graduates competed from 11 universities. The NEWSS universities represented at the contest were Cornell, Guelph, Penn State, Tennessee, and Virginia Tech. The NCWSS universities represented at the contest were Illinois, Kansas State, Michigan State, Missouri, Nebraska, and Ohio State. Penn State's teams included graduate students (**Ryan Bates, Nelson DeBarros, Franklin Egan, and Ben Crockett**) and undergraduate students (**Cory Chelko, Alicia Spangler, and Renae DiPierre**). Students participated in four contest segments including: 1) weed identification; 2) sprayer application technology; 3) diagnosis and identification of herbicides by symptoms; and 4) problem solving and recommendations in a field setting (role-play event). The goal of the contest is to include "real-world" weed management scenarios in agronomy, horticulture, turf, and natural areas for experiential learning with a twist of fun. Of the 14 graduate teams in the contest, not only did Penn State claim 1st place in the Northeast region for the second consecutive year but it also won the coveted "Golden Hoe" trophy which was awarded to the Grand Champion team of the entire contest. Individually, **Nelson DeBarros** won 2nd place and **Ryan Bates** took 3rd place of all NEWSS contestants across the four events. Many thanks to **Dwight Lingenfelter** who coached the team in preparation for this practical and exciting challenge.

Turf Club

The **Penn State Turf Club** had another exciting year for the 60+ students who participated in its activities including the Cutter Cup, the Collegiate Turf Bowl of the Sports Turf Managers' Association (STMA) and the Golf Course Superintendents Association of America (GCSAA), Dance Marathon, and numerous group-organized events.

Taking advantage of their competitive nature, students in the club brought home a series of accolades and financial winnings. Their first victory came in October with a 4-1 win over Michigan State University to retain the Cutter Cup. This year's 18-hole event was hosted by alumnus **Frank Dobie** and The Sharon Club. Not wanting to slow down, the students proceeded to perform exceptionally well in the 2010 STMA and GCSAA Turf Bowls. In

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January, students placed 1st in both the 4-year and 2-year division of the SMTA Student Challenge. In addition to bringing home the trophies, each winning team brought with them a check for \$4,000 which will fund a practical learning lab at Penn State. At the GCSAA Turf Bowl in San Diego, student teams finished in 5th and 9th place and brought home \$1000 to support the Turf Club.

Perhaps one of the greatest accomplishments of the year was the students' participation in the Penn State Dance Marathon (www.thon.org). Each year, students from Penn State join forces to help raise money in support of Pediatric Cancer through The Four Diamonds Fund. This is the largest student-run philanthropy in the world and the total raised in 2010 was a mind-staggering \$7.8 million dollars. The Turf Club contributed a small portion of the total, but the excitement generated will surely spill over into future fund-raising efforts in support of this worthwhile cause.

In addition to all of the hard work and effort the students put forward this year, they also managed to organize several guests speakers, two barbecues for its members, the turf club luncheon at the Golf Turf Conference, and even launched the new turf club website. For more information on the club or to read about many of the stories listed above, please visit the club at www.pstaturfclub.blogspot.com.



Participants in the 2009 Cutter Cup competition between Penn State and Michigan State.

Mark your calendar for the next Alumni Symposium on **October 1, 2010** when **Joel Hunter** will provide his perspectives on agricultural practice in Pennsylvania.

Nominations for the 2011 Outstanding Alumni Award are due January 15, 2011. Nomination forms are available at http://cropsoil.psu.edu/Outstanding_Alumni-Form.pdf.

Alumni Symposium Notes



The 2009 Alumni Symposium was held on October 30, 2009. Our outstanding alumnus and guest speaker was **Joel Myers** (BS, 1965; MS 1967). Mr. Myers worked for USDA-NRCS for 41 years, serving as State Agronomist from 1988 until his retirement in 2006. He continues his professional contributions by serving as technical coordinator for the Pennsylvania No-Till Alliance. Joel was recognized for his accomplishments related to the promotion and implementation of no-till planting systems and his deep practical and theoretical knowledge of soil conservation plan development.

The 2010 Outstanding Alumni Award recipient is **Joel Hunter** (BS, 1984; MS 1988). Joel is an Extension Educator for Crawford County and is recognized as a tireless innovator who passionately engages farmers and crop advisors to adopt profitable and sustainable management practices. He is known for his work related to soil management practices and soil compaction. His efforts have impacted forage production, dairy cow nutrition and productivity, adoption of no-till practices in three states, and most recently made it possible for a biodiesel plant and local agricultural producers to mutually accomplish their business objectives. Joel has a passion for farmer adoption of no-till practices, literally turning NW Pennsylvania into a "no-till machine", and has brought his clients to a new level of understanding of soil conservation and soil health/productivity.

Faculty Updates



Armen Kemanian joined the Department in 2010 as an assistant Professor of Production Systems and Modeling. Armen develops and applies comprehensive agricultural and natural systems simulation models with the goal of improving productivity and environmental stewardship.

Mary Ann Brunns received an International Professorship for Africa Award from the American Society of Microbiology.

Doug Beegle received the Environment and Natural Resources Institute (ENRI) Career Award and was designated a University Distinguished Professor.

Marvin Hall was elected a Fellow of the Crop Science Society of America.

Jason Kaye received the ENRI Early Career Award.

Sridhar Komarneni was appointed a Guest Professor at the China University of Petroleum and an Adjunct Professor of Civil & Environmental Engineering at Penn State.

David Mortensen received the Collage of Agricultural Sciences Alex and Jessie C. Black Award for Excellence in Research.

Andy McNitt received the Collage of Agricultural Sciences Community of Teaching Excellence Award and was inducted into the Academy of Teaching Excellence.

Jan Pruss, Instructor in Agronomy, retired in June 2009

Tom Watschke received the Fred Grau Turfgrass Science Award from the Crop Science Society of America

Staff Updates

Justin Dillon received the Agriculture Student Council Outstanding Student Organization Advisor Award for his work with the Agronomy Club.

Madeline Laubach received the Department Outstanding Staff Award in 2009.

Dwight Lingenfelter received the Outstanding Educator Award from the NE Weed Science Society.



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NEWS BRIEF

Student Updates

Mike Castellano, Ph.D. in Soil Science received the ENRI Graduate Student Award.

Jing Dai, Ph.D. in Agronomy, received the Department Outstanding Service Award in 2009.

Matt Ryan, Ph.D. in Ecology, received the Outstanding Graduate Student Award from the NE Weed Science Society, the Penn State Graduate Symposium Outreach Award, and the Penn State Mott Meritorious Graduate Student Award in Crop Science.

Alicia Spangler, BS in Agroecology, received the Penn State Outstanding Senior Award by the Students of Agronomy, Soils, and Environmental Sciences (SASES), an undergraduate student organization of the Tri-Societies.

EXCELLENCE FUND

To maintain the quality of our programs we depend on the support of our alumni and friends. The Department has an **Excellence Fund** to facilitate important projects that would otherwise be impossible. Examples of uses for gift monies include: helping deserving students present research results at professional meetings, facilitating development of teaching materials, and aiding graduate students in conducting research in unfunded areas by providing funding for research supplies and equipment.

If you wish to donate to this cause please make your check payable to Penn State (with a notation in the memo section of the check "Crop and Soil Sciences Excellence Fund") and send to: Office of Development, College of Agricultural Sciences, The Pennsylvania State University, 233 Agricultural Administration Bldg., University Park, PA 16802, or you may donate online at:

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