

PLSC Productivity

NEWS FROM THE DEPARTMENT OF
PLANT & SOIL SCIENCES



UNIVERSITY OF DELAWARE
AGRICULTURE &
NATURAL RESOURCES

Chair's Corner

Season's Greetings everyone! All is beginning to get quiet in Townsend Hall as it's time to grade final exams and projects and look forward to spending the holidays with family and friends!

We enjoyed our annual departmental Holiday celebration on December 14. Our event was a bit bittersweet as we celebrated the career of Nancy Gregory who is retiring as Director of our Plant Diagnostic Clinic after a 26-year career with us. Nancy started working at UD in 1993 in the area of plant pathology, rising from part-time, miscellaneous wage to supplemental faculty. The UD Plant Diagnostic Clinic was formally established in 2004; she continually assessed plant samples brought in showing signs or symptoms of disease. In 2006, Nancy began her ascent up the Cooperative Extension ladder, starting as an Extension Associate II and landing as an Extension Agent III in 2014. In 2012, she picked up the Master Gardener training and outreach on ornamental plant pathology, as well as field crops outreach. Nancy and Dr. Tom Evans collaborated extensively, with Nancy serving on graduate committees and as a co-author on a number of papers out of the Evans Lab. As is evident, Nancy contributed greatly to all three missions of PLSC, CANR, and Cooperative Extension! Her leadership in plant pathology throughout Delaware will be missed.



In last December's issue I made four New Year's resolutions, so let's check in and see how I (we) did.

Resolution 1: Keep supporting our new major in Landscape Architecture. ✓ We have grown to 52 undergraduates; hired Dr. Eric Bardenhagen into the program; had a successful May 2019 accreditation visit; revised and expanded the curriculum so that students will now graduate with a Bachelor's of Landscape Architecture (BLA); won a Gold Medal for their educational display at the Philadelphia Flower Show!; expanded the Coastal Resilience Design Studio to include training of graduate students; and hosted another successful Landscape Architecture Symposium at the Delaware Center for Horticulture.

Resolution 2: Grow undergraduate enrollment by offering a new major in Sustainable Food Systems (SFDS) where students will "learn-by-doing" on our "350-acre classroom." ✓ First enrollment for SFDS was this fall, and without any ability for spring-admitted students to choose this major, we now have five students. Dr. Gordon Johnson developed and taught PLSC145, Introduction to Sustainable Food Systems, to a full class of 20 students. Part-time student recruiter Paula Annesi has been very busy giving talks at area high schools, intersecting with university admissions, and working with CANR Communications on a digital marketing campaign. At the last UD CANR recruiting event in November, we had nine families visit with a SFDS interest. I am working with Dr. Brandon McFadden in UD's Department of Applied Economics & Statistics to co-advise a master's student who will be the lead organizer for a new organic vegetable distribution program to UD faculty/staff/students and select community charities out of the UD Fresh to You garden. Via this program, students will gain detailed experience in the food system chain, from marketing to production to packaging and delivery. Finally, we are very close to hiring a new assistant professor of Controlled Environment Horticulture who will be the lead advisor for SFDS students and round out the program by teaching and doing applied research with hydroponics/aspects of indoor vertical farming.

Resolution 3: Support our award-winning faculty and their innovative research. ✓ Please browse the rest of this newsletter to read about recent faculty successes! There will be more to come as faculty move into brand new research labs in the Biopharmaceutical Innovation Center on the STAR campus (spring 2020) and Worrilow Hall (fall 2020).

Resolution 4: Keep extending our science-based solutions to stakeholders in the Mid-Atlantic and beyond. ✓ I continue to be impressed with the quality programs that our extension faculty and staff lead, from summer field days at Carvel and the UD Botanic Gardens, to the Mid-Atlantic Crop Management School and nutrient management certification classes, to Master Gardener and Master Naturalist trainings, to DNLA turf and landscape continuing education - all are well-organized and well-attended! Next up, come see our Extension Specialists speak on their latest research at Delaware Agriculture Week (January 13-16, 2020) at the Delaware State Fairgrounds in Harrington.

Have a great Holiday Season and let's look forward to an extra day of productivity in Leap Year 2020!

Honorifics

Excellence at many levels!



Six University of Delaware professors are among the most influential scientists in the world, according to the 2019 Highly Cited Researchers list released by the Web of Science Group. PLSC's own Dr. Rodrigo Vargas, associate professor of ecosystem ecology and environmental change, is one of the six who are ranked in the top 1% cited by peers. His research focuses on how biophysical factors regulate carbon and water dynamics in terrestrial ecosystems. Specifically, he studies soil-plant-atmosphere interactions to understand the response of terrestrial ecosystems to management, extreme events, and global environmental change. On the PLSC faculty since 2012, Dr. Vargas is particularly honored to be named in the "cross-field" category, which recognizes the interdisciplinary nature of his research. He said, "I am inspired by the fact that I can learn how nature works. Writing is a way to synthesize and share what we have learned to advance the science and apply new knowledge." Many of Dr. Vargas' highly cited papers are a result of teamwork with scientists across the world, demonstrating the importance of data sharing and interdisciplinary collaborations.

Dr. Gordon Johnson, assistant professor and Extension Specialist, Fruits & Vegetables, earned the 2019 Northeast Region Excellence in Extension Award for his applied research and impactful education work with vegetable and fruit crops. Dr. Johnson, who completed his Ph.D. in PLSC in 2011, is known for placing a high priority on producer needs. Throughout Delaware and the Mid-Atlantic, his research and extension program provides evidence-based, scientific answers to grower questions and problems. In addition to numerous variety trials with an array of crops, his research includes everything from hollow heart disorder in watermelon to decommissioning poultry houses — considering both protecting the environment and future production. Dr. Johnson's approach to his extension work is multi-faceted, encompassing: identifying and addressing needs of the agricultural community and rural residents, and developing programming to address those needs; providing science-based information on potential new opportunities for agriculture in Delaware with applied research; encouraging entrepreneurship in agriculture and commercial horticulture; and helping the industry understand and address environmental and health-related regulatory concerns by providing education and assistance in those areas. He says, "I take pride in making an impact in teaching adults and in providing critical information in a timely manner to the industry."



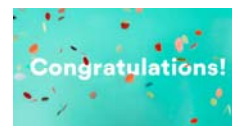
At the November 2019 ASA, CSSA & SSSA Annual Meeting in San Antonio, TX, two PLSC graduate students excelled in communicating their research, and thus earned awards (which included cash)!



Lauren Mosesso, advised by Dr. Amy Shober, 1st place oral presentation in the Nutrients and Environmental Quality Division for "Using Stable Water Isotopes to Characterize Pathways of Subsurface Phosphorus Loss in a Ditchdrained Field."



Abby Evans, advised by Dr. Angelia Seyfferth, 2nd place poster presentation in the Wetlands Division for "Using Iron and Manganese-Coated IRIS Films to Quantify Soil Redox Potential in Rice Paddies under Alternate Wetting and Drying (AWD) Management."



Faculty Highlights

"Live-cell, Quantum-Dot-Based Tracking of Plant and Microbial Extracellular Vesicles"

Armed with \$2.25 million in new funding from the U.S. Department of Energy (DOE) under its Biomolecular Characterization and Imaging Science Program/New Bioimaging Approaches for Bioenergy awards, a UD research team led by PLSC associate professor Dr. Jeffrey Caplan is studying how cells use microscopic packages filled with information to communicate within plants, and between plants and pathogens, in hopes of unlocking new approaches to developing crops that are resilient to disease and other stresses. The work could also play a role in reengineering plants and microbes to improve biofuel production. In particular, the research will focus on studying the interactions between sorghum, a drought-resistant cereal grain that is used in food, livestock feed and ethanol, and one of its most serious pathogens, *Colletotrichum sublinoleum*. The project is one of six selected nationally by DOE to develop new approaches to microscopic imaging of plants and microbes, with the goal of advancing bioenergy research. Caplan Lab research associate Kun Huang is also an investigator in this interdisciplinary project.

The following grants were also awarded this fall to our talented PLSC faculty.

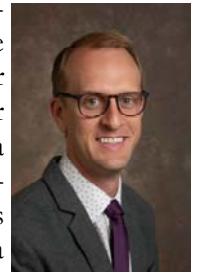
<u>Principal Investigator</u>	<u>Title/Topic</u>	<u>Sponsor</u>
Dr. Harsh Bais	Microbial Inoculants for the Improvement of Alfalfa Crop Productivity and Health	USDA
Dr. Amy Shober	Investigating How Soil Health Practices Impact Subsurface Legacy Phosphorus Loss from Soil on the Delmarva Peninsula	USDA
Dr. Rodrigo Vargas	Carbon Analysis of Understory and Overstory Fluxes in Changing Urban and Natural Systems	USDA
Dr. Susan Barton	Enhancing Delaware Highways – Establishment of Desirable Vegetation on Medians and Road-sides	Delaware Department of Transportation

Faculty Spotlight

*Kyle Davis—Assistant Professor, Geography
PLSC Joint Appointment New Professor Profile*

Could you give a little background on yourself?

I did my undergrad at UD and got a B.S. in biochemistry. While I was here, I realized that I enjoyed research but also wanted opportunities to be in nature and do research in a variety of places. That's where I started to get interested in environmental science and sustainable development topics. I took one year and did an internship at the University of Ibadan in Nigeria where they were establishing a Center for Sustainable Development. I came back for graduate school to do my Ph.D. at the University of Virginia in the Department of Environmental Sciences, and that's where I started to get more focused on environmental science and questions related to agriculture, food security, and natural resource use – topics that have become my main focus. I did three years of postdoctoral work at the Earth Institute and Data Science Institute at Columbia University. And now I'm back at UD, so it's come full circle.



What are your plans at UD?

My main focus is on sustainable food systems and identifying ways to make food production more nutritious, more environmentally friendly, and better adapted to climate change. I was hired through UD's Data Science Institute cluster hire, and given my broad research interests, the opportunity to be part of such an interdisciplinary endeavor was really exciting for me. In addition to my research on sustainable food systems, I am also interested in global environmental change and how it influences human migration, the effects of foreign land investments on the environment and local communities in targeted countries, and the ways that resources and disruptions travel through international food trade networks.

In a recently published study, my team and I show that India can sustainably enhance its food supply and improve its environmental footprint by reducing its reliance on rice and planting more nutritious and less environmentally damaging crops such as sorghum, finger millet and pearl millet. While the reliance on rice during the Green Revolution succeeded in feeding a large population, it also pushed out a lot of traditional cereals that are still consumed in India but to a lesser extent. These traditional cereals also tend to be less sensitive to variability in temperature and precipitation so they're more resilient to climate variability. There are also many places where the yields of these cereals are comparable to or higher than rice. For all of those reasons, we wanted to look at whether there were opportunities to replace some rice production with some of these traditional cereals without reducing food supply in the country. This was an India-focused study, but it makes a broader statement about sustainable agriculture and framing agriculture as a solution to multiple global challenges like malnutrition, water scarcity, and greenhouse gas. You often see agriculture presented as causing environmental problems, when in fact agriculture is the solution to many challenges. Our study shows there are opportunities to realize a number of different benefits through more thoughtful agricultural practices, and it shows that a single intervention can change multiple outcomes for the better.

Ready – Set – Grow!

From UDBG Associate Director Valann Budischak: “If you happen to be standing in the lobby of the Townsend Hall Commons and look outside due west, what do you see? Not the hollies... Unfortunately, the hollies had become too large. Besides permitting more light into the lobby, their removal opens the vista to the gardens that engage faculty and students in what’s happening in the landscape. Having said that, removing a plant



that is in a collection requires more than just a chainsaw. We had to acquire a new *Ilex × aquipernyi* 'Meschick' DRAGON LADY plant and accession it prior to removing the others. Thanks to some elbow grease by UDBG’s Andrew Adams and 2019 summer intern Connor Armstrong, as well as funding by UDBG and PLSC, the bed now is home to *Fothergilla × intermedia* ‘Mt. Airy’, *Viburnum nudum* ‘Winterthur’, and a *Magnolia virginiana*, all native plants. Future plans include the addition of a groundcover and bulbs for multiple seasons of interest.”



Would any CANR alums from the late-1970’s like to ‘fess up to the “artwork” uncovered when the steel beams of WorriLOW Hall were exposed during this phase of the renovation? Reading “HELP US!!!!” (inside top right of full-size photo), along with other sentiments, gave all who passed by new meaning to the phrase “the writing on the wall”; perhaps some readers can relate?!?

Behind the plywood panels, rebuilding is happening in earnest. A large hole in the ground at the foot of the plywood is being filled with the foundation for a glassed-in staircase. This will be a welcome addition as the former steel-and-concrete connecting walkway between WorriLOW Hall and Townsend Hall has been missed since it needed to be taken down several years ago.



We encourage alumni to send us news to keep us informed! A new job, a promotion, a personal or professional award... they’re all accomplishments we want to know! Email a note or a press release, including your graduation year, to mpautler@udel.edu

We are seeking to showcase alumni stories on a bulletin board in the PLSC corridor of Townsend Hall. We would like to highlight the career paths of our former students to current and prospective students and their families. If you are interested in providing a 250-words or less description of your career path from your PLSC education to your current job, along with a photo showing you at said job, please email mpautler@udel.edu for more details.

Back Porch Business

Please consider making a DONATION to the PLSC department to support, for example: student travel to research meetings and professional development events or to fund stipends for undergraduate summer research and/or Extension scholars. One hundred percent of your gifts will impact the program you wish to support. You may make your gift to the University, the College of Agriculture and Natural Resources or another program by visiting www.udel.edu/development/makeagift.htm **However, designating the gift specifically to our department (PLSC) ensures that it will be used in direct support of PLSC students and faculty. Be sure to complete the “Other designation – indicate a specific purpose below” section and input “Dept. of Plant and Soil Sciences”.** If you have any questions or require assistance to complete any of these forms, please contact Dan Sarkissian, Director of Development, College of Agriculture and Natural Resources at 302-831-4595 or djs@udel.edu

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