

Station News

The Connecticut Agricultural Experiment Station
Volume 11 Issue 5 May 2021



Liliac Bush at CAES in New Haven

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CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875



DR. JASON C. WHITE held a ZOOM call with Professor Azam Noori of Merrimack College to discuss a collaborative NSF proposal (April 1); participated in the monthly Laboratory Preparedness Advisory Committee teleconference call with the CT Department of Public Health (April 5); along with staff from the Department of Consumer Protection Drug Control Division visited CTPharma in Rocky Hill for a tour of the facilities and a discussion of programs (April 6); participated by Teams in the bi-weekly Rapid Response Team meeting hosted by the CT Department of Consumer Protection Foods Division (April 7, 21); participated in the weekly Center for Sustainable Nanotechnology (CSN) All-Hands calls (April 7, 21, 28); participated in an organizational ZOOM call for planning the annual FDA Laboratory Flexible Funding Model (LFFM) meeting (April 7, 21, 28); participated in the Society of Toxicology “FDA Food Safety Colloquium: Integrated Approaches to Testing and Assessment: The Future of Regulatory Toxicology Assessment” webcast (April 8); with **DR. BRIAN EITZER**, participated in a ZOOM call with collaborators at the Harvard T.H. Chan School of Public Health to discuss ongoing experiments (April 9); participated in the monthly FDA LFFM WebEx calls for the Human & Animal Food and Food Defense cooperative agreement programs (April 12); with **DR. NUBIA ZUVERZA-MENA**, participated in a ZOOM call with Dr. Ileana Vera Reyes of Centro de Investigación en Química Aplicada (CIQA) in Mexico to discuss a research visit at CAES (April 13); hosted the monthly CSN Nanochem-Plant working group ZOOM call (April 13); with collaborators at the University of Minnesota, participated in a ZOOM call with representatives of Bayer Crop Science to discuss interests in nano-enabled agriculture (April 13); gave a presentation at the American Chemical Society Spring 2021 Meeting in the AGFD Presidential Symposium “Sustainability: Advances and Applications” entitled “Nanoscale Micronutrients as a Sustainable Approach to Manage Crop Disease” (April 14); hosted the quarterly CAES Board of Control meeting held in New Haven (April 14); gave an invited lecture entitled “Nanotechnology and Agriculture: Applications and Implications” to the University of Nevada Reno Department of Civil and Environmental Engineering (April 14); participated by ZOOM in a Farmland Preservation Advisory Board Meeting (April 16, 22); was interviewed by Mr. Jack Richards of the University of Pittsburgh on topics related to nano-enabled agriculture (April 16); held a ZOOM call with collaborators at Johns Hopkins University to discuss collaborative research (April 16); along with **DR. WADE ELMER**, participated in the annual staff evaluation for CSN researchers (April 16); participated in a ZOOM call with collaborators at the University of Nevada Reno to discuss a joint USDA proposal (April 19); participated in a Teams meeting for the Annual DAS Statewide Leasing and Property Transfer Overview (April 20); participated in the monthly CSN All-Faculty ZOOM meeting (April 20); hosted the annual meeting of the Experiment Station Associates on ZOOM and gave a Director’s update on CAES activities (April 21); met with Dr. Richard Jaynes of Broken Arrow Nursery (April 22); with **DR. JOSEPH PIGNATELLO** and **MR. MICHAEL LAST**, participated in a Teams call with staff of the Attorney General’s office to discuss recent issues with the National Science Foundation (April 22); participated in the National Nanotechnology Initiative (NNI) Public NanoEHS Webinar - What We Know about NanoEHS: Environment (April 27); with **DR. YI WANG**, participated by ZOOM in a monthly project progress meeting with collaborators at the Harvard T.H. Chan School of Public Health and Nanyang Technological University (April 27); hosted a meeting of the CAES nanotechnology group (April 29); hosted the monthly CAES J-1 Visa recipient meeting (April 30); held a ZOOM called with representatives of the Northeast Regional Association of Experiment Station Directors (NERA) to discuss recent issues with the National Science Foundation (April 30); and participated in a ZOOM call with colleagues at the Arizona Department of Public Health, Ohio Department of Agriculture, and Virginia Division of Consolidated Laboratory Services to discuss a presentation at the upcoming annual FDA LFFM meeting (April 30).

ANALYTICAL CHEMISTRY

DR. CHRISTINA ROBB had two research data review meetings with the FDA Forensic Chemistry Center (FCC) (April 2, 30); attended several executive committee board meetings for the Eastern Analytical Symposium (EAS) (April 5, 12, 19, 26); met with the Editor-in-Chief of the Journal of Liquid Chromatography on the subject of analytical review (April 23); and assisted in judging the Sigma Xi Student Research Conference at Quinnipiac University (April 26).

DR. BRIAN EITZER, with **MS. TERRI ARSENAULT**, had a Teams call with the New Jersey Department of Health, Environmental and Chemical Laboratory Services unit to assist them with their use of the Food Emergency Response Network's analytical methods of analysis (April 7); participated in the monthly call of the North American Chemical Residue Workshop's Organizing Committee (April 8); the monthly call of the APHL Cannabis Community of Practice Call (April 8); the biweekly call of the Connecticut Rapid Response Team (April 9, 21); the monthly FDA Laboratory Flexible Funding Model Calls (April 12); and attended the 2021 Integrated Foodborne Outbreak Response and Management (InFORM) Regional Meeting by remote access (April 26-29).

MS. AYESHA NISAR is a doctoral scholar from the Institute of Agricultural Sciences, University of the Punjab, Lahore, Pakistan, where she is pursuing a PhD in Plant Pathology. She has been working on the synthesis and characterization of nanoparticles using bacterial cell-free growth cultures and evaluating the nanoparticles for application in crop disease control. Ms. Nisar will be a visiting research fellow at the Department of Analytical Chemistry for the next 6 months under the auspices of IRSIP (International Research Support Initiative Program). At DAC, she will characterize biogenically synthesized nanoparticles and assess their effects on crops using molecular tools.



ENTOMOLOGY

DR. KIRBY C. STAFFORD III presented a talk via ZOOM on ticks and control of blacklegged and lone star ticks to the Old Saybrook Garden Club (April 5); participated in an Asian longhorn tick group call (April 12); spoke on ticks, tick control, and tick-borne diseases for the Town of Woodbridge Commission on Use of Publicly Owned Properties (12 attendees) (April 26); was interviewed about tick populations in Connecticut by Robert Miller, Danbury News-Times (April 27); was interviewed about tick activity this spring by Anthony Terzi, Fox 61 News (April 29); and participated in an IACUC administrators group call (April 30).

MS. TIA M. BLEVINS participated in a virtual Post Entry Quarantine (PEQ) training with the USDA APHIS PPQ Professional Development Center focused on procedures required to process plants arriving into the United States, which need to be quarantined before they can be sold by our Connecticut nurseries (April 7); participated in a Beech Leaf Disease (BLD) Workshop, which discussed history, survey, and monitoring efforts as well as detection, cause, and treatment of BLD (April 15); participated in Aerial Survey, Aviation Safety & Management (AS2M), a virtual course organized by USDA USFS Forest Health Protection to review risk management, air space coordination, aircraft instrumentation, flight following, and mishaps of 2020 (April 20-22); and participated in a Region 9 Preseason Aerial Survey meeting presented by the USDA USFS Durham Field Office to review flight plans for the upcoming forest health aerial survey and to prepare the mapping system for data collection (April 28).

MR. MARK H. CREIGHTON attended a virtual New England Apiary Inspectors conference and discussed the upcoming season and shared bordering state Health Inspection data (April 2); gave a virtual talk on the History of Beekeeping in Connecticut to the Drum Hill Chapter of the Daughters of the American Revolution (25 attendees) (April 15); and held a mini field day at the Montessori School of Greater Hartford in New Hartford, where 25 students met him at the school apiary, opened the hives, and reviewed basic bee anatomy and function (April 26).

DR. MEGAN LINSKE participated in the doctoral dissertation proposal defense of Rebecca Bingham, University of Memphis, entitled “The Search for Lyme Disease Prioritizing Areas for Wildlife Vaccine Deployment” as a graduate committee member (April 21); became President of the Northeast Section of the Wildlife Society (NETWS) (April 22); and hosted the annual NETWS members meeting as Section President and Chairperson of the Workshop Committee (April 22).

DR. GALE E. RIDGE was interviewed about cicadas and Brood X by Margaret Burnett of Gardenmaker, LLC (April 8); and was interviewed about spiders by Robert Miller of the Danbury News-Times (April 13).

DR. VICTORIA L. SMITH completed online Aerial Survey Aviation Safety and Management, including coursework A-100, Basic Aviation Safety, A-200, Mishap Review, and A-205, Risk Management, sponsored by the US Forest Service (20 participants) (April 20-22); and participated in the Durham Field Office Aerial Survey Pre-season Meeting, held online, sponsored by the US Forest Service (April 28).

DR. KIMBERLY A. STONER presented “Planting for the Bees’ Needs” to the Menunkatuck Audubon Society via ZOOM (25 attendees) (April 13); was interviewed about “No Mow May” and converting lawns to pollinator habitat by Eric Parker of WFSB television (April 22) (aired on April 25); presented “Planting for the Bees’ Needs” to the White Memorial Conservation Center, hosted by Jamie Fischer (33 attendees) (April 27); and was interviewed about planting for pollinators by Edward Stannard of the New Haven Register (April 30).

MS. TRACY ZARRILLO was interviewed about the importance of pollinators in eastern CT, specifically addressing the status and variety of bees in the area by Ms. Fran Kefalas from The Last Green Valley organization for their member magazine called the National Heritage Corridor (April 1); and attended and gave an oral presentation entitled "The Bee Fauna of an Atlantic Coastal Plain Tidal Marsh Community in Southern New England, USA" at the virtual New England Natural History Conference (26 attendees) (April 16).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO gave a lecture entitled "Factors Influencing the Biological and Physical Availability of Chemicals in Contact with Soil Particles" to the 2021 virtual Annual Meeting of the Connecticut Association of Wetland Scientists Association (approx. 75 attendees) (April 8); met virtually with collaborators on a project funded by USDA dealing with treatment of fumigant vent streams (April 12); and met virtually with collaborators from Vilanova University, Pacific Northwest National Laboratory, and Oregon Health and Science University on an SERDP grant project (April 26).

DR. PHILIP ARMSTRONG spoke about the public health implications of pesticide applications to reduce mosquito populations and West Nile virus risk to students in the Environmental Studies Program at Connecticut College (4 attendees) (April 21); and was interviewed about the release of genetically-modified mosquitoes as a strategy to reduce mosquito populations in the wild by WTIC (April 28).

MS. ANGELA BRANSFIELD participated in a CAES Health and Safety Committee meeting via ZOOM (March 22); and participated in BioRAFT's EHS Community Connection webinar Designing Safety Training That Sticks (March 25).

MR. GREGORY BUGBEE spoke on "Soil Testing and Invasive Aquatic Plants" to an earth science class from Southern Connecticut State University (10 attendees) (April 27).

DR. JOSEPH R. McMILLAN presented a virtual seminar entitled "Mosquito & Disease Ecology in CT" to the UConn New Haven Master Gardener's 2021 Spring cohort (approx. 10 attendees) (March 16).

DR. GOUDARZ MOLAEI was interviewed by the Republican American <https://www.rep-am.com/local/localnews/2021/04/24/turns-return-to-state-with-a-vengeance/> (April 24); was interviewed by FOX61 on the tick activity season and forecast (April 26); was interviewed by The Hartford Courant, <https://www.courant.com/news/connecticut/hc-news-ct-bad-year-for-ticks-20210429-wzy74kwi6bflxbj7s4gy3zoe4a-story.html> (April 27); presented the virtual talk, "Climate Change and Accelerating Invasion Potentials of Mosquito and Tick Vectors of Human Diseases" to Y's Men, a community group in Meriden (26 attendees) (April 27); was interviewed by NEWS 8 <https://www.wtnh.com/news/animals-and-wildlife/scientists-warn-of-bad-ticks-season-ahead-for-ct/> (April 30); was interviewed by the Connecticut Post, <https://www.ctpost.com/news/article/Tick-tick-boom-Disease-carrying-insects-on-the-16145577.php> (April 30); and was interviewed by the Newtown Bee, on tick activity this year and measures to prevent tick exposures (April 30).

DR. SARA NASON gave a seminar entitled "Chemical Characterization of Primary Sewage Sludge Collected During the COVID-19 Pandemic: Trends in Pharmaceuticals, Drugs, and Other Molecules of Interest" for the CAES Seminar Series (approx. 75 attendees) (April 28); attended a meeting of the Benchmarking and Publications for Non-Targeted Analysis working group (April 20); met with John Jemison, University of Maine, to discuss phytoremediation research (April 21); and judged posters for the Quinnipiac Chapter Sigma Xi Student Research Conference (April 26).

MR. JOHN SHEPARD spoke on “Mosquitos and How to Avoid Being Bitten” to members of the Church Street Elementary School (Hamden) community via ZOOM (April 22) (14 households attended).

DR. CHARLES VOSSBRINCK judged the Quinnipiac University Chapter of Sigma Xi Student Research Conference (numerous graduate and undergraduate students participated) (April 19).

DR. REBECCA JOHNSON judged undergraduate presentations for the [virtual Quinnipiac Chapter Sigma Xi Student Research Conference](#) (April 26).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD was interviewed about current forest research by Mary O'Neill for the Great Mountain Newsletter (April 9); administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board (April 14); participated in a Forest Ecosystem Monitoring Cooperative State Coordinators Meeting (April 16); participated in a Yankee Division - Society of American Foresters Forest Carbon Outreach committee meeting call (April 26); presented a webinar entitled “The Roots of CT’s Forest and Its Future” for the CAES Experiment Station Associates (April 21); participated in a New England Society of American Foresters Silviculture Working Group field meeting call (April 28); and participated in the Forest Ecosystem Monitoring Cooperative ecosystem monitoring proposal review committee (April 29).

DR. SUSANNA KERIÖ presented a webinar entitled “Urban Tree Health in Connecticut” for Quinnipiac University’s Sigma Xi Society’s meeting (42 attendees) (April 7); assisted in administering the arborist exam to arborist candidates at Lockwood Farm (17 attendees) (April 14); presented a webinar on urban forest health for the CAES Experiment Station Associates (April 21); and met virtually with Dr. Nathan Havill (USFS, Hamden) to discuss potential collaboration (April 21).

DR. ABIGAIL A. MAYNARD discussed artichoke culture at Vaiuso Farm in Branford (April 19).

DR. SCOTT C. WILLIAMS, as a sitting advisory member, participated in a biweekly meeting of the National Wildlife Tick-Borne Disease Program (April 1); became a member of Cornell University Master’s student Joseph Poggi’s graduate committee (April 5); participated in a conference call for the Editorial Advisory Board for The Wildlife Society’s publication, The Wildlife Professional (April 7); as a sitting advisory member, participated in the biweekly meeting of the National Wildlife Tick-Borne Disease Program (April 15); as outgoing past-president, participated in the Northeast Section of The Wildlife Society’s annual membership meeting (April 22); and participated in the virtual Northeast Fish and Wildlife Conference (April 26-27).

MR. JOSEPH P. BARSKY met with David Yih (Wesleyan University) to discuss monitoring macrofungi on Old Series Plots in Portland (April 8); met with soil scientists from USDA-NRCS and UConn to participate in evaluation of field infiltration techniques on cutting method study (April 20); and gave a presentation entitled “Native Trees and Shrubs” to members of the Federated Garden Clubs of Connecticut as a component of their Gardening School (40 attendees) (April 28).

DR. WADE ELMER attended a WebEx meeting as a member of the UConn Search Committee for Department Head of Plant Science and Landscape Architecture (PSLA) (9 members) (April 12); with **DRS. JASON WHITE, YU SHEN,** and **CARLOS TAMEZ,** attended, via ZOOM, the Nano Plant meeting for the Center for Sustainable Nanotechnology (11 attendees) (April 13); with **DR. JASON WHITE** and **MR. MICHAEL LAST,** attended the Board of Control meeting held in New Haven (April 14); participated as a member of the UConn search committee for the PSFL Department Head via WebEx in the interviews of candidates; with **DRS. CHRISTIAN DIMKPA, CARLOS TAMEZ,** and **ISHAQ ADISA,** visited with Dr. Ben Hsiao of Stony Brook University New York about nano fertilizers (April 15); attended, via Teams, the CT Management Advisory Council Monthly Meeting (April 21); participated, via ZOOM, in the American Phytopathological Society Foundation meeting (April 21); participated as a member of the UConn search committee for the PSFL Department Head via WebEx in the interviews of Dr. Mengmeng Gu (April 27-28); and attended the NIFA POW reporting webinar (April 28).

MS. REGAN HUNTLEY served as a judge for the Quinnipiac Chapter of the Sigma Xi student research poster session via ZOOM for five student poster presentations (April 26).

DR. YONGHAO LI presented “Backyard Small Fruit 101” for the Avon Free Public Library Adult Program via ZOOM (16 adults) (April 12); presented “Tree Disease Updates” for the Tree Wardens Association of Connecticut Education Program via ZOOM (18 adults) (April 13); and presented “Backyard Composting” for the Windsor Public Library - Wilson Branch Adult Program via ZOOM (16 adults) (April 17).

DR. ROBERT E. MARRA presented a talk, via ZOOM, entitled “Beech Leaf Disease: Updates for Connecticut” for the CT Tree Wardens Association (25 participants) (April 13); presented a talk, via Adobe Connect, entitled “Beech Leaf Disease in Connecticut: Survey Results and Research” for the USFS Beech Leaf Disease Workshop (350 participants) (April 15); participated in, via MS Teams, the Forest Ecosystem Monitoring Cooperative State Coordinators meeting (25 participants) (April 16); participated as a judge in the Sigma Xi Quinnipiac Chapter Poster Competition (April 26); presented a talk, via ZOOM, entitled “The Impact of Climate Change and Weather Extremes on Tree Diseases” for the Riverside Garden Club (30 participants) (April 27); and participated in, via MS Teams, reviewing competitive research proposals for the Forest Ecosystem Monitoring Cooperative (20 participants) (April 29).

DR. RAVIKUMAR PATEL assisted, via ZOOM, as a judge for the 2021 Sigma Xi Quinnipiac Chapter Virtual Student Research Conference for six graduate students (April 26).

DR. TEJA SHIDORE won the Best Poster Award in the Professional Researcher Category for her poster on “Nanoparticle Aided dsRNA Delivery System for Tackling Plant Viruses,” which was presented at the 2021 Ohio State University Plant Sciences Symposium (March 26); and gave a guest lecture entitled “Nano Enabled Delivery of RNA Molecules for Tackling Plant Viruses” for the class “Molecular Biotechnology” at the University of New Haven (12 students, 2 faculty members) (April 14).

DR. NEIL SCHULTES served as an organizing judge for the 2021 Sigma Xi Quinnipiac Chapter Virtual Student Research Conference (50 participants) (April 26).

DR. STEPHEN J. TAERUM presented “Ecology and Evolution of Symbiotic Single Cell Eukaryotes” to the Penn State Microbiome Center (70 adults) (March 26).

DR. QUAN ZENG attended a ZOOM conference call with Dr. Juan Díaz-Colunga and Dr. Alvaro Sanchez from Yale University to discuss research planning (April 16); visited Blue Hills Orchard in Wallingford and established a field experiment (April 23); hosted Dr. Juan

Díaz-Colunga and performed collaborative research on flower microbiomes at Lockwood Farm (April 28, 30); and met, via ZOOM, with Dr. Jon Clements of the University of Massachusetts to discuss research collaboration (April 30).

VALLEY LABORATORY

DR. JAMES LAMONDIA conducted a boxwood blight training program including boxwood blight biology and management updates for Prides Corner Farms (8 attendees) (April 6); participated in a national Potato Cyst Nematode Research Conference call to report research progress (12 attendees) (April 13); conducted oral exams for candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in Hamden (April 14); and was interviewed about the Tobacco Station/Valley Laboratory and its role in tobacco production in relation to the 60th anniversary of the movie “Parrish” by Jenny Hawran, Howard Marsh, and Jamil Ahmed of Windsor Community Television and James Daniels of the CT Valley Tobacco Museum (April 28).

DEPARTMENTAL RESEARCH UPDATES APRIL 2021

Adeel, M., T. Farooq, **Jason C. White**, J. L. Gardea-Torresdey, and Y. Rui. 2021. COVID-19 and nanoscience in the developing world: Rapid detection and remediation in wastewater. *Nanomaterials* 11:991.

Abstract- Given the known presence of SARS-Cov-2 in wastewater, stemming disease spread in global regions where untreated effluent in the environment is common will experience additional pressure. A combination of nanotechnology with wastewater-based epidemiology and artificial intelligence could be deployed for community level wastewater virus detection and remediation.

Barry, A., S. K. Ooi, A. M. Helton, **Blaire Steven**, C. S. Elphick, and B. A. Lawrence. 2021. Vegetation zonation drives salt marsh soil carbon mineralization and microbial communities. *Estuaries and Coasts* <https://doi.org/10.1007/s12237-021-00943-0>.

Abstract- Coastal marshes are important blue carbon reservoirs, but it is unclear how vegetation shifts associated with tidal restoration and sea level rise alter soil microbial respiration rates and bacterial community composition. Within 20 Connecticut salt marshes (10 without tidal restrictions, 10 tidally restored), we sampled three vegetation zones dominated by *Spartina alterniflora* (short-form, <30 cm tall), *S. patens*, and *Phragmites australis* to estimate microbial respiration rates (SIR, substrate-induced respiration; carbon mineralization), root zone bacterial 16S rRNA genes, and a suite of plant and soil characteristics. Carbon density was greater in unrestricted marshes than tidally restored marshes and was the only parameter that differed among sites with varying restoration histories. We observed strong differences among vegetation zones, with vegetation being a top predictor of both SIR and carbon mineralization. Electrical conductivity (EC) was also a top predictor for SIR, and we observed strong, positive correlations between EC and both metrics of microbial respiration, with elevated rates in more frequently inundated *S. alterniflora* than *P. australis* zones. We also observed distinct root zone microbial communities associated with vegetation zones, with greater abundance of sulfate-reducing bacteria in *Spartina* spp. zones. Our findings suggest that dominant salt marsh vegetation zones are useful indicators of hydrologic conditions and could be used to estimate microbial respiration rates; however, it is still unclear whether differences in microbial respiration and community composition among vegetation zones are driven by plant community, environmental conditions, or their interactions.

Kodati, Srikanth, A. O. Adesemoye, G. Y. Yuen, J. D. Volesky, and S. E. Everhart. 2021. Origin of agricultural plant pathogens: Diversity and pathogenicity of Rhizoctonia fungi associated with native prairie grasses in the Sandhills of Nebraska. *PLOS ONE* 16(4), e0249335.

Abstract- The Sandhills of Nebraska is a complex ecosystem, covering 50,000 km² in central and western Nebraska and predominantly of virgin grassland. Grasslands are

the most widespread vegetation in the U.S. and once dominated regions are currently cultivated croplands, so it stands to reason that some of the current plant pathogens of cultivated crops originated from grasslands, particularly soilborne plant pathogens. The anamorphic genus *Rhizoctonia* includes genetically diverse organisms that are known to be necrotrophic fungal pathogens, saprophytes, mycorrhiza of orchids, and biocontrol agents. This study aimed to evaluate the diversity of *Rhizoctonia* spp. on four native grasses in the Sandhills of Nebraska and determine pathogenicity to native grasses and soybean. In 2016 and 2017, a total of 84 samples were collected from 11 sites in the Sandhills, located in eight counties of Nebraska. The samples included soil and symptomatic roots from the four dominant native grasses: sand bluestem, little bluestem, prairie sandreed, and needle-and-thread. Obtained were 17 *Rhizoctonia*-like isolates identified, including five isolates of binucleate *Rhizoctonia* AG-F; two isolates each from binucleate *Rhizoctonia* AG-B, AG-C, and AG-K, *Rhizoctonia solani* AGs: AG-3, and AG-4; one isolate of binucleate *Rhizoctonia* AG-L, and one isolate of *R. zeae*. Disease severity was assessed for representative isolates of each AG in a greenhouse assay using sand bluestem, needle-and-thread, and soybean; prairie sandreed and little bluestem were unable to germinate under artificial conditions. On native grasses, all but two isolates were either mildly aggressive (causing 5-21% disease severity) or aggressive (21-35% disease severity). Among those, three isolates were cross-pathogenic on soybean, with *R. solani* AG-4 shown to be highly aggressive (86% disease severity). Thus, it is presumed that *Rhizoctonia* spp. are native to the sandhills grasslands and an emerging pathogen of crops cultivated may have survived in the soil and originate from grasslands.

Liu, W., Lindsay Triplett, and X. L. Chen. 2021. Emerging roles of posttranslational modifications in plant pathogenic fungi and bacteria. *Annual Review of Phytopathology*, Vol. 59, <https://doi.org/10.1146/annurev-phyto-021320-010948>

Abstract- Posttranslational modifications (PTMs) play crucial roles in regulating protein function and thereby control many cellular processes and biological phenotypes in both eukaryotes and prokaryotes. Several recent studies illustrate how plant fungal and bacterial pathogens use these PTMs to facilitate development, stress response, and host infection. In this review, we discuss PTMs that have key roles in the biological and infection processes of plant-pathogenic fungi and bacteria. The emerging roles of PTMs during pathogen-plant interactions are highlighted. We also summarize traditional tools and emerging proteomics approaches for PTM research. These discoveries open new avenues for investigating the fundamental infection mechanisms of plant pathogens and the discovery of novel strategies for plant disease control.

Niu, Zhenfu, Kai Zhang, De-Wei Li, Jian Ma, and Rafael F. Castañeda-Ruiz. 2021. *Distobactrodesmium* gen. nov. to accommodate *Bactrodesmium rhamii* and notes on *Bactrodesmium*. *Mycotaxon* 136(1):141-158. <https://doi.org/10.5248/136.141>.

Abstract- A new genus *Distobactrodesmium* is proposed to accommodate *Bactrodesmium rhamii*, characterized by sporodochial conidiomata that produce distoseptate, brown to dark brown phragmoconidia through monoblastic conidiogenous cells. Notes and illustrations on *Bactrodesmium* species are provided.

Patel, Ravikumar R., P. P. Kandel, E. Traverso, K. L. Hockett, and Lindsay R. Triplett. 2021. *Pseudomonas syringae* pv. *phaseolicola* uses distinct modes of stationary phase persistence to survive bacteriocin and streptomycin treatments. *mBio* 12: 10.1128/mBio.00161-21.

Abstract- Antimicrobial treatment of bacteria often results in a small population of surviving tolerant cells, or persisters, that may contribute to recurrent infection. Antibiotic persisters are metabolically dormant, but the basis of their persistence in the presence of membrane-disrupting biological compounds is less well understood. We previously found that the model plant pathogen *Pseudomonas syringae* pv. *phaseolicola* 1448A (*Pph*) exhibits persistence to tailocin, a membrane-disrupting biocontrol compound with potential for sustainable disease control. Here, we compared physiological traits associated with persistence to tailocin and to the antibiotic streptomycin and established that both treatments leave similar frequencies of persisters. Microscopic profiling of treated populations revealed that while tailocin rapidly permeabilizes most cells, streptomycin treatment results in a heterogeneous population in the redox and membrane permeability state. Intact cells were sorted into three fractions according to metabolic activity, as indicated by a redox-sensing reporter dye. Streptomycin persisters were cultured from the

fraction associated with the lowest metabolic activity, but tailocin persisters were cultured from a fraction associated with an active metabolic signal. Cells from culturable fractions were able to infect host plants, while the nonculturable fractions were not. Tailocin and streptomycin were effective in eliminating all persisters when applied sequentially, in addition to eliminating cells in other viable states. This study identifies distinct metabolic states associated with antibiotic persistence, tailocin persistence, and loss of virulence and demonstrates that tailocin is highly effective in eliminating dormant cells.

Si, Yuan-Zhi, Guan-Qun Jin, **De-Wei Li**, Jian-Wei Sun, and Li-Hua Zhu. 2021. Leaf spot of *Sapindus mukorossi* caused by *Diaporthe biconispora* in China. *Australasian Plant Pathology* 50:193-202. <https://doi.org/10.1007/s13313-020-00762-0>

Abstract- Leaf spot of soapberry, *Sapindus mukorossi* is a disease new to China. The disease significantly reduces not only the plant's ornamental value but also its medicinal properties. Identification of pathogens timely assists preventing and controlling this disease. In July 2019, foliage of soapberry on the campus of Nanjing Forestry University, China, was infected by the disease, and the disease incidence was 96%. Symptomatic leaves were collected from three infected trees. After isolating the fungus, its pathogenicity was tested to satisfy Koch's postulates, and the culture was identified based on its morphological features and multi-gene phylogenetic analyses. Isolates WHZ3 and YB1 from the diseased leaves were identified as *Diaporthe biconispora*, and the identification was confirmed using morphological features and multi-gene phylogenetic analyses derived from an internal transcribed spacer (ITS), elongation factor 1-alpha (*EF1-a*), beta-tubulin (*B-tub*), histone H3 (*HIS*), and calmodulin (*CAL*). Koch's postulates proved the fungus to be a pathogen on soapberry. *Diaporthe biconispora* was previously reported as an endophyte in plants of the *Citrus* group, but was shown to be pathogenic to soapberry causing leaf spots.

Steven, Blaire, M. Phillips, J. Belnap, L. V. Gallegos-Graves, C. R. Kuske, and S. C. Reed. 2021. Resistance, resilience, and recovery of dryland soil bacterial communities across multiple disturbances. *Frontiers in Microbiology*; <https://doi.org/10.3389/fmicb.2021.648455>.

Abstract- Dryland ecosystems are sensitive to perturbations and generally slow to recover post disturbance. The microorganisms residing in dryland soils are especially important as they contribute to soil structure and nutrient cycling. Disturbance can have particularly strong effects on dryland soil structure and function, yet the natural resistance and recovery of the microbial components of dryland soils has not been well documented. In this study, the recovery of surface soil bacterial communities from multiple physical and environmental disturbances is assessed. Samples were collected from three field sites in the vicinity of Moab, UT, United States, 6 to 7 years after physical and climate disturbance manipulations had been terminated, allowing for the assessment of community recovery. Additionally, samples were collected in a transect that included three habitat patches: the canopy zone soils under the dominant shrubs, the interspace soils that are colonized by biological soil crusts, and edge soils at the plot borders. Field site and habitat patch were significant factors structuring the bacterial communities, illustrating that sites and habitats harbored unique soil microbiomes. Across the different sites and disturbance treatments, there was evidence of significant bacterial community recovery, as bacterial biomass and diversity were not significantly different than control plots. There was, however, a small number of 16S rRNA gene amplicon sequence variants that distinguished particular treatments, suggesting that legacy effects of the disturbances still remained. Taken together, these data suggest that dryland bacterial communities may possess a previously unappreciated potential to recover within years of the original disturbance.

Yang, Y., J. Wang, **Zhengyang Wang**, Y. Gao, and **Joseph J. Pignatello**. Abatement of polycyclic aromatic hydrocarbon residues in biochars by thermal oxidation. *Environmental Science & Technology Letters*; online April 22; doi: 10.1021/acs.estlett.1c00167

Abstract- Biochars often contain residues of polycyclic aromatic hydrocarbons (PAHs) that can pose risks to exposed organisms and ultimately to human health. This study shows that thermal oxidation of an anoxically-produced (500°C) softwood biochar using brief post-pyrolysis thermal oxidation in air caused a substantial decline in solvent-extractable PAHs (up to 85% of Tot-PAH) and a sharp decrease (up to 82%) in the EPA Relative Potency Factor. Optimum conditions were 400°C for 20 min. An alternative approach of including 1% O₂ in the nitrogen flow stream during pyrolysis was less effective. PAH loss is attributed to combustion processes as opposed to outgassing. Oxidation of PAHs occurs in the gas and adsorbed phases and is promoted by pore reaming of biochar micropores and

mesopores during thermal oxidation, which facilitates diffusive exchange of O₂, reactive oxygen species, and PAH molecules. Oxidation also may be promoted by self-heating of the biochar body, which increases the local temperature. The results indicate that a short post-pyrolysis thermal oxidation step can reduce the risks associated with PAH residues in biochar.

JOURNAL ARTICLES APPROVED APRIL 2021

Aulakh, Jatinder S. Evaluation of herbicides and application rates for mugwort (*Artemisia vulgaris* L.) management in cool season forage grasses. *CAES Bulletin*

Brackney, Doug, Jacquelyn LaReau, and R. Smith. Frequency matters: How successive feeding episodes by blood-feeding insect vectors influences disease transmission. *PLOS Pathogens*

Cowles, Richard S. Sustainable management of armored scales. *The Real Tree Line*

Drummond, F. A., J. Lund, and **Brian Eitzer.** Honey bee health in Maine wild blueberry production. *Insects*

Hiskes, Rose, and **Richard S. Cowles.** Pesticide guide toward integrated insect management for Connecticut Christmas tree growers. *CAES Bulletin* (Web Only)

Hong, C., M. L. Daughtrey, D. G. Luster, C. Hall, J. E. Weiland, F. Baysal-Gurel, F. Gouker, P. Kong, J. A. Crouch, James A. LaMondia, J. W. Pscheidt, L. Santamaria, N. Shishkoff, and **K. L. Snover-Clift.** Boxwood Blight Insight Group (BBIG): An International Consortium to Protect a Major Evergreen Shrub Crop and Iconic Landscape Plant. *Phytopathology* (Abstract)

Li, Yonghao. Phytophthora needle cast - An emerging foliar disease on Douglas fir. *The Real Tree Line*

Maynard, Abigail A., and **Jeffrey S. Ward.** Butternut squash trials 2017-2019. *Station Bulletin*

Sharma, Rohit, Duncan Cozens, Philip Armstrong, and **Doug Brackney.** Vector competence of human-biting ticks *Ixodes scapularis*, *Amblyomma americanum* and *Dermacentor variabilis* for Powassan virus. *Emerging Infectious Diseases*

Taerum, Stephen J., J. Micciulla, G. Corso, Blaire Steven, D. J. Gage, and **Lindsay R. Triplett.** A dual sequence and culture-based survey of maize rhizosphere protists reveals dominant, plant-enriched, and culturable community members. *Environmental Microbiology*

Madeleine Dumas a technician in the **da Silva Laboratory** at CAES, has been awarded The Cornell Graduate School Sage Fellowship and was selected to join the Plant Pathology Graduate Program at Cornell University. This competitive fellowship is selected based on academic achievement, leadership abilities, and the potential of the student to become an emerging talent in their field of study.

“Madeleine is an enthusiastic researcher who shows great initiative and creativeness in pursuit of her study goals,” said **Dr. Washington da Silva**, Assistant Scientist at CAES. “Her enthusiasm and success in science are exceptionally relevant considering the adversities she overcame growing up the daughter of a subsistence farmer in rural Connecticut. She is the first in her multigenerational family of farmers to go to college and move beyond the confines of small holder farming.”



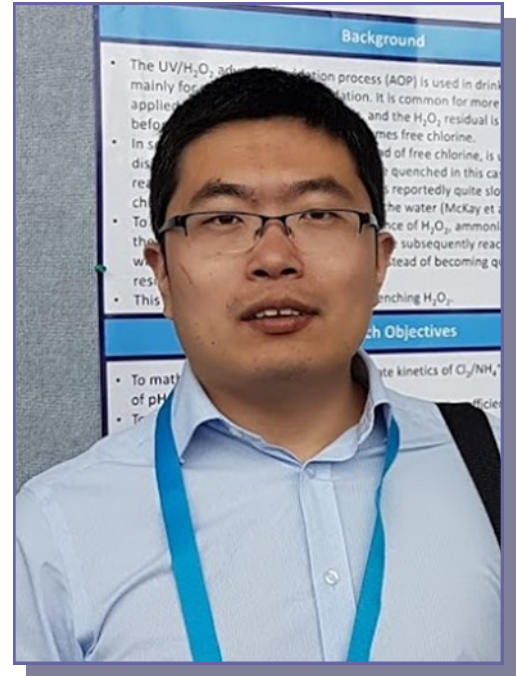
Madeleine earned her bachelor’s degree in Sustainable Plant and Soil Systems from the University of Connecticut (UConn) in May 2020. Guided by a lifelong passion for nature and a strong interest in fundamental research, Madeleine volunteered to assist in Dr. Washington da Silva’s plant virus laboratory at the CAES in New Haven after her Junior year of college to acquire preliminary experience with molecular biology research. After graduation from UConn, Madeleine was hired as the primary technician for the end of a four-year research project on the presence of grapevine viruses in New England. She quickly acquired various molecular laboratory techniques as well as computational biology skills. Her exceptional ambition, willingness to learn, and experience at CAES led her to creating a competitive application for Ph.D. programs. This coming summer, she will be joining Dr. Clare Casteel’s laboratory at Cornell University to pursue her Ph.D. in plant virus proteomics.

Teja Shidore, a postdoc in the **da Silva Laboratory**, received the Best Poster Award in the Professional Researcher category at The Ohio State University Plant Sciences Symposium. Her winning poster was titled “Nanoparticle Aided dsRNA Delivery System for Tackling Plant Viruses.” Kudos to Teja!

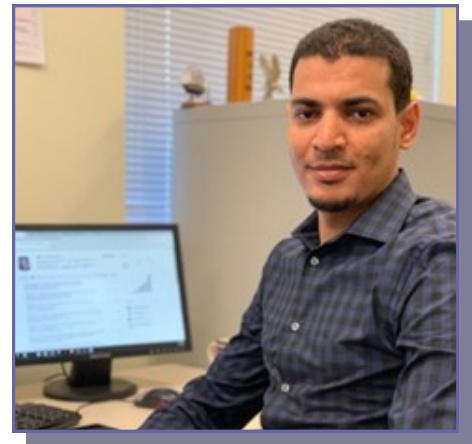


NEW STAFF, STUDENTS, AND VOLUNTEERS APRIL 2021

Dr. Chengjin Wang started his Postdoctoral Scientist job in Dr. Pignatello's group in January 2021. His research is focused on removing sulfuranyl fluoride from spent fumigation exhausts using adsorptive/absorptive and hydrolysis processes. Before joining CAES, Dr. Wang worked on advanced oxidation processes in water treatment as a postdoctoral fellow in the University of Toronto. He received his Bachelor's and Master's degrees from Tongji University in China and his PhD degree from the University of Alberta, Canada. His office is in Room 305, Slate Laboratory, and he can be found there or in the laboratories on the third floor.



Dr. Wael Abdelraheem started April 9 in Joe Pignatello's laboratory as a Postdoctoral Research Scientist. He obtained his PhD from the University of Cincinnati in Environmental Engineering. Wael will be working with an interdisciplinary team of scientists on a project funded by the DoD's Strategic Environmental Research and Development Program (SERDP) to optimize carbon amendments for simultaneous adsorption and transformation of legacy and insensitive high explosives in water and soil. He will be working in the third-floor laboratories of Slate, especially Room 308.





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