

Station News

The Connecticut Agricultural Experiment Station
Volume 13 Issue 9 | September 2023



The mission of The Connecticut Agricultural Experiment Station is to develop, advance, and disseminate scientific knowledge, improve agricultural productivity and environmental quality, protect plants, and enhance human health and well-being through research for the benefit of Connecticut residents and the nation. Seeking solutions across a variety of disciplines for the benefit of urban, suburban, and rural communities, Station scientists remain committed to "Putting Science to Work for Society", a motto as relevant today as it was at our founding in 1875.



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The Connecticut Agricultural Experiment Station

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ADMINISTRATION

JASON C. WHITE, PH.D., along with **SARA THOMAS, PH.D.**, **SARA NASON, PH.D.**, and **NUBIA ZUVERZA-MENA** participated in a Zoom call with collaborators from the University of Minnesota and Yale University to discuss progress on a joint NIEHS grant on PFAS phytoremediation (August 1); along with **CHRISTIAN DIMKPA, PH.D.**, and **SHITAL VAIDYA, PH.D.**, hosted a Zoom call with collaborators at Johns Hopkins University to discuss progress on a joint USDA nanoscale phosphorus project (August 1); participated remotely in the Ph.D. dissertation defense of Eric Ostovich of the University of Wisconsin Milwaukee (Dr. White was on his committee) (August 1); met by Zoom with scientists at the environmental engineering firm AECOM to discuss PFAS remediation (August 3); met by Zoom with colleagues at the University of Minnesota and Katana Agriscience to discuss collaborative work (August 3, 18, & 21); met by Zoom with collaborators at the NSF Center for Sustainable Nanotechnology (CSN) to initiate a SWOT analysis of programs and projects (August 4); along with **YI WANG, PH.D.**, participated in a Zoom call with collaborators at the University of Massachusetts to discuss progress on a joint USDA proposal on nanoscale sulfur (August 4); along with **YI WANG, PH.D.**, and **CHAOYI DENG, PH.D.**, gave a tour of Lockwood farm to two Yale graduate students (August 4); along with **SARA NASON, PH.D.**, participated in a Teams meeting for the PFAS testing Laboratory Capacity and Capability discussion group (August 8); hosted the monthly CSN Nanochemistry-Plant working group call (August 8); participated in a Zoom call with the Sand County Foundation to discuss the nomination of Terry Jones for the 2023 Leopold Conservation Award (August 8); participated by Zoom in a planning meeting for the NIEHS SRP R01 Annual Meeting (August 8 & 31); participated in the Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA) Multistate Activities Committee meeting (August 9); along with **SHITAL VAIDYA, PH.D.**, travelled to Knoxville, TN, to participate in the 2023 USDA/NIFA Nanotechnology Grantees Conference and gave two platform presentations titled “Biodegradable Polymer-Nanoparticle Composites for Controlled Release and Targeted Delivery of Phosphorus During Plant Growth” and “Nanoscale Sulfur for Plant Nutrition, Disease Suppression, and Food Safety” (August 9-11); participated in the monthly CSN Faculty meeting (August 10); travelled to American Chemical Society (ACS) Fall 2023 Conference, San Francisco, CA, and gave a platform presentation titled “Nanoscale soil amendments to decrease toxic metal accumulation in and toxicity to food crops” (August 13-17); along with **YI WANG, PH.D.**, and **CHAOYI DENG, PH.D.**, met with colleagues at the University of Hamburg (Germany) to discuss collaborative work (August 15 & 31); met with an undergraduate student from Post University that is interested in doing a research internship at CAES (August 18); participated in a Zoom call with colleagues from Auburn University and Johns Hopkins University to discuss a collaborative grant proposal (August 18 & 21); along with **NUBIA ZUVERZA-MENA, PH.D.**, participated in a Zoom call with colleagues at Rutgers University and the New Jersey Institute of Technology to discuss progress on a joint USDA grant focused on micro-nanoplastics (August 21); along with **SHITAL VAIDYA, PH.D.**, participated in a Zoom call with collaborators at the Johns Hopkins University to discuss progress on a joint USDA proposal on nanoscale phosphorus (August 22); participated in the weekly CSN all hands call (August 23); participated by Zoom in a CSN Faculty strategic planning meeting (August 24); along with **CHRISTIAN DIMKPA, PH.D.**,

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and **CHAOYI DENG, PH.D.**, hosted three graduate students from the University of Minnesota for seven days (August 28-31); participated by Zoom in the Ph.D. Dissertation defense of Shang Gao of the University of Massachusetts (Dr. White was on his committee) (August 29); met by Zoom with a Senior Editor from *Nature Nanotechnology* to discuss the field of nano-enabled agriculture (August 30); along with **YI WANG, PH.D.**, participated in a kick off meeting with collaborators from Louisiana State University to start planning on a recently funded grant (August 31); hosted the monthly CAES J-Visa recipient meeting (August 31).

PUBLICATIONS

1. Singh, Y., Kumar, U., Panigrahi, S., Balyan, P., Mehla, S., Sihag, P., Kapoor, P., Sagwal, V., **White, J. C.**, Singh, K. P., and Parkash Dhankher, O. (2023). Nanoparticles as novel elicitors in plant tissue culture applications: Current status and future outlook. *Plant Physiol. Biochem.* [In press].

Abstract: Plant tissue culture is the primary, fundamental, and applied aspect of plant biology. It is an indispensable and valuable technique for investigating morphogenesis, embryogenesis, clonal propagation, crop improvements, generation of pathogen-free plants, gene transfer and expression, and the production of secondary metabolites. The extensive use of various nanoparticles (NPs) in fields such as cosmetics, energy, medicine, pharmaceuticals, electronics, agriculture, and biotechnology have demonstrated positive impacts in microbial decontamination, callus differentiation, organogenesis, somatic variations, biotransformation, cryopreservation, and enhanced synthesis of bioactive compounds. This review summarizes the current state of knowledge with regard to the use of nanoparticles in plant tissue culture, with a particular focus on the beneficial outcomes. The positive and negative effects of engineered NPs in tissue culture medium, delivery of transgenes, NPs toxicity concerns, safety issues, and potential hazards arising from utilization of nanomaterials in agriculture through plant tissue culture are discussed in detail, along with the future prospects for these applications. In addition, the potential use of novel nanomaterials such as graphene, graphite, dendrimers, quantum dots, and carbon nanotubes as well as unique metal or metalloid NPs are proposed. Further, the potential mechanisms underlying NPs elicitation of tissue culture response in different applications are critically evaluated. The potential of these approaches in plant nanobiotechnology is only now becoming understood and it is clear that the role of these strategies in sustainably increasing crop production to combat global food security and safety in a changing climate will be significant.

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JASON WHITE, PH.D. (left) and **CHAOYI DENG, PH.D.** (right), with collaborators from the University of Minnesota.

HUU TRUNG BUI, PH.D. gave a presentation titled “Sequestration of per- and poly-fluoroalkyl substances (PFAS) in soil with biochar-based materials,” at ACS Fall meeting, San Francisco, CA (August 13-17).

CARLOS TAMEZ, PH.D. attended the EPA National Pesticide Workshop for training in the updated multi-residue mega-method titled “QuECHERSER” at the USDA ARS Eastern Regional Research Center in Wyndmoor, PA (July 31–August 4).

KITTY PRAPAYOTIN-RIVEROS participated in the ASQ Root Cause Analysis virtual training organized by the US FDA’s Travis Goodman, Rapid Response Team (RRT) Program Specialist (August 21-24).

SHITAL VAIDYA, PH.D. presented a poster titled “Biodegradable polymer nanocomposites for controlled and targeted P release during plant growth,” at the USDA-NIFA 2023 AFRI nanotechnology for agriculture and food systems (A1511), University of Tennessee, Knoxville. (August 9-11).

NEW STUDENTS, STAFF, AND VOLUNTEERS:



Andrés Patricio Torres Gómez joined the Department of Analytical Chemistry from the Center for Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV) Saltillo Unit, Ramos Arizpe Coahuila, Mexico, as a visiting Ph.D. student. He is in the fourth year of his Ph.D. program and plans to graduate in March 2024. He arrived in Connecticut on August 1, 2023, for a travel and internship experience, and will be at the CAES for six months. Andrés working hypothesis is that nanoparticles synthesized using biomaterials like lemon peel will generate environmentally friendly processes and outcomes, compared to chemically synthesized nanoparticles. Accordingly, while at CAES he will develop biosynthesized ZnO NPs with lemon peel, and evaluate the biosynthesized ZnO nanoparticles on zucchini plants, in comparison with chemically synthesized ZnO nanoparticles. In addition, he will also be involved in several other ongoing studies elucidating the effects of fertilizer nanoparticles on plant growth, health, nutrient accumulation, and overall performance. Andres will analyze samples and learn the use of equipment like ICP-OES, TEM, DLS, FTIR, nitrogen analyzer, and HPLC. Andres can be reached at andres.torres@cinvestav.edu.mx



Jon Dominic Habito is a visiting Ph.D. candidate from the University of Auckland in New Zealand. His research focuses on the applications of nanopesticides in winegrowing, with a special emphasis on environmental fate and ecological risks. Jon joined CAES on July 10, 2023, and will be here to perform part of this PhD research until late October 2023. He is currently performing a field experiment to elucidate the effects of foliar applications of nano-sulfur on the host-pathogen interaction of grapevines and powdery mildew. His research will hopefully generate results that will help advance the use of nanopesticides in winegrowing. This project is a collaboration of the CAES Department of Analytical

Chemistry, CAES Plant Pathology and Ecology Laboratory, and the School of Environment at the University of Auckland.

ENTOMOLOGY

GRANTS AWARDED:

1. **KELSEY FISHER, PH.D.**, and **CLAIRE RUTLEDGE, PH.D.**, “Using the stable isotope of nitrogen as a long-term marking strategy to estimate natural dispersal capacity of spotted lanternfly,” \$93,345, USDA Specialty Crop Block Grant Program.

Abstract: The spotted lanternfly (SLF) has not been reported in CT vineyards yet; however, this insect pest thrives in suburban landscapes with edge habitats. Since CT vineyards are integrated into suburban neighborhoods, it is only a matter of time before SLF becomes a pest in grape production. The CAES scientists will use stable-isotope methodology to study the natural dispersal patterns of SLF. The aim of this project is to determine how far, where, and when SLF will move across the state to infest vineyards. Findings from this project will assist in better understanding the dispersal ecology of this pest and in developing targeted control approaches.

DEPARTMENTAL RESEARCH UPDATES:

GOUDARZ MOLAEI, PH.D. was interviewed by Hartford Courant (August 1), Record-Journal (August 3), NBC CT (August 21), Channel 3 (August 21), Connecticut Post (August 21), and CT Insider (August 24), on ticks and tick-borne diseases especially babesiosis and Powassan virus; and presented an invited talk, “Climate Change and Invasion Potential of Human Disease Vectors,” to the CT Association of Public Health Nurses (August 10); hosted Dr. Rama Yakubu, a medical microbiology fellow at Yale New Haven Hospital, and along with **KIRBY STAFFORD III, PH.D.**, **DOUGLAS BRACKNEY, PH.D.**, **PHILIP ARMSTRONG, PH.D.**, **GALE RIDGE, PH.D.**, **ANDREA GLORIASORIA, PH.D.**, **SCOTT WILLIAMS, PH.D.**, **MEGAN LINSKE, PH.D.**, and **JOHN SHEPARD** provided him with training on medically important vectors and vector-borne

diseases (August 15-16); along with **PHILIP ARMSTRONG, PH.D., DOUGLAS BRACKNEY, PH.D., SCOTT WILLIAMS, PH.D., MEGAN LINSKE, PH.D.,** and **ANDREA GLORIA-SORIA, PH.D.,** participated in a call to discuss projects for the recent grant awarded by CDC to the CAES Vector Biology Group and other NEVBD members for “Strengthening Training, Evaluation, and Partnerships in the Prevention and Control of Vector-Borne Diseases” along with collaborators from Cornell University, Pennsylvania State University, University of Maryland, Maine Health, and the CDC (August 29).

ANGELA BRANSFIELD participated via Zoom in Yale University's BSL-3 Subcommittee meeting (August 14), participated via Zoom in Yale University's Biosafety Committee meeting (August 17), and participated in the Federal Select Agent Program’s Responsible Official webinar “eFSAP Information System Updates” (August 31).

MARK CREIGHTON attended the annual Eastern Apicultural Society short Course and conference at UMass Amherst (August 1–4); received training at Api Engineering in Wheatfield Ill (August 13–15); and spoke at the Portland Public Library on Beekeeping in Connecticut (August 21).

HANY DWECK, PH.D., hosted Ananda Turner, a Plant Health Fellow in his laboratory, and advised his Final Research Symposium presentation (August 3); wrote an interview for Current Biology (August 11); and submitted an NIH R01 grant application (August 27).

KELSEY FISHER, PH.D., presented virtually “Advancing monarch butterfly conservation through engaged research” within the “Approaches to engaged scholarship in ecology and adjacent fields” inspire session of the Ecological Society of America annual meeting (August 7); provided statements to Joy VanderLek with the Cheshire Citizen (August 7) and Kathy Connolly with Zip06.com (August 21) on monarch butterfly populations.

MEGAN LINSKE, PH.D., participated in a call with members of Genesis Labs, Inc. to discuss the 2023 field season and the application of their host-targeted products in upcoming field trials (August 3); participated in a meeting with representatives from Cornell University, Pennsylvania State University, University of Maryland, Maine Health, and the Centers for Disease Control and Prevention (CDC) to discuss the evaluation of a new rodent-targeted vaccine product (August 7); participated in a call with representatives from US Biologic to discuss the new rodent-targeted vaccine evaluation (August 8); participated in a meeting with representatives from CDC to discuss current and upcoming field trials for new tick management products (August 9); participated in a call with Banfield Bio, Inc. and North Carolina State University to discuss updates in field and laboratory trials (August 22); and conducted a field demonstration of small mammal trapping and processing at the University of Connecticut (August 28).

GALE RIDGE, PH.D., was interviewed by Hearst Connecticut Media Group about hammerhead worms, Planarians who prey on the invasive Asian jumping worms present in Connecticut (August 8); interviewed by the Hartford Courant Newspaper about bees and wasps (August 9); presented a webinar and lecture on Delusional Infestation sponsored by Georgia University (August 9); interviewed by WCBS 880 radio, New York about the predation of hammerhead worms on the invasive Asian jumping worms (August 10).

CLAIRE RUTLEDGE, PH.D., participated in an “Expert Elicitation” with the European Food Safety Authority, on the biology and risk of *Agrilus planipennis* and *A. anxius* (August 21, 23, & 25); presented a talk on the Spotted Lanternfly at the New Canaan Library. It was co-sponsored by Planet New Canaan, New Canaan Conservation Commission, New Canaan Land Trust and the New Canaan Nature Center (August 30).

JOHN SHEPARD participated in the Board of Directors meeting of the Northeastern Mosquito Control Association via Zoom (August 17); and presented on the “Statewide Monitoring Program for Mosquito-borne Viruses in Connecticut” for the Joint LHD-IP-Infectious Diseases meeting of the Connecticut Department of Public Health via Teams (August 30).

VICTORIA SMITH, PH.D., was interviewed by the Record Journal regarding spotted lanternfly (August 3); was interviewed by the Connecticut Examiner regarding spotted lanternfly (August 4); participated in a webinar concerning Asian longhorned beetle (August 7); and was interviewed by Connecticut Patch regarding spotted lanternfly (August 15).

VICTORIA SMITH, PH.D., along with **CLAIRE RUTLEDGE, PH.D.**, **HANY DWECK, PH.D.**, and **KELSEY FISHER, PH.D.** joined a press conference with Senator Blumenthal held at East River Park in East Hartford, CT, regarding federal funding for spotted lanternfly research and outreach, and reported on the CAES efforts in regulation, education, and research efforts for mitigating the impact of this invasive insect pest in Connecticut (August 30).

TRACY ZARRILLO was interviewed by Zip06.com about pollinator habitat (August 2); met with Max McCarthy of Rutgers University, Victor DeMasi, and Faith Novella of Earthplace to search for the endangered bee species *Andrena parnassiae* in a quarry in Bethel (August 20); attended a meeting about sharing CAES bee data to a new initiative called the Symbiota “Bee Library Portal” which will expose our bee collection to a larger community of bee researchers (August 31).

PUBLICATIONS:

1. **Stafford, K. C. III, Molaei, G., Williams, S. C., and Mertins, J. W.** (2023). Introduction of the ectoparasite *Rhipicephalus pulchellus* (Ixodida: Ixodidae) into Connecticut with a human traveler from Tanzania, and a review of its importation records into the United States. *Journal of Medical Entomology*. DOI: [10.1093/jme/tjad109](https://doi.org/10.1093/jme/tjad109)

Abstract: Globalization, increased frequency of travel, and a rise in legal and illegal animal trades can introduce exotic ticks into the United States. We herein report the importation of a male *Rhipicephalus pulchellus* (Gerstäcker) on a human traveler returning to Connecticut from Tanzania, Africa, and review historical importation records of this species into the United States. This common tick is broadly distributed throughout East Africa, from Eritrea to Tanzania, has a wide host range on domestic animals and wildlife, and has been most frequently introduced into the United States on tick-infested wild animal hosts and animal trophies, but documentation of importation on humans has been rare. Archival records at the United States Department of Agriculture’s National Veterinary Services La-

laboratories show *R. pulchellus* has been introduced into the United States at least 40 times over the last 62 yr. *Rhipicephalus pulchellus* has been linked to *Rickettsia conorii*, the agent of boutonneuse fever in humans, *Crimean-Congo hemorrhagic fever orthonavivirus*, and *Nairobi sheep disease orthonavivirus*. Given the potential for this exotic tick to introduce animal or human pathogens, proper surveillance, interception, identification, and reporting of these ticks are vital in protecting human and animal health.

2. Holcomb, K. M., Khalil, N., Cozens, D. W., Cantoni, J. L., Brackney, D. E., Linke, M. A., Williams, S. C., Molaei, G., and Eisen, R. J. (2023). Comparison of acarological risk metrics derived from active and passive surveillance and their concordance with tick-borne disease incidence. *Ticks and Tick-borne Diseases*, 14.

Abstract: Tick-borne diseases continue to threaten human health across the United States. Both active and passive tick surveillance can complement human case surveillance, providing spatiotemporal information on when and where humans are at risk for encounters with ticks and tick-borne pathogens. However, little work has been done to assess the concordance of the acarological risk metrics from each surveillance method. We used data on *Ixodes scapularis* and its associated human pathogens from Connecticut (2019–2021) collected through active collections (drag sampling) or passive submissions from the public to compare county estimates of tick and pathogen presence, infection prevalence, and tick abundance by life stage. Between the surveillance strategies, we found complete agreement in estimates of tick and pathogen presence, high concordance in infection prevalence estimates for *Anaplasma phagocytophilum*, *Borrelia burgdorferi sensu stricto*, and *Babesia microti*, but no consistent relationships between actively and passively derived estimates of tick abundance or abundance of infected ticks by life stage. We also compared nymphal metrics (i.e., pathogen prevalence in nymphs, nymphal abundance, and abundance of infected nymphs) with reported incidence of Lyme disease, anaplasmosis, and babesiosis, but did not find any consistent relationships with any of these metrics. The small spatial and temporal scale for which we had consistently collected active and passive data limited our ability to find significant relationships. Findings are likely to differ if examined across a broader spatial or temporal coverage with greater variation in acarological and epidemiological outcomes. Our results indicate similar outcomes between some actively and passively derived tick surveillance metrics (tick and pathogen presence, pathogen prevalence), but comparisons were variable for abundance estimates.

3. Fisher, K. E. and Bradbury, S. P. (2023). Monarch butterfly breeding habitat restoration: How movement ecology research can inform best practices for site selection. *Current Opinion in Insect Science*. DOI: [10.1016/j.cois.2023.101108](https://doi.org/10.1016/j.cois.2023.101108)

Abstract: Population dynamics, persistence, and distribution are emergent properties of animal movement behavior and the spatial configuration of resources. Monarch butterflies are a vagile species with an open population structure. Selecting locations for monarch butterfly breeding habitat restoration that align with natural movement behavior will facilitate efficient habitat utilization across the landscape, increase realized fecundity, and ultimately support increases in the overwintering population size in Mexico. Obtaining and interpret-

ing empirical movement and space use data through field and laboratory studies are fundamental to this effort. To gain insights into population responses at larger, spatially explicit landscape scales, results from empirical studies can be incorporated into simulation models. Together, empirical and simulation Journal Pre-proof Fisher & Bradbury - Breeding Habitat Restoration 2 studies can inform options for creating functional connectivity of monarch butterfly breeding habitats. Given currently available information, we synthesize studies for the eastern monarch butterfly to illustrate how an improved understanding of movement ecology can assist in planning conservation practices.

4. Dorey, J...Zarrillo, T. A., et al. (2023). An R package and globally synthesized and flagged bee occurrence dataset. *bioRxiv*. <https://www.biorxiv.org/content/10.1101/2023.06.30.547152v1>

Abstract: Species occurrence data are foundational for research, conservation, and science communication. But the limited availability and accessibility of reliable data represents a major obstacle, particularly for insects, which face mounting pressures. We present *BeeDC*, a new R package, and a global bee occurrence dataset to address this issue. We combined >17.7 million bee occurrence records from multiple public repositories (GBIF, SCAN, iDigBio, USGS, ALA) and smaller datasets, then standardised, flagged, deduplicated, and cleaned the data using the reproducible *BeeDC* R-workflow. Specifically, we harmonised species names following established global taxonomy, country, and collection date and we added record-level flags for a series of potential quality issues. These data are provided in two formats, “completely-cleaned” and “flagged-but-uncleaned”. Our data cleaning process is open and documented for transparency and reproducibility. The *BeeDC* package and R Markdown are provided, and will be improved and updated regularly. By publishing reproducible R workflows and globally cleaned datasets we can increase the accessibility and reliability of downstream analyses. This workflow can be implemented for other taxa to support research and conservation.

GRANTS AWARDED

1. **ITAMAR SHABTAI, PH.D.**, was awarded a USDA-CT DoAG Specialty Crop Block Grant program for proposed project “Evaluating the Use of Organic Amendments to Reduce Crop Drought Stress by Increasing Plant Available Water.” \$96,162.

DEPARTMENTAL RESEARCH UPDATES

SCOTT C. WILLIAMS, PH.D., participated in a conference call with staff from Genesis Laboratories, Inc. about collaborative research efforts (August 3); participated in a Zoom meeting with Dr. Choukri Ben Mamoun of Yale University School of Medicine about *Babesia* spp. in Connecticut (August 7); participated in a collaborative Zoom call with members of the newly formed Centers for Disease Control and Prevention-funded Training and Evaluation Center (partnering with Cornell University, Penn State University, University of Maryland, MaineHealth) about rodent-targeted vaccine evaluation (August 7); participated in a Zoom call with staff from US Biologic, Inc. about rodent-targeted vaccine evaluation (August 8); participated in a collaborative Zoom call with members of the Banfield Biologic NIH SBIR-funded tick repellent fabric team (August 8); participated in a Zoom call with staff from CDC and about the roll of CAES in future rodent-targeted vaccine evaluation (August 9); met with Yale University microbiology fellow Dr. Rama Yaku-bu (August 15); participated in a Zoom call with staff from the CDC Division of Vector-Borne Diseases on progress made on a funded integrated tick management project (August 16); participated in a collaborative Zoom call with members of the Banfield Biologic NIH SBIR-funded tick repellent fabric team (August 22); gave a small rodent capture and handling demonstration for University of Connecticut undergraduates in the Wildlife Techniques class in the Department of Natural Resources and the Environment (August 28); participated in a Zoom meeting of the Centers for Disease Control and Prevention-funded Teaching & Evaluation Center project kick-off meeting (August 29).

JOSEPH P. BARSKY co-organized the 2023 New England Society of American Foresters Silviculture Working Group Summer Field Tour in Allenstown, NH (28 attendees) (August 25).

GREGORY BUGBEE spoke on “Invasive Aquatic Plants in Connecticut” at the Southbury Public Library (August 1); interviewed on “CT River Hydrilla” by CNBC TV (August 15); spoke on “CT River Hydrilla” at a press conference hosted by Rep. Christine Palm and attended by Sen. Richard Blumenthal at Chester Marina (August 16); interviewed on “CT River Hydrilla” by WBUR radio (August 16); interviewed on “CT River Hydrilla” by FOX 61 TV (August 16).

ZHIHAO CHEN, PH.D., attended the American Chemical Society fall meeting (San Francisco, CA) and in the session Division of Environmental Chemistry, Radiation Chemistry, Aquatic Photochemistry, and Advanced Oxidation Processes in Environmental Chemistry, presented two talks titled “Methods for colorimetric determination of hydrogen peroxide, peroxymonosulfate and peroxydisulfate in binary peroxide systems” with **JO-**

SEPH PIGNATELLO, PH.D., as co-author and “Hydrogen peroxide-assisted alkaline hydrolysis of fumigant emissions of sulfuryl fluoride, a potent greenhouse gas, in scrubbing media” with Chengjin Wang, Ph.D., and **JOSEPH PIGNATELLO, PH.D.**, as co-authors (August 13-17).

JEREMIAH FOLEY, IV, PH.D., assisted the US Army Corps of Engineers in the application of dye at four research sites along the Connecticut River (August 8–31); attended a press conference with Senator Blumenthal and State Representative Palm on the impact and future management of *Hydrilla* infestations in the Connecticut River (August 16); interviewed by Elizabeth Regan from The Day on an article titled “Scientists conduct dye test as they look to rid Connecticut River of invasive weed” (August 30).

SUSANNA KERIÖ, PH.D., co-organized a Connecticut Urban Forest Council Forest Forum 2024 conference planning committee meeting (August 7); attended the Yale Biosafety Committee meeting (August 17); met with Fairfield tree planting coordinators Thomas Correll and Michael Keohane to plan collaboration on mycorrhizal inoculations on urban trees (August 18); served on a USDA grant review panel (August 22).

SARA NASON, PH.D., participated in meetings for the Best Practices for Non-Targeted Analysis working group (August 7, 10, 22, 23, & 28, virtual); participated in the CT PFAS testing Laboratory Capacity and Capability discussion group meeting (August 8); participated in the American Chemical Society meeting (San Francisco, CA) and presented talk titled “Working with stakeholders to determine high impact research directions for non-targeted analysis” (25 attendees) and research poster titled “Expanding work on microcontaminants in agricultural and wastewater systems using non-targeted analysis with high resolution mass spectrometry” (August 12-17); met with stakeholders from water utilities companies to discuss how non-targeted analysis with high resolution mass spectrometry can be used in their field (August 30).

ITAMAR SHABTAI, PH.D., met with a colleague from Ben-Gurion University, Israel to discuss a grant proposal to the NSF’s Signal in the Soil program (August 14); met with colleagues from Purdue University and USDA-ARS to discuss a grant proposal to the NIFA-AFRI Soil Health program (August 24); met with colleagues from CAES and University of Maryland Baltimore to discuss a grant proposal to the NSF Ecosystem Science cluster (August 24); met with colleagues from the Technical University of Munich to discuss ongoing NanoSIMS analyses for a joint project (August 28).

SUMMER STEBBINS with **RILEY DOHERTY** gave an aquatic plant workshop to the Four Oakes Day Camp in Redding (20 attendees).

ELISABETH WARD, PH.D., met with Colleen Murphy-Dunning, Shimon Anisfeld, Ph.D., and Mark Ashton, Ph.D. (Yale School of the Environment), Danica Doroski, Ph.D. (State Urban Forestry Coordinator, CT DEEP), and Dawn Henning (Assistant Engineer, City of New Haven) to plan panel and workshop on urban forestry and green infrastructure in New Haven (August 4); presented a talk at the Ecological Society of America Annual meeting (Portland, OR) titled “Depth-dependent effects of tree and shrub mycorrhizal associations on soil carbon and nitrogen pools in a temperate forest” (60 attendees) (August 7-

11); participated in panel and workshop for incoming Masters students at the Yale School of the Environment on urban forestry and green infrastructure and presented a talk titled “Managing for forest ecosystem health and resiliency in Connecticut” (40 attendees) (August 24).

JEFFREY S. WARD, PH.D. (Emeritus), was interviewed about forest health by Robert Miller, Danbury News-Times (August 29).

LEIGH WHITTINGHILL, PH.D., gave a talk titled “Effects of annual compost additions to an agricultural green roof on growing media organic matter and nutrient content over time” at the Ecological Society of America 2023 annual conference in Portland, OR (10 attendees) (August 8); met with green roof researchers M. M. Lehkön Alam (East Carolina University) and Lee Skabelund (Kansas State University) to discuss green roof research collaborations (August 25).

PUBLICATIONS

1. Barry, A., Ooi, S. K., Helton, A. M., **Steven, B.**, Elphick, C. S., and Lawrence, B. A. (2023). Carbon dynamics vary among tidal marsh plant species in a sea-level rise experiment. *Wetlands*, 43, 78. DOI: [10.1007/s13157-023-01717-z](https://doi.org/10.1007/s13157-023-01717-z)

Abstract: Tidal wetlands are important blue carbon reservoirs, but it is unclear how sea-level rise (SLR) may affect carbon cycling and soil microbial communities either by increased inundation frequency or via shifting plant species dominance. We used an *in-situ* marsh organ experiment to test how SLR-scenarios (0, +7.5, +15 cm) and vegetation treatments (*Spartina alterniflora*, *Spartina patens*, *Phragmites australis*, unvegetated controls) altered CO₂ fluxes (net ecosystem exchange, ecosystem respiration), soil carbon mineralization rates, potential denitrification rates, and microbial community composition. Increasing inundation frequency with SLR treatments decreased the carbon sink strength and promoted carbon emissions with +15-cm SLR. However, SLR treatments did not alter soil chemistry, microbial process rates, or bacterial community structure. In contrast, our vegetation treatments affected all carbon flux measurements; *S. alterniflora* and *S. patens* had greater CO₂ uptake and ecosystem respiration compared to *P. australis*. Soils associated with *Spartina* spp. had higher carbon mineralization rates than *P. australis* or unvegetated controls. Soil bacterial assemblages differed among vegetation treatments but shifted more dramatically over the three-month experiment. As marshes flood more frequently with projected SLR, marsh vegetation composition is predicted to shift towards more flood-tolerant *S. alterniflora*, which may lead to increased CO₂ uptake, though tidal marsh carbon sink strength will likely be offset by increased abundance of unvegetated tidal flats and open water. Our findings suggest that plant species play a central role in ecosystem carbon dynamics in vegetated tidal marshes undergoing rapid SLR.

LINDSAY TRIPLETT, PH.D., participated in a meeting of the Academic Unit Leaders Forum of the American Phytopathological Society (18 participants) (August 1); organized and moderated the Plant Health Fellows final symposium (60 adults) (August 3), and participated in a federal grant panel. participated and led discussion in a Microbiomes Think-a-thon workshop (35 adults) (August 12). Organized and led a meeting of the APHIS Widely Prevalent Bacteria committee (7 participants) (August 13). Gave an oral presentation titled “Persistence of protist-associated bacteria in rhizosphere communities” at Plant Health 2023 in Denver, CO (55 adults) (August 13); co-authored a poster presentation titled “Higher Streptomycin Persister Populations by RES-Xre Toxin-Antitoxin (TA) Mutations in *Pseudomonas syringae* and Modified TA Complex Interaction” (70 adults) (August 15).

WASHINGTON DA SILVA, PH.D., attended the 2023 USDA-NIFA nano Grantees meeting in Knoxville, TN (August 9-12) and gave a presentation titled “Tunable release of dsRNA molecules into plants from sustainable nanocarriers: A novel management tool for viral pathogens” (45 adults); attended the 2023 APS meeting in Denver, CO (August 12-16), presented a poster titled “Tunable release of dsRNA molecules into plants from sustainable nanocarriers” (50 adults) and led the annual meeting of the working group SBP-APS (Brazilian society of phytopathology–American society of phytopathology); attended the 2023 International Congress of Plant Pathology (ICPP) in Lyon, France (August 19-26) and gave an invited seminar titled “Using Nanocarriers for Targeted RNAi Therapy in Controlling Plant Pathogens” (80 adults).

YONGHAO LI, PH.D., presented “What Wrong with My Plants?” and “Check It Out: How to evaluate container plant quality – A hands on demonstration” at a continuing education program organized by The Connecticut Chapter of the American Society of Landscape Architects in Lebanon, CT (65 adults) (August 3); Participated in the National Plant Diagnostic Network Online Communication & Web Portal Committee meeting via Zoom (6 adults) (August 9); Attended the Plant Diagnostic Network Northeast Regional meeting via Zoom (August 24).

QUAN ZENG, PH.D., participated in different events at Plant Health 2023, including speed mentoring, idea café, and bacteriology and phyllosphere committee round table, during the meeting, he also participated in the senior editor meeting of Phytopathology (August 14).

MOHAMED-AMINE HASSANI, PH.D., organized and presented at a special session meeting during the Plant Health 2023 conference in Denver, CO, titled “All yeasts considered, characterization of plant colonizing yeasts and their impact on plant health” (20 adults) (August 14).

FELICIA MILLETT presented “Pruning Woody Plants” at the Demonstration Tent during Plant Science Day 2023 (2 presentations, 75 adults each) (August 2); presented on Apple Trees to West Haven Parks and Recreation Summer Camp Program in West Haven, CT (17 youths, 4 adults) (August 8); attended USDA Federal Seed School in Gastonia, NC,

(August 14–16); participated in the NPDN Proficiency Committee Meeting (7 adults) (August 22); participated in the NEPDN Monthly Meeting (15 adults) (August 24).

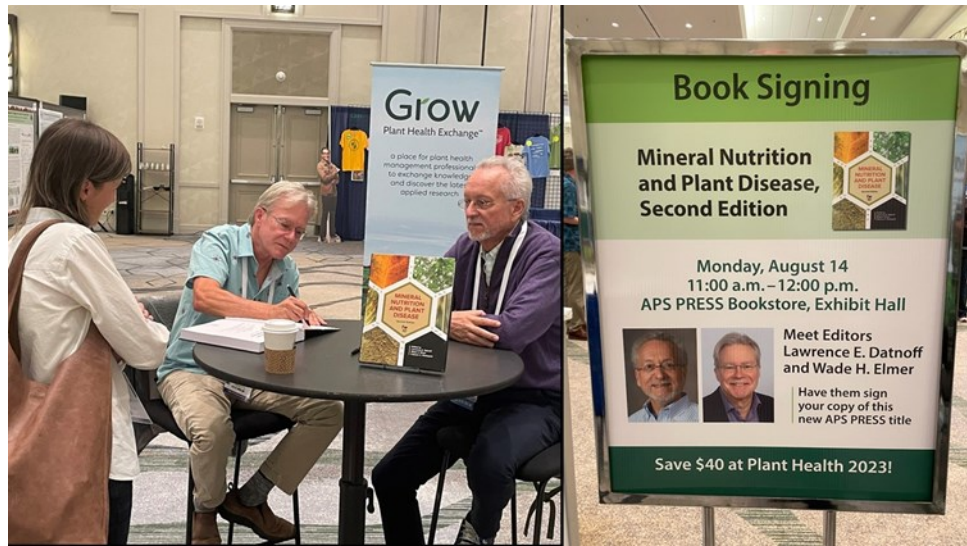
SALMA MUKHTAR, PH.D., presented a talk on “Role of Pollinators in Microbiome Development on Apple Flowers” at Plant Health 2023 (68 adults) (August 14); and gave a poster presentation on “Quorum Sensing Mediated Bacterial Interspecies Communication in Soybean Rhizosphere” at the Plant Health 2023 conference (August 15) held in Denver, CO, from August 12–16, 2023.

WADE ELMER, PH.D., (Emeritus) attended a book signing event along with his co-editor, Lawrence Datnoff, Ph.D., of Louisiana State University, for his recent publication *Mineral Nutrition and Plant Disease*, 2nd edition at the Annual Meeting of the American Phytopathological Society in Denver, CO (August 14).

ROBERT MARRA, PH.D., met with Helen Poulos, Ph.D., and undergraduate Paul Kraut of Wesleyan University to discuss beech leaf disease research opportunities (August 18); was interviewed by Robert Miller of the News-Times of Danbury about beech leaf disease; met with Guilford Land Trust members Nicole Crane and Kathi Lazzarini to discuss a citizen-science project.



WASHINGTON DA SILVA, PH.D., delivering an invited seminar at the International Congress of Plant Pathology (ICPP) Lyon-France on August 24, 2023.



Wade Elmer, Ph.D., (center) signs an autograph for one of his adoring fans.



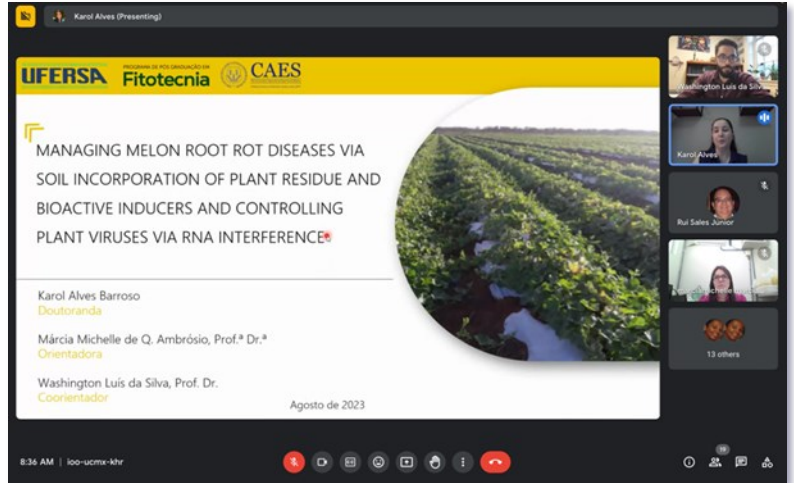
Salma Mukhtar, Ph.D., took center stage in the Grand Ballroom of the Denver Convention Center to present her research on bees and the floral microbiome.

NEW STUDENTS, STAFF, AND VOLUNTEERS:



Maria Helena Diogenes, a Ph.D. student from the Universidade Federal Rural do Semi-arido (UFERSA) in Brazil, joined the Department of Plant Pathology on August 3, 2023 as an intern. She is stationed at the **da Silva Lab** under the guidance of her co-advisor, **Washington da Silva, Ph.D.**, and working on her thesis research conducting molecular characterization of several *Fusarium spp.* isolates that infect melon and watermelon plants. She will also investigate the delivery of siRNA molecules via nano-liposomes to manage potato virus Y (PVY) infections in tobacco and potato plants. Maria Helena comes to the da Silva Lab with vast experience in the private sector, she worked for Sumitomo Chemicals for many years and was promoted to several positions in the company, and decided to leave her thriving industry career to pursue her Ph.D.

Karol Barroso, a Ph.D. student at the **da Silva Lab** at CAES and at the Universidade Federal Rural do Semi-arido (UFERSA) in Brazil, successfully defended her thesis titled “Managing melon root rot diseases by incorporating plant residue and bioactive inducers in the soil and controlling plant viruses via RNA interference” on August 30, 2023. Ms. Karol, now Dr. Barroso, was hired by Bayer AG in January 2023 as a lab manager in her hometown, Petrolina in the state of Pernambuco – Brazil, and was promoted to branch manager in just a few months in the job. Kudos to Karol!



Ph.D. student, **Karol Barroso**, defending her thesis via Google Meetings (August 30, 2023).

PUBLICATIONS:

1. Jahromi, A. K., Esehaghbeygi, A., Sajadi, S. M., Nikbakht, A., **da Silva, W.**, Sharif-nabi, B., and Toghraie, D. (2023). An application of dielectric barrier discharge treatment to control gray mold growth on cut rose flowers. *Journal of Stored Products Research*, 104, 102170. DOI: [10.1016/j.jspr.2023.102170](https://doi.org/10.1016/j.jspr.2023.102170)

Abstract: Cold atmospheric pressure plasma irradiation is an efficient method for decontaminating fruits and vegetables. The present study evaluates the effect of dielectric barrier discharge (DBD) cold plasma treatment on controlling gray mold (*Botrytis cinerea* Pers.), a destructive pathogen of cut roses (*Rosa hybrida* L. cv. Samurai). The ion leakage, relative water content (RWC), proline, chlorophyll, carotenoid, anthocyanin content, and discoloration of treated rose petals were measured. Experimental observation showed significant changes in ion leakage, RWC, and chlorophyll content at 20 kV for 8 min compared to the control. The same treatment induced significant changes in the proline content of the rose petals, but no statistical difference was observed in their anthocyanin and carotenoid contents compared to the control. The results indicated that gray mold growth was entirely suppressed by plasma irradiation at 20 kV for 4, 6, and 8 min and 15 kV for 8 min. Plasma at 10 kV for 8 min and 15 kV for 6 min suppressed 90% and 70% of the gray mold growth, respectively. It is noteworthy that plasma irradiation at 20 kV for just 4 min and at 15 kV for 6 min suppressed 100 and 70% of *B. cinerea* growth, respectively; however, plasma irradiation did not change the quality indices of rose petals. Overall, it can be said that cold plasma treatment by DBD has the potential to increase the shelf life of cut roses by suppressing gray mold development.

2. Datnoff, L. E., **Elmer, W. H.**, and Rodrigues, F., eds. (2023). *Mineral Nutrition and Plant Disease*. 2nd Edition, APS Press, St. Paul, MN. 488 p.

Abstract: The book provides updated chapters from the first edition, *Mineral Nutrition and Plant Disease*. In 2007 by Datnoff, L. E., Elmer, W. H., and Huber, D. N. eds.. APS Press. St. Paul, MN. 278 pages.

3. **Elmer, W.**, Hines, D., and **Schultes, N. P.** (2023). First report of *Fusarium liberatis*, a member of the *Fusarium oxysporum* species complex, causing vascular disease of Jade plant (*Crassula ovata*) in Connecticut, USA". *J. Plant Path.* DOI: [10.1007/s42161-023-01410-4](https://doi.org/10.1007/s42161-023-01410-4)

Abstract: During 2021, approximately 10% of 50 jade plant [*Crassula orvata* (Miller) Druce] from a green house in central Connecticut, USA, dropped basal leaflets and showed extensive vascular discoloration in longitudinally cut basal stems. Isolates, designated JP 1 to JP 5, were grown from surface-disinfested vascular tissue from five plants placed on peptone *pentachloronitrobenzene* agar. Single conidium sub-culturing were carried out from the resulting colonies onto carnation leaf agar and potato dextrose agar with incubation for 10 days at 25° C under cool white fluorescent lights and for 12 h photoperiod. Isolates came from independent plants. Cultures were examined under the microscope with 400x magnification. Macroconidia were produced on monophialides in orange sporodochia, 2 or 3-septate, and averaged 15 to 25 µm in length. Microconidia were abundant, 1- or 2-celled and were born on mono- and polyphialides in the aerial mycelium. ClustalW

alignment of sequences for *translation elongation factor-1a* (*tefl*: primers EF-1/EF-2; Gb acc. no. OP150936), *calmodulin* (*CmdA*: primers CAL228F/CAL2Rd; OP150935), *RNA polymerase subunit 2* (*RPB2*: primers rRPB2-5f2/-7cr; OP150938) and *b-tubulin 2* (*b-tub*: primers T1/Bt2b; OP150937) from isolate JP 5 displayed 100% (615/615bp); 100% (602/602bp); 100%(877/877) and 99.8% (573/574bp) sequence identity with sequences from *Fusarium libertatis* strain CPC28465, respectively (Lombard et al. 2019). Phylogenetic analysis using concatenated *RPB2* and *tefl* sequences from representative species across the *Fusarium* genus and JP5 employing Maximum Likelihood or Neighbor Joining analysis placed JP 5 in the FoSC clade (Table S1; Fig. S1). A more detailed phylogenetic analysis using using *tefl*, *CmdA*, *RPB2* and *b-tub* concatenated sequences from FoSC species and JP5 employing Maximum Likelihood or Bayesian inference analysis placed JP 5 in a clade with three *F. libertatis* accessions (Table S1; Fig. S2). Pathogenicity tests were performed on Jade with five isolates each with four replications (ten replicates for JP 5) under greenhouse conditions. Ground colonized millet inoculum was added to potting soil at 1 g inoculum/liter potting soil and non-infested potting mix served as controls. All inoculated plants developed dull green coloration after two weeks, dropped basal leaves, and had vascular discoloration. Controls remained green and healthy. Fungal isolates from the discolored tissue in the Koch's postulate tests for JP 1 through JP5 were isolated and upon microscopic analysis were similar to the original JP 5 isolate. The DNA sequence of *tefl* amplified from the JP 5 Koch's postulate fungal isolate matched that of the original JP 5 *tefl*. This is the first report of *F. libertatis* causing disease on Jade plants.

4. Schultes, N. P., Sinn, J. P., and McNellis, T. W. (2023). Glyceraldehyde-3-phosphate dehydrogenase is required for fire blight disease establishment in apple fruitlets. *Physiol. Mol. Plant Path.*, 126. DOI: [10.1016/j.pmpp.2023.102044](https://doi.org/10.1016/j.pmpp.2023.102044)

Abstract: Host sugar resource utilization is an essential aspect of parasitism by *Erwinia amylovora*, the bacterium that causes fire blight disease of pome fruits. We assessed the virulence of *E. amylovora* *glyceraldehyde-3-phosphate dehydrogenase* (*gapA*) mutants, which are predicted to be defective in sugar utilization through both glycolysis and the phosphogluconate pathway. A plasmid insertion mutant and an allelic exchange mutant of *gapA* were generated and found to be avirulent in apple fruitlets. The *gapA* insertion mutant was unstable, with insertion element excision resulting in restoration of pathogenicity. The results indicate that *gapA* is essential for *E. amylovora* virulence on apple fruitlets.

5. Gdanetz, K., Dobbins, M. R., Villani, S. M., Outwater, C. A., Slack, S. M., Nesbitt, D., Svircev, A. M., Lauwers, E. M., Zeng, Q., Cox, K. D., and Sundin, G. W. (2023). Multisite field evaluation of bacteriophages for fire blight management: incorporation of 2 UVR protectants, and impact on the apple flower microbiome. *Phytopathology*. DOI: [10.1094/PHYTO-04-23-0145-KC](https://doi.org/10.1094/PHYTO-04-23-0145-KC)

Abstract: Fire blight, a disease of pome fruits caused by the bacterium *Erwinia amylovora*, has become increasingly difficult to manage after the emergence of streptomycin-resistant strains. Alternative antibiotics and copper are available; however, these chemicals have use restrictions in some countries and also can carry risks of phytotoxicity. Therefore, there is growing interest in biological-based management options, with bacteriophage (phages) showing promise, as these naturally occurring pathogens of bacteria are easy to isolate and

grow. However, there are several technical challenges regarding the implementation of phage biocontrol in the field as the viral molecules suffer from ultraviolet radiation (UVR) degradation and can die off rapidly in the absence of the host bacterium. In this work we assessed the efficacy of *Erwinia* phages and a commercial phage product for blossom blight control in the field across multiple locations in the eastern United States.

6. Sundin, G., Peng, J., Brown, L., **Zeng, Q.**, Förster, H., and Adaskaveg, J. E. (2023). A novel IncX plasmid mediates high-level oxytetracycline and streptomycin resistance in *Erwinia amylovora* from commercial pear orchards in California. *Phytopathology*. DOI: [10.1094/PHYTO-06-23-0190-SA](https://doi.org/10.1094/PHYTO-06-23-0190-SA)

Abstract: Isolates of the fire blight pathogen *Erwinia amylovora* with high-level resistance to oxytetracycline (minimal inhibitory concentration (MIC) > 100 μ g/ml) and to streptomycin (MIC > 100 μ g/ml) were recovered from four commercial pear orchards in California between 2018-2020. The two representative oxytetracycline and streptomycin-resistant (OxyTcR-SmR) strains 32-10 and 33-1 were as virulent as the antibiotic susceptible strain 13-1 in causing blossom blight of pear, and were recovered more than 50% of the time seven days after co-inoculation to pear flowers with strain 13-1. In the field, inoculation of strain 32-10 to pear flowers that were pre-treated with oxytetracycline at 200 μ g/ml did not reduce disease compared to an untreated control. Four OxyTcR-SmR strains were subjected to draft genome sequencing to identify the genetic determinants of antibiotic resistance and their location. A 43.6 kb IncX plasmid, designated pX11-7, was detected in each of the four strains, and this plasmid encoded the tetracycline-resistance gene *tetB* and the streptomycin-resistance gene pair *strAB* within a large putatively mobile genetic element consisting of the transposon Tn10 that had inserted within the streptomycin-resistance transposon Tn6082. We also determined that pX11-7 was conjugative, and was transferred at a rate that was 10⁴-10⁵ higher into an *E. amylovora* strain isolated in California compared to an *E. amylovora* strain that was isolated in Michigan. The occurrence of high levels of resistance to both oxytetracycline and streptomycin in *E. amylovora* strains from commercial pear orchards in California significantly limits the options for blossom blight management in these locations.

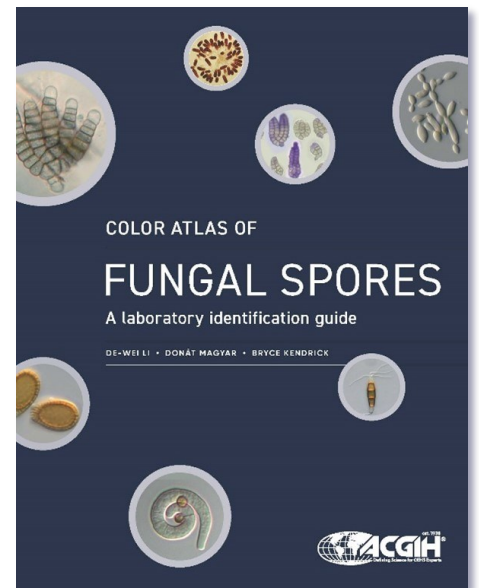
JATINDER S. AULAKH, PH.D., attended the 113th Annual Plant Science day in Hamden, CT and presented a barn exhibit titled “Asiatic Dayflower Management in Christmas Trees “(August 2); reviewed a research paper titled “Selective method for invasive plant removal enhances restoration” for Restoration Ecology Journal (August 15); and reviewed a grant proposal titled “Biological Control of Arthropod Pests and Weeds” (August 28).

RICHARD COWLES, PH.D., remotely presented “Small investments with large returns,” a description of practices that improve establishment of transplants to the Virginia Christmas Tree Growers’ Association, (30 participants) (August 4). He discussed “Armored scale management,” and demonstrated “Make your own deer repellent,” to the Connecticut Christmas Tree Growers’ Association Fall Meeting, Mystic, (60 participants) (August 19), and the same two subjects to the MA Christmas Tree Growers’ Association (60 participants) (August 20). He spoke about “Climate change and horticulture, beech leaf disease, and a new deer repellent” to the Enfield Garden Club, (20 participants) (August 23).

PUBLICATIONS:

1. Li, D.-W., Magyar, D., and Kendrick, B. (2023). Color Atlas of Fungal Spores: A laboratory identification guide. American Conference of Governmental Industrial Hygienists (ACGIH), 852 pp. <https://portal.acgih.org/s/#/store/browse/detail/a158a0000ACTljAAH>

Abstract: This comprehensive color atlas and manual serves as a resource for identifying fungal spores. With descriptions of over 500 species and nearly 1,000 color images, its primary purpose is to aid in the identification of fungal allergens, allowing for the analysis of their daily and seasonal variations, as well as the composition of fungal spores present in the air. This book is an essential tool for professionals in environmental microbiology laboratories, aeromycologists, aerobiologists, bioaerosol scientists, indoor air quality experts, as well as graduate students conducting lab work or research.



2. Li, H., Liao, Y.-C.-Z., Wan, Y., Li, D.-W.*, and Zhu, L.-H.* (2023). *Colletotrichum siamense*, a novel causal agent of *Viburnum odoratissimum* leaf blotch and its sensitivity to fungicides. *J. Fungi*, 9, 882. DOI: <https://doi.org/10.3390/jof9090882>

Abstract: *Viburnum odoratissimum* Ker-Gawl is native to Asia and is usually used as a garden ornamental. In September 2022, a leaf blotch on *V. odoratissimum* was observed in Nanjing, Jiangsu, China. The disease causes the leaves of the plants to curl and dry up and defoliate early. It not only seriously affects the growth of the plants but also greatly reduces the ornamental value. The pathogenic fungus was isolated from the diseased leaves, and the fungus was identified to be *Colletotrichum siamense* based on morphological features and multilocus phylogenetic analyses of the internal transcribed spacer (ITS) region, actin (*ACT*), calmodulin (*CAL*), beta-tubulin 2 (*TUB2*), chitin synthase (*CHS-1*), *Apn2-Mat1-2* intergenic spacer and partial mating type (*ApMat*), and glyceraldehyde-3-phosphate dehydrogenase (*GAPDH*) genes. Pathogenicity tests were performed by inoculating healthy leaves with conidia. *C. siamense* can grow at 15–35 °C, with an optimal growth temperature at 25–30 °C. The results of sensitivity to nine fungicides showed that *C. siamense* was the most sensitive to prochloraz in the concentration range of 0.01 µg/mL to 100 µg/mL. Therefore, spraying prochloraz before the optimum growth temperature of pathogenic fungus can achieve effective control. It provided useful information for future studies on the prevention and treatment strategies of *C. siamense*. This is the first report of leaf blotch caused by *C. siamense* on *V. odoratissimum* in China and worldwide.

3. Liao, Y.-C.-Z., Cao, Y.-J., Wan, Y., Li, H., Li, D.-W.*, and Zhu, L.-H.* (2023). *Alternaria arborescens* and *A. italica* causing leaf blotch on *Celtis julianae* in China. *Plants*, 12, 3113. DOI: [10.3390/plants12173113](https://doi.org/10.3390/plants12173113)

Abstract: *Celtis julianae* Schneid. is widely planted as a versatile tree species with ecological and economic significance. In September 2022, a leaf blotch disease of *C. julianae* was observed in Nanjing, Jiangsu, China, with an infection incidence of 63%. The disease led to severe early defoliation, significantly affecting the ornamental and ecological value of the host tree. The accurate identification of pathogens is imperative to conducting further research and advancing disease control. Koch's postulates confirmed that the fungal isolates (B1–B9) were pathogenic to *C. julianae*. The morphology of the characteristics of the pathogen matched those of *Alternaria* spp. The internal transcribed spacer region (ITS), large subunit (LSU) and small subunit (SSU) regions of rRNA, glyceraldehyde-3-phosphate dehydrogenase (*GAPDH*), *Alternaria* major allergen gene (*Alt a 1*), RNA polymerase second largest subunit (*RPB2*), and portions of translation elongation factor 1-alpha (*TEF1-α*) genes were sequenced. Based on multi-locus phylogenetic analyses and morphology, the pathogenic fungi were identified as *Alternaria arborescens* and *A. italica*. The findings provided useful information for disease management and enhanced the understanding of *Alternaria* species diversity in China. This is the first report of *A. arborescens* and *A. italica* causing leaf blotch of *C. julianae* in China and worldwide.

Feng, Y., Cao, X., Tao, M., Xu, L., Wang, C., Chen, F., **White, J. C.**, Wang, Z., and Xing, B. Foliar applied $MnFe_2O_4$ NMs positively impact both plant and soil health. *Environmental Science and Technology*.

He, J., **Li, D.-W.**, Cui, W.-L., Zhu, L.-H., and Huang, L. Seven novel species of *Alternaria* causing leaf blight of Chinese fir, *Cunninghamia lanceolata*. *Mycosphere*.

Hiskes, R. T. Native plant caution advisory: spotted water hemlock. *CAES Fact Sheet*.

Li, H., Guo, Y., Liang, A., Xu, X., Shang, H., Li, C., Cai, Z., Han, L., Zhao, J., **White, J. C.**, Ma, C., and Xing, B. Antimicrobial engineered nanomaterials improve soil health via suppressing soil-borne *Fusarium* and positively altering the soil microbiome. *Environmental Science and Ecotechnology*.

Lian, J., Cheng, L., Huang, X., Wang, X., Wang, Y., Xin, X., Zou, T., Chen, Y., Yu, H., Pan, J., He, Z., **White, J. C.**, and Wang, X. Foliar application of iron-based nanofertilizers to wheat promotes safe production but not biofortification: An ionic study. *Journal of Agricultural and Food Chemistry*.

Liao, Y.-C.-Z., Cao, Y.-J., Wan, Y., Li, H., **Li, D.-W.**, and Zhu, L.-H. *Alternaria arborescens* and *A. italica* causing leaf blotch on *Celtis julianae* in China. *Plants*.

McMillan, J. R., Chaves, L. F., and **Armstrong, P. M.** Hierarchical models for West Nile virus risk mapping in Connecticut, USA. *International Journal of Health Geographics*.

Wu, X., Jia, W., Hu, J., Yu, X., Yan, C., **White, J. C.**, Liu, J., Yang, Y., and Wang, X. Simultaneous reduction of arsenic and lead bioaccumulation in rice (*Oryza sativa* L.) by nano- TiO_2 : A mechanistic study. *Environmental Science: Nano*.

Yue, L., Tao, M., Xu, L., Wang, C., Xu, Y., Liu, Y., Cao, X., **White, J. C.**, and Wang, Z. Size-dependent photocatalytic inactivation of *Microcystis aeruginosa* and degradation of microcystin by a copper metal organic framework. *The Journal of Hazardous Materials*.

Zhang, X., Zeng, J., **White, J. C.**, Xiong, Z., Zhang, S., Xu, Y., Zhao, Q., Wu, F., and Xing, B. Mechanistic evaluation of enhanced graphene toxicity to *Bacillus* induced by humic acid adsorption. *Nature Water*.

Zhou, J., Tang, C., Kuzyakov, Y., Zhou, X., Gef, T., Xiao, M., Cai, Y., Yu, B., **White, J. C.**, Jiang, Z., and Li, Y. Biochar-based urea increases soil methane uptake in a subtropical forest. *Global Change Biology*.



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Station News was prepared and edited by Jason White, Vickie Bomba-Lewandoski, and Kelly Fairbrother.



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