Station News

The Connecticut Agricultural Experiment Station
Volume 14 Issue 8 | August 2024

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.

CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875

This Issue

ADMINISTRATION

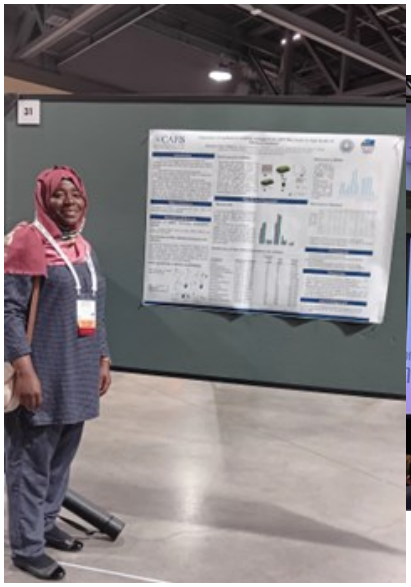
JASON C. WHITE, PH.D. met by Zoom with collaborators at Johns Hopkins University to discuss ongoing experiments (July 1); along with **Nubia Zuverza-Mena, Ph.D.** participated in a Zoom meeting with collaborators at Yale University and the University of Minnesota for a joint NIEHS grant (July 2); met by Zoom with researchers at the University of Texas El Paso to discuss a collaborative grant proposal (July 3); along with **CHRISTIAN DIMKPA, PH.D.** and **Hina Ashraf, Ph.D.** hosted a Zoom call with collaborators at Johns Hopkins University and Stonybrook University to discuss progress on a joint USDA nanoscale phosphorus project (July 3; 17; 31); participated in the weekly NSF Center for Sustainable Nanotechnology (CSN) all hands call (July 3; 10; 17); met with collaborators at the University of Minnesota and Convergent Bioscience to discuss joint experiments (July 3); met with collaborators in France to discuss a joint research project on nanotechnology and agriculture (July 9; 17); participated in a NSF Zoom webinar on their SBIR grant program (July 9); met by Zoom with colleagues at the University of Massachusetts to discuss collaborative research (July 10); along with staff in the Department of Analytical Chemistry participated in a FDA webinar on year 5 of the Laboratory Flexible Funding Model (July 10); hosted the quarterly CAES Safety Committee meeting (July 12); along with **Quan Zeng, Ph.D.** participated in a Teams call with UConn Technology Commercialization Services (July 15); along with **SCOTT WILLIAMS, PH.D.** participated in a Teams call with UConn Technology Commercialization Services (July 15); gave a CAES tour to 12 members of the CAES Experiment Station Associates (July 16); participated in a Teams call with colleagues at Columbia University to discuss collaborative research (July 18); met by Zoom with colleagues at the University of Minnesota and the University of Wisconsin Milwaukee to discuss a collaborative grant proposal (July 18); along with **Natalie Rivera** and **Vickie Bomba-Lewandoski** met by Teams with a journalist to discuss a podcast filmed at Plant Science Day (July 18); met with Dr. Kalumbu Malekani of Smithers Inc. by Zoom to discuss collaborative programs (July 19); travelled to UMass Amherst to participate in the PhD dissertation defense of Sudhir Sharma (July 19); travelled to Guangdong University of Technology in Guangzhou China and Central South University of Forestry and Technology in Changsha China to give a series of lectures on nanotechnology and agriculture and to meet with collaborators (July 22-29); along with **Nubia Zuverza-Mena, Ph.D.,** and **Mandeep Kaur, Ph.D.** participated in a Zoom meeting with collaborators at Rutgers University to discuss a joint USDA grant (July 29); and along with **Michael Last** and **DEWEI LI, PH.D.,** participated in the kick off meeting for the Valley Laboratory construction and renovation project (July 30).

JASON C. WHITE, PH.D. with former CAES Post-doc, **Chuanxin Ma, Ph.D.**, now a Professor at the Guangdong University of Science and Technology, and his staff.

JASON C. WHITE, PH.D. with faculty and staff at Central South University of Forestry and Technology.

ANALYTICAL CHEMISTRY

NASSIFATOU TITTIKPINA, PH.D. attended the 34th International Association for Food Protection (IAFP) annual meeting. She was a recipient of the Travel Award for employees working for food and health agencies in North America. Other recipients of the award included Virginia Hamilton (Kentucky Department for Public Health, Division of Public Health Protection and Safety, Lexington, Kentucky), Christie Radtke (State of Minnesota, Minnesota Department of Agriculture, St. Paul, Minnesota) and Marie-Eve Rousseau (Quebec Ministry of Agriculture, Fisheries, and Food, Quebec, Canada). The meeting took place in Long Beach, California (July 14-17).



MEGHAN CAHILL attended an FDA Training Course at the FDA San Fransisco/Alameda Lab. The course focused on ICP and XRF techniques for evaluating elements in food and feed samples. (July 21-27).

PUBLICATIONS:

1. Aikpokpodion, P. E., Hsiao, B., **Dimkpa, C. O.** (2024). Mitigation of nitrogen loss in a plant-soil system through incorporation of nanocellulose and zinc-modified nanocellulose. *Journal of Agricultural and Food Chemistry*. DOI: 10.1021/acs.jafc.4c03997.

Abstract: Most nitrogen (N) applied to plants as fertilizer is lost through leaching. Here, nanocellulose was used in mitigating N leaching loss. Lettuce-cropped soil was treated with unmodified or Zn-modified nanocellulose (1–2% by wt) in combination with NPK, compared with urea and NPK-only treatments. Consecutive leaching, plant growth, plant N uptake, and soil nitrogen retention were assessed. Nanocellulose + NPK significantly ($p \leq 0.05$) reduced N leaching, compared with urea and NPK-only. 1-and-2 wt % nanocellulose, as well as Zn-modified 1-and-2 wt % nanocellulose, reduced N leaching by 45, 38, 39, and 49% compared with urea and by 43, 36, 37, and 47% compared with NPK-only, respectively. Nitrogen leached mainly as NO_3^- (98.4%). Compared with urea and NPK, lettuce shoot mass was significantly ($p \leq 0.05$) increased by 30–42% and by 44–57%, respectively, by all nanocellulose treatments, except for the Zn-modified 1 wt % nanocellulose. Leached N negatively correlated to biomass yield. Soil N retention was enhanced by the pristine and Zn-modified nanocelluloses between 27 and 94%. Demonstrably, nanocellulose can be utilized for mitigating N loss in soil and supporting crop production, resource management, and environmental sustainability.

2. Averill, A. L., **Eitzer, B. D.,** Drummond, F. A. (2024). Pesticide Contamination in Native North American Crops, Part I—Development of a Baseline and Comparison of Honey Bee Exposure to Residues in Lowbush Blueberry and Cranberry. *Insects 15*, 489. DOI: 10.3390/insects15070489

Abstract: A pesticide exposure baseline for honey bees was compiled for two New England cropping systems, the native North American plant species consisting of lowbush blueberry (*Vaccinium angustifolium* Aiton) and cranberry (*Vaccinium macrocarpon* Aiton). More unique pesticide compounds were applied in blueberry than cranberry, but the numbers of pesticides discovered in trapped honey bee pollen were similar between the two crop systems. Not all pesticides found in pollen were the result of the applications reported by growers of either crop. When comparing residues, number of pesticides detected, total concentration, and risk quotient varied between the two crops. Also, blueberry was dominated by fungicides and miticides (varroacides) and cranberry was dominated by insecticides and herbicides. When comparing reported grower applications that were matched with detection in residues, the proportion of pesticide numbers, concentrations, and risk quotients varied by crop system and pesticide class. In most cases, pesticide residue concentrations were of low risk (low risk quotient) to honey bees in these crops. Estimation of decay rates of some of the most common pesticide residues under field conditions could aid growers in selection of less persistent compounds, together with safe application dates, prior to bringing in honey bees for pollination.

3. Drummond, F. A., Averill, A. L., **Eitzer, B. D.** (2024). Pesticide Contamination in Native North American Crops, Part II—Comparison of Flower, Honey Bee Workers, and Native Bee Residues in Lowbush Blueberry. *Insects 15*, 567. DOI: 10.3390/insects15080567

Abstract: In lowbush blueberry fields, we conducted residue analysis comparing flowers, trapped pollen (honey bee and *Osmia* spp.), and collected bees (honey bee workers, bumble bee queens, and non-*Bombus* spp. wild native bees). The study was conducted from 2012 to 2014. The number of pesticide residues, total concentrations, and risk to honey bees (Risk Quotient) on flowers were not significantly different from those determined for trapped honey bee pollen (except in one study year when residues detected in flower samples were significantly lower than residue numbers detected in trapped pollen). The compositions of residues were similar on flowers and trapped pollen. The number of residues detected in honey bee pollen was significantly greater than the number detected in *Osmia* spp. pollen, while the total concentration of

residue was not different between the two types of pollen. The risk to honey bees was higher in trapped honey bee pollen than in trapped *Osmia* spp. pollen. The analysis of honey bee workers, native bumble bee queens, and native solitary bees showed that although more pesticide residues were detected on honey bee workers, there were no differences among the bee taxa in total residue concentrations or risk (as estimated in terms of risk to honey bees).

ENTOMOLOGY

PHILIP ARMSTRONG, PH.D. spoke to a reporter from Hearst Media about West Nile virus and the best repellents to protect against mosquito bites (July 11), interviewed by WTIC (July 18) and Univision News (July 19) about increased West Nile virus activity in Connecticut, and interviewed by NBC CT about the detection of EEE virus in mosquitoes (July 24).

ANGELA BRANSFIELD participated in a CAES Health and Safety Committee meeting (July 12), participated in Yale University's BSL-3 Subcommittee meeting (July 15), participated in Yale University's Biosafety Committee meeting (July 18), and participated in the Federal Select Agent Program's Responsible Official webinar "The FD-961 Process Explained; Genetically Modified Biological Select Agents and Toxins" (July 25).

KATHERINE DUGAS talked about the work in the Insect Information Office to a tour group from the Experiment Station Associates (12 attendees) (July 16); attended a career Q&A panel with the CAES undergraduate interns (July 29).

MEGAN LINSKE, PH.D. participated in a conference call with staff from Genesis Laboratories, Inc. on upcoming CDC-funded project on an experimental host-targeted systemic bait for tick management (July 22).

GOUDARZ MOLAEI, PH.D. attended the monthly meeting of the longhorned tick, *Haemaphysalis longicornis*, and discussed this tick activity in CT (July 8); was interviewed by WBZ NewsRadio 1030-Boston's News Radio about the surge in tick-borne diseases (July 10); and virtually met with scientists from the CDC Rickettsial Zoonoses Branch Division of Vector-Borne Diseases and discussed the recent increases in the incidence of Rocky Mountain spotted fever in Connecticut and the potential of a joint project in this regard (July 12); was interviewed by CNN about tick repellents; was interviewed by CNN about tick repellents including DEET or picaridin-based products and their suitability for children and sport/extremely sweaty conditions (July 12); and provided the "ESA CAES Behind the Scenes Tour" of the CAES Tick Testing Laboratory to the Experiment Station Associates (July 16).

JACOB RICKER attended the CT Tree Protective Association's annual summer meeting (July 18).

GALE E. RIDGE, PH.D. authored the Waterbury schools, "The School Nurse Procedure Manual" for the management of bed bugs in schools and students homes; she talked about the work in the Insect Information Office to a tour group from the Experiment Station Associates (12 attendees) (July 16); interviewed by Andrew DaRosa, Hearst Connecticut Media Group about Japanese beetles and Asiatic garden beetles (July 17); interviewed by William Hobbs, New London Day nature correspondent about bumble bees (July 18); had identification confirmed by USDA-SEL as a new Connecticut State record for Elm zigzag sawfly *Aproceros leucopoda* Takcuchi (Argidae) (July 26); interviewed by WCBS about migrating green darner dragonflies that swarmed Misquamicut beach in Rhode Island, also by Kathy Williams Channel 3 TV, Briceyda Landeverde NBCUniversal, and Patrick Soldi WTNH news 8 TV.

JOHN SHEPARD was interviewed about West Nile virus positive mosquitoes and tips to prevent mosquito bites and reduce mosquitoes around the home by Greg Thompson, News 12 (July 3) and Toi Thornton, NBC Connecticut (July 10); spoke about the Mosquito Trapping and Arbovirus Surveillance Program to a tour group of Experiment Station Associates (12 attendees) (July 16).

KIM STONER, PH.D. gave a talk, "Protecting Nature" at Massaro Community Farm in Woodbridge (18 attendees) (July 13). Participated in the state technical committee meeting of

the CT Office of the Natural Resources Conservation Service (NRCS). Hybrid meeting, participated by Zoom (40 participants) (July 17).

VICTORIA SMITH, PH.D. participated in the CT Tree Protective Association Summer meeting (July 18); was interviewed by Jennifer Ahrens of CT Public Radio about spotted lanternfly (July 19); participated in the National Plant Board 98th Annual Meeting, held at the Amway Grand Plaze in Grand Rapids, MI, with discussions on spotted lanternfly, box tree moth, and pest detection (July 21-25).

PAULA WOLF joined CAES as Apiary Inspector (July 26). Paula brings a wealth of experience to the position.

TRACY ZARRILLO provided input about Connecticut bees at a CT-SWAP meeting to discuss next steps for the 2025 update to the Connecticut State Wildlife Action Plan (July 11); was interviewed by William Hobbs of Estuary Magazine about native bees in Connecticut (July 19); participated in a zoom meeting with Dr. Steve Alm and Ms. Casey Johnson from the University of Rhode Island to discuss a new potential project with the NRCS (July 26).

PUBLICATIONS:

1. deMaynadier, P. G., Schlesinger, M. D., Hardy, S. P., McFarland, K. P., Saucier, L., White, E. L., **Zarrillo, T. A.**, and Young, B. E. (2024). Insect pollinators: The time is now for identifying species of greatest conservation need. *Wildlife Society Bulletin*. DOI: 10.1002/wsb.1537.

Abstract: Severe declines in the abundance of insects, including economically and ecologically important pollinators, are alarming conservationists and the public. Yet despite these increasingly well-documented declines, relatively few pollinating insects other than butterflies, moths, and bumble bees have appeared as Species of Greatest Conservation Need (SGCN) in State Wildlife Action Plans, decadal-scale blueprints for wildlife conservation efforts across the United States that require updating in 2025. Species absent from SGCN lists are ineligible for congressionally appropriated State Wildlife Grants that direct millions of dollars annually for their conservation. In the past, knowledge about the distribution and abundance of many insect pollinators was too poor to identify those meeting state guidelines for inclusion as SGCN. Using case studies from 4 northeastern states, we demonstrate that sufficient conservation status data now exist for many pollinators, including bees, butterflies, moths, beetles, and flower flies, to identify at-risk species meriting inclusion on SGCN lists in many states. Doing so will increase funding for surveys, habitat protection and enhancement, and other conservation activities that will benefit this vitally important guild.

AWARDS:

Victoria Smith, Ph.D. received the National Plant Board President's Outstanding Committee award, as part of a task force comprised of representatives from each of the four plant boards and USDA-Plant Protection and Quarantine, for work on box tree moth regulatory responses.

ENVIRONMENTAL SCIENCE & FORESTRY

SCOTT WILLIAMS, PH.D. as the Northeast Section Representative, participated in a Zoom call for members of the Professional Certification Review Board of The Wildlife Society (July 16); participated in a conference call with scientists from Genesis Laboratories, Inc. on progress on several ongoing collaborative projects (July 22); serving as Executive Treasurer, participated in a meeting of the Executive Committee of the Northeast Section of The Wildlife Society (July 23).

JOSEPH P. BARSKY gave an invited presentation on the Connecticut Oak Masting Surveillance Program as part of the 2024 Summer Seminar Series at Yale-Myers Forest in Eastford (45 attendees) (July 10); participated, as chair-elect, at the New England Society of American Foresters Board of Directors Meeting (July 16); attended the Connecticut Tree Protective Association summer meeting in Farmington (July 18).

JESSICA BROWN, PH.D. was interviewed by CT Insider for an article titled "Connecticut enlists homeowners, mice and deer in the fight against ticks" regarding ongoing tick surveillance efforts amid a 5-year area-wide study focused on host-targeted control of blacklegged ticks, *Ixodes scapularis* in residential settings (July 2).

GREGORY BUGBEE met via video conference with the United States Army Corps of Engineers to discuss the CT River Hydrilla Project (July 8, 10); participated in the quarterly meeting of the CT DEEP AIS Task Force (July 15); presented an invited talk on "Aquatic Vegetation in Bashan Lake" at the East Haddam Grange (July 25); interviewed by Elizabeth Regan of The Day on hydrilla in Gardner Lake (July 25); interviewed by Edward Mahoney of the Hartford Courant on hydrilla in the Connecticut River (July 30); gave invited talk on "Soil Testing: A Refresher" to the American Society of Landscape Architects in the Jones Auditorium (July 31).

RILEY DOHERTY conducted an invasive aquatic plant program for the North Stonington Parks and Recreation summer camp with **MADISON MANKE** (15 kids) (July 2).

JEREMIAH FOLEY, IV, PH.D. was interviewed by the Hartford Courant for a piece titled "Saving a CT Waterway: Scientist Gears Up for Summer-Long Fight Against Noxious, Destructive Weed" (July 8); was interviewed by The Day for a piece titled "Effort to Remove Invasive Aquatic Weed from Connecticut River Underway" (July 9); and attended and presented research poster titled "Northern Hydrilla (*Hydrilla verticillata* subsp. *lithuanica*): Discovery and Establishment Outside the Connecticut River" at the Aquatic Plant Management Society conference in St. Petersburg, FL (20 attendees) (July 15-18).

SUSANNA KERIÖ, D.SC. attended the Connecticut Tree Protective Association summer meeting and presented updates of a research project studying the impact of mycorrhizal inoculation on urban tree health at CAES booth (July 18); attended the Executive Committee meeting of the Connecticut Urban Forest Council as Executive Secretary (July 25).

ITAMAR SHABTAI, PH.D. travelled to the Department of Energy's Environmental Molecular Sciences Laboratory to work on an Exploratory Program project (July 1-5); met with **BLAIRE STEVEN. PH.D.** and collaborators from UConn to discuss a Long Island Sound Research Grant (July 18); discussed a BARD-ISUS grant proposal with a collaborator from the Hebrew University of Jerusalem, Israel (July 24); hosted a colleague from Virginia Tech at CAES to discuss a grant proposal to the NSF Low Temperature Geochemistry program (July 26).

SUMMER STEBBINS with **MADISON MANKE** gave an invasive aquatic plant workshop

to young campers for the Town of North Stonington (July 3); chaired the virtual Town of Guilford Lake Quonnipaug Subcommittee meeting (July 16).

ELISABETH WARD, PH.D. participated in the monthly State Coordinators meeting for the Forest Ecosystem Monitoring Cooperative (July 8); organized and co-led a dendrochronology and tree coring workshop at Yale-Myers Forest to assess the timing of ash tree mortality from emerald ash borer across Connecticut with Nathan Siegert, Ph.D. (State, Tribal, and Private Forestry, US Forest Service) and Marlyse Duguid, Ph.D. (The Forest School, The Yale School of the Environment) (13 attendees) (July 10); met with partners from organizations involved in urban and community forestry in Connecticut, including the Connecticut Urban Forest Council, Tree Wardens Association, University of Connecticut, CT DEEP Forestry Division, and Connecticut Land Conservation Council, to discuss opportunities for organizing a collaborative conference featuring forest health in Connecticut (July 17); was interviewed by The Yale School of the Environment on careers in forestry and forest ecosystem ecology (July 22).
CHARLIE (YINGXUE) YU, PH.D. met with collaborators from New Mexico State University and discussed about application of NIFA AFRI grant (July 24); attended the online workshop from EMSL "High Resolution Characterization of Mineral-Associated Organic Matter" (July 26).

LEIGH WHITTINGHILL, PH.D. met Stephen Cremin-Endes, Director, Community Building and Organizing NHS New Haven, and Stacy Maddern, UConn, at the Ivy Street Community Garden to discuss possible collaborations in collaborative and citizen science research on urban gardens in New Haven (July 13).

PUBLICATIONS:

1. Yu, Y., Qafoku, O., Kovarik, L., Astner, A. F., Hayes, D. G., and Flury, M. (2024). Mobility of soil-biodegradable nanoplastics in unsaturated porous media affected by protein-corona. *Environmental Science: Nano*. DOI: 10.1039/D4EN00140K

Abstract: Soil-biodegradable plastic has been increasingly used as mulches in agriculture, which provides not only agronomical benefits but also in situ disposal and biodegradation options. However, soil-biodegradable plastic mulches inevitably fragment into micro- and nanoplastics during biodegradation, which can reside in soils or migrate into deep soils, where they may not degrade readily due to reduced microbial activity. To date, little is known about the transport of soil-biodegradable micro- and nanoplastics in soils. Here, we studied the transport of soil-biodegradable nanoplastics (□200 nm) made of polybutylene adipate co-terephthalate (PBAT) in unsaturated sand (proxy for soil). Specifically, we studied the mobility of pristine and weathered PBAT nanoplastics in the absence and presence of proteins (positively charged lysozyme and negatively charged bovine serum albumin, pH = 7.7). We found that (1) both pristine and the weathered PBAT nanoplastics were mobile; (2) positively charged lysozyme formed protein-coronas around PBAT nanoplastics and inhibited the transport; and (3) decreased water saturation promoted the retention of PBAT nanoplastics via physical straining. These results suggest that soil-biodegradable nanoplastics fragmented from soil-biodegradable plastic mulches are mobile and may readily migrate into deep soil layers, but positively charged proteins and unsaturated flow would prevent such transport via formation of protein-corona and physical straining.

2. Tippery, N. P., Moreland, J., Wild, T., **Bugbee, G. J.**, **Stebbins, S. E.**, Mickley, J. G., Franck, A. R., Wefferling, K. M. and Warman, M. J. (2024). Toward a comprehensive phylogeny of North American bladderworts (Utricularia, Lentibulariaceae). *Aquatic Botany 195*, 103794. DOI: 10.1016/j.aquabot.2024.103794

Abstract: Carnivorous plants in the genus *Utricularia* (bladderwort) are diverse and widespread, represented in North America primarily by free-floating aquatic species. In the Nearc-

tic ecoregion, roughly corresponding to temperate North America, there are 20 species of *Utricularia*, comprising a small fraction of the approximately 270 species in the genus worldwide. However, despite their low number, the Nearctic species represent seven of the 18 taxonomic sections of *Utricularia*, a pattern that potentially reflects multiple ancestral dispersal events into North America. Most of the Nearctic bladderwort species are represented by DNA sequence data, yet there is no single genetic locus that has been sequenced for all species, and this has precluded a thorough evaluation of their phylogenetic relationships. In this study, we obtained DNA sequence data for genetic loci and species that had not been sequenced previously, to produce a fully sampled molecular phylogeny. The resulting phylogeny includes all species that occur in the USA and data from five DNA regions: one nuclear locus (internal transcribed spacer, ITS) and four plastid loci (trnK/matK, rpl20-rps12, rps16, and trnL-trnF). We recovered a close relationship between *U. inflata* and *U. radiata*, two species that both have aerenchymatous floral support structures, and which previously had not been sequenced for any of the same genetic loci. We also sequenced numerous *U. macrorhiza* individuals, and our data support the phylogenetic distinctness and molecular diagnosability of this species against *U. australis*, *U. tenuicaulis*, and *U. vulgaris*. Curiously, we discovered plants in Ohio, USA that were identified as *U. tenuicaulis* and *U.* × *neglecta* (= *U. tenuicaulis* × *U. vulgaris*), and these represent the first evidence of such plants being naturalized in North America. These previously overlooked species and hybrids highlight the importance of using DNA in plant surveys and the value of having a robust reference library of DNA sequences.

NEW STUDENTS, STAFF, AND VOLUNTEERS:

Natalie Bailey joined the Department as Technician I in July. She will be working under **SCOTT WILLIAMS, PH.D.** and **Megan Linske, Ph.D.** on host-targeted tick management research. In May, she graduated from Cornell with a BS in Environment and Sustainability. During her undergraduate years, Natalie worked in Dr. Laura Harrington's vector biology lab, where she assisted with research projects focused on isolating the genes responsible for remating behaviors in mosquitos. During the last two summers, she worked as an intern on the New York State Tick Blitz, an annual citizen science project that aims to document the distributions of the lone star tick (*Amblyomma americanum*) and Asian longhorned tick (*Haemaphysalis longicornis*) throughout New York. This project utilized volunteers from around the state to sample ticks in their home counties and was done in collaboration with the Northeast Regional Center for Excellence in Vector-Borne Diseases (NEVBD) and the Cornell Cooperative Extension. In her free time, Natalie enjoys trying out new recipes and tending to her planted aquarium.

PLANT PATHOLOGY AND ECOLOGY

LINDSAY TRIPLETT, PH.D. presented a poster titled "Exploring novel communities of plant-associated protists in the rhizosphere (60 adults) (July 9) and presented a talk titled "Function of predator-associated *Pseudoxanthomonas* in the rhizosphere" at the International Congress of Plant Pathogenic Bacteria and Biocontrol meeting in Blacksburg, VA (85 adults) (July 11); led a data analysis workshop and presentation practice session for students in the Plant Health Fellows program (10 adults) (July 29); chaired the annual meeting of the APHIS Widely Prevalent Bacteria meeting as part of Plant Health 2024 (11 adults) (July 29).

WASHINGTON DA SILVA, PH.D. The **da Silva Lab** group met with faculty members from the UCONN Material Sciences Department to discuss potential collaborations in tuning nanocarriers to deliver antiviral and antifungal agents to plants to induce plant protection; **Dr. da Silva** gave a presentation on the research being conducted at the da Silva Lab at CAES-Storrs, CT (15 adults) (July 2); met with employees of the company, 12-15 Diagnostics, to discuss future collaborations in developing a rapid test for plant pathogens detection (10 adults) (July 10); delivered an invited seminar entitled "Realizing the potential of nanotechnology for the diagnosis and control of plant viruses" at the Plant Health 2024 meeting in Memphis, TN (80 adults) (July 28).

YONGHAO LI, PH.D. participated in the National Plant Diagnostic Network Online Communication & Web Portal Committee meeting via Zoom (8 adults) (July 10); participated in the Northeast National Plant Diagnostic Network Meeting via Zoom (12 adults) (July 11); with **Felicia Millett**, talk about plant disease diagnosis and seed testing to ESA CAES Behind the Scenes Tour (10 adults) (July 16); staffed the Station booth at the Connecticut Tree Protective Association Summer Meeting in Farmington (July 18).

ROBERT MARRA, PH.D. conducted in-field training at Harvard Forest in the use of sonic and electrical-resistance tomography to a Yale grad student and two undergraduate research interns in the Harvard Forest program in Petersham, MA (July 1- July 4).

FELICIA MILLETT participated in the NPDN Professional Development Committee monthly meeting (10 adults) (July 2); participated in the NPDN Proficiency Committee monthly meeting (6 adults) (July 16); and spoke to Plant Health Fellows as part of a career panel (10 students) (July 29).

RAVIKUMAR PATEL PH.D. presented a talk "Soil protists harbor diverse novel bacteria that encode plant growth-promoting traits" at the Plant Health 2024 meeting in Memphis, TN (37 adults) (July 30)

STEPHEN TAERUM, PH.D. presented a keynote speech titled "Exploring the impact of protist microbiomes on plant health" at the International Congress of Plant Pathogenic Bacteria and Biocontrol meeting in Blacksburg, VA (190 adults) (July 9)

QUAN ZENG PH.D. presented a poster titled "Identification and characterization of yeast flower microbiome that induces plant defense in apple" (60 adults) (July 9) and presented a keynote talk titled "Quorum sensing mediated bacterial inter species communication in the rhizosphere" at the International Congress of Plant Pathogenic Bacteria and Biocontrol meeting in Blacksburg, VA (85 adults) (July 12); participated in the Senior Editor meeting for Phytopathology at the Planthealth2024 in Memphis, TN (12 adults) (July 27), and Bacteriology group discussion (10 adults) (July 29) at the same meeting.

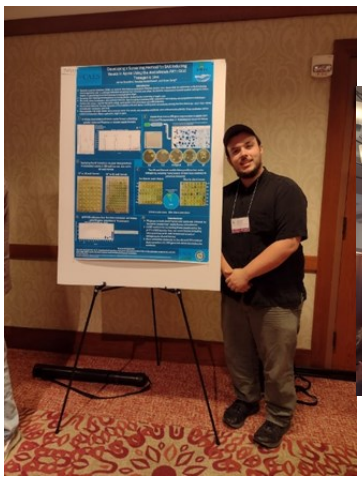
PUBLICATIONS:

1. Zeng, Q., Emeriewen, O., Rezzonico, F. et al. (2024). Burning questions for fire blight research. II. Critical next steps in disease management and in host resistance breeding of apple and pear. *J Plant Pathol.* DOI: 10.1007/s42161-024-01678-0

Abstract: Fire blight is a devastating disease of apple and pear worldwide. One reason fire blight is so difficult to manage is because of the lack of effective non-antibiotic management options as well as a limited host resistance gene pool. Traditional management approaches utilizing antibiotic and copper sprays face multiple problems including antibiotic resistance and human health concerns. Furthermore, most management materials are used to control the blossom blight stage of infection, and fewer materials are available to control shoot blight stage of infection. Breeding for host resistance against fire blight is limited by the heterozygosity of apple, as well as the lack of understanding of the host-pathogen interactions. In this review, we raised some of these "burning questions", which suggest directions for future research in management and resistance breeding of fire blight.

2. Assunção, D., Evangelista, L. F., **da Costa, T.**, **Silva, J.**, Bento, E., Alves Neto, J., **da Silva, W.**, Ambrósio, M. M., Holanda, I. (2024). First report of *Colletotrichum plurivorum* and *Colletotrichum truncatum* causing anthracnose on melon plants in Brazil. *Plant Disease*. DOI: 10.1094/PDIS-02-24-0379-PDN

Abstract: Melon (*Cucumis melo* L.) is an economically important crop in Brazil, with an annual production of 699.281 tons. Fungal diseases are one of the biggest problems in melon production, and melon growers in northeastern Brazil have reported over 80% of plants showing anthracnose-like symptoms in the fields during rainy seasons. Plants were wilted, displaying brown necrotic lesions and water-soaked spots with yellowish edges on the leaves and vines. Melon fruits displayed necrotic lesions on the outside. From June 2022 to June 2023, melon leaves (varieties Yellow, Galia, and Cantaloupe) from symptomatic plants were collected in four melon farms located in the municipalities of Afonso Bezerra, Mossoró, Tibau, and Upanema in the state of Rio Grande do Norte. Isolated fungi were identified by morphology and Sanger sequencing, eight isolates were identified as *Colletotrichum plurivorum* and three isolates as *C. truncatum.* Pathogenicity tests were performed and confirmed the isolates as causal agents of the disease observed in the melon fields. The species *C. plurivorum* has already been reported to cause disease in Cucumbers in Brazil and *C. plurivorum* and *C. truncatum* in *Citrullus lanatus* in China. To the best of our knowledge, this is the first report of *C. plurivorum* and *C. truncatum* causing anthracnose in melon plants in Brazil.




Left to Right: Quan Zeng, James Standish, and Stephen Taerum present at the International Congress of Plant Pathogenic Bacteria at Virginia Tech.

The da Silva Group visiting the Department of Material Sciences at UCONN. From left to right, **Joedson Lima, Rania El-Tanbouly, Washington da Silva, Raja Muthuramalingan, Jarlan Silva,** and **Talison da Costa**.

VALLEY LABORATORY

DEWEI LI, PH.D. participated in IAA International Aerobiology Congress in Lithuania and made a poster presentation 'Airborne basidiospores of Thelephoroid and Tomentelloid fungi' (203 attendees) (July 1-5).

JATINDER S AULAKH, PH.D. and **RICH COWLES, PH.D.** attended the Connecticut Christmas Tree Growers' twilight meeting and gave a research demonstration on postemergence herbicide crop safety and weed control in Christmas trees at Gray Ledge Tree Farm – 210 Lathrop Road, Plainfield, CT (~ 65 attendees) (July 11).

CAROLE CHEAH, PH.D., through a 2024 grant from the Lower Farmington and Salmon Brook Wild and Scenic Committee funded by the National Park Service's Partnership Wild and Scenic River Program, released hundreds of *Sasajiscymnus tsugae* ladybeetles to control hemlock woolly adelgid (HWA) on infested hemlocks at McLean Game Refuge with staff (May 29); visited the Tree Savers Insect Rearing Laboratory in Mayfield, PA to collect *S. tsugae* donated to Cheah HWA biological control program for CT state lands (July 17); released *S. tsugae* to protect Belding, Tankerhoosen and Kollar Wildlife Management Areas (State of CT WMAs) with DEEP wildlife biologist and seasonal staff (July 22); released hundreds of *S. tsugae* at Kettletown State Park (July 24), at Talbott WMA in Scotland in the Merrick Brook watershed with DEEP wildlife biologist and forester (July 25), and Great Pond, Massacoe State Forest, Simsbury (July 25); trained staff and interns at Steep Rock Association (SRA), Washington on methods to assess hemlock health in release sites and participated in video filming on biological control of HWA and the supporting role of SRA (5 participants) (July 29); released along Furnace Brook, Wyantenock SF, Golds Pine, and Dean's Ravine, Housatonic State Forest (July 30); gave an overview of *S. tsugae* for HWA biological control for Avalonia Land Conservancy and guided the release at the Hoffman Evergreen Preserve (5 members and volunteers) (July 31).

JAMES LAMONDIA, PH.D. participated in a beech leaf disease researcher meeting held at the CAES campus in New Haven (April 23); participated in a joint CT Ag Information Council and CT Ag Education Foundation meeting concerning future interaction (May 10); chaired a CT Ag Information Council meeting concerning the Century Farm Award (May 31); attended and participated in the premier showing and panel discussion of the documentary 'Stepping in to the shade' held at the Westport CT library (June 1); toured nominated farms as a part of the Century Farm award selection process by the CAIC (June 12).

NATHANIEL WESTRICK, PH.D. participated in the International Fungal Pathogen Genomics workshop at the Wellcome Genome Campus in Hinxton, UK (24 Participants) (June 2-7).

JOURNAL ARTICLES APPROVED JULY 2024

Abdelraheem, W., Meng, L., **Pignatello, J. J.*** Nourin Seenthia, Wenqing Xu Participation of Strong H-bonding to Acidic Groups Contributes to the Intense Sorption of the Anionic Munition, Nitrotriazolone (NTO) to a Carbon. *Environmental Science and Technology*.

Chen, Z., Wang, C., and **Pignatello, J. J.*** Hydrogen Peroxide-Assisted Alkaline Defluorination of the Fumigant and Potent Greenhouse Gas, Sulfuryl Fluoride: Hydrogen Peroxide as a Nucleophilic Reagent. *Environmental Science and Technology*.

Hafiz, A. M. I., Ahmadisharaf, E., Salehi, M., Farner, J., **White, J. C.**, Zeng, E. Y., Nazari, B. A review of concepts, processes and models for the export of microplastics from terrestrial to aquatic systems. *Wire Water*.

Irshad, S., Jiang, Y., Sun, Y., Tuga, B., Haynes,C., **White, J. C.**, Rui, Y., Zhang, P. Mo-Nitrogen Nexus: Current state of knowledge and recent advances in Mo-based efficient nitrogen fixation. *Environmental Science and Technology*.

Li, C., Shang, H., Hu, X., Eggleston, I., McClements, D. J., Han, B., **White, J. C.**, Ma, C., Xing, B. Ingestion of polystyrene nanoplastics impairs nutrient assimilation from corn (*Zea mays*) in a simulated human digestive tract: Impact of nanoplastic surface chemistry on starch digestibility and phytochemical bioaccessibility. *Environmental Science and Technology*.

Mondron, K., **Keriö, S.**, Søndreli, K. L., Chen, J.-G., Muchero, W., Simon, S. J., DiFazio, S. P., X LeBoldus, J. M. QTL and transcriptomic analyses reveal a putative transcription factor associated with Septoria (*Sphaerulina musiva*) stem canker in Populus trichocarpa × Populus deltoides hybrid poplar. *New Phytologist*.

Nieland, M. A., Lacy, P., Allison, S. D., Bhatnagar, J. M., Doroski, D., Frey, S. D., Greaney, K., Hobbie, S., Kuebbing, S. E., Lewis, D. B., McDaniel, M., Perakis, S. S., Raciti, S. M., Templer, P. H., Shaw, A., Sprunger, C. D., Strickland, M. S., van Diepen, L. T. A., Vietorisz, C.,. **Ward, E. B.**, Keiser, A. D. Nitrogen deposition weakens coupled soil carbon and nitrogen dynamics across the continental United States. *Global Change Biology*.

Noman, M., Ahmed, T., **White, J. C.**, Wang, J. Bioinspired smart microcarriers precisely deliver agrochemicals in plants. *Trends in Plant Science*.

Rochlin, I., Kenney, J., Little, E., **Molaei, G.*** Public Health Significance of the White-tailed Deer (*Odocoileus virginianus*) and Its Role in the Eco-epidemiology of Tick and Mosquito-Borne Diseases. *Parasites & Vectors*.

Takeshita, V., Oliveira, F. F., Garcia, A., **Zuverza-Mena, N.**, **Tamez, C.**, Cardosa, B. C., Pinácio, W. C., Steve, B. T., LaReau, J., Astete, C. E., Sabliov, C. M., Fraceto, L. F., Tornisielo, V. L., Dimkpa, C.O., **White, J.C.** Delivering metribuzin from biodegradable nanocarriers: Assessing herbicidal effects for soybean plant protection and weed control. *Nano*.

Teng, M., Li, Y., Zhao, L., Zhou, C., **White, J. C.**, Sun, J., Zhang, Z., Zhao, X., Wu, F. Life cycle exposure to differentially charged polystyrene nanoplastics leads to gender-specific particle accumulation and neurotoxicity in Zebrafish (*Danio rerio*). *Nature Nanotechnology*.

Zhang, X., Zhang, X., **White, J. C.**, Xu, Y., Yang, J., Hou, X., Zhao, Q., Wu, F., Xing, B. Understanding the regulatory mechanisms of nanomaterials on carbon fixation in plants. *Nature Communications*.

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The Connecticut Agricultural Experiment Station

Main Laboratories
123 Huntington Street
New Haven, CT 06511-2016
Phone: 203-974-8500

Lockwood Farm
890 Evergreen Avenue
Hamden, CT 06518-2361
Phone: 203-974-8618

Griswold Research Center
190 Sheldon Road
Griswold, CT 06351-3627
Phone: 860-376-0365

Valley Laboratory
153 Cook Hill Road
Windsor, CT 06095-0248
Phone: 860-683-4977

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Station News was prepared and edited by Dr. Jason White, Ms. Vickie Bomba-Lewandoski, and Mrs. Natalie Rivera.

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