

Station News

The Connecticut Agricultural Experiment Station
Volume 10 Issue 12 December 2020



Photo taken by Dr. Quan Zeng in the Department of Plant Pathology and Ecology, Lockwood Farm Sunset on 12/14/2020.

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

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GRANTS RECEIVED NOVEMBER 2020

“Assessing the suitability of recycled wastewater with variable stormwater influence for use in crop irrigation”; Sara Nason with co-PIs, Nubia Zuverza-Mena and Lee Blaney; \$500,000; USDA NIFA AFRI.

Project Summary: Wastewater reuse for irrigation reduces demand from surface and ground water sources. However, this innovative strategy involves risks from the higher levels of organic and inorganic contaminants in recycled wastewater (RWW) compared to conventional water sources. During storm events, contaminant concentrations in RWW fluctuate because sewers receive variable loads of municipal wastewater and stormwater. This project will characterize stormwater influences on contaminant loads in RWW and the associated effects on RWW irrigated crops. In Objective 1, we will assess how rain events affect the organic contaminant, heavy metal, and nutrient profiles of RWW from two sites with significant intentional and unintentional wastewater infiltration. In Objective 2, we will determine how RWW irrigation with variable stormwater influence affects accumulation of contaminants in zucchini plants and plant health and nutritional value. Objectives 1 and 2 will feature both targeted and novel non-targeted analysis methods to provide extremely broad coverage of organic contaminant detection. In Objective 3, we will develop novel predictive tools to determine the effects of using RWW with varying levels of stormwater influence for crop irrigation. Our strategies include chemical fingerprinting and contaminant partitioning models. This project will enable development of reliable RWW quality benchmarks for assessing non-traditional water use for irrigation. Furthermore, results will be used to provide guidance to farmers and wastewater utilities on best management practices for irrigation with wastewater reclaimed during storm events.

ADMINISTRATION

DR. JASON C. WHITE participated in the Department of Public Health Laboratory Preparedness monthly conference call (November 2); participated in the 4th International Conference on NanoForAgri 2020 (Virtual): Application of Nanotechnology for Sustainable Productive and Safer Agriculture and Food Systems and presented a seminar entitled “Nano-enabled Strategies to Enhance Crop Nutrition and Protection” (65 attendees) (November 5-6); participated in the weekly calls for the NSF Center for Sustainable Nanotechnology (CSN) (November 4, 11); participated in a ZOOM call with Harvard University collaborators to discuss ongoing joint projects (November 4); participated in teleconference calls with **DR. KIRBY STAFFORD** and **DR. VICTORIA SMITH**, as well as officials at the CT DEEP, CT DoAg, and USDA APHIS regarding surveillance for the spotted lanternfly (November 5, 19); participated in a monthly CSN all faculty call (November 5); as a member of her graduate committee, participated in the Proposal B Defense of Yingqing Ye, a PhD student at the University of Texas El Paso (November 9); participated in a CSN panel discussion for graduate students on grant proposal preparation and submission (November 10); hosted by ZOOM the CSN monthly “Nanochemistry-Plant” working group call (November 10); participated in the Materials Innovation for Sustainable Agriculture (MISA) 2020 Symposium (Virtual) and gave a presentation entitled “Nano-enabled Management of Crop Disease: Applications and Implications” (30 attendees) (November 12); participated in the 2020 Annual Sustainable Nanotechnology Organization (SNO) Conference and gave presentations entitled “Nanoscale Micronutrients to Enhance Crop Disease Resistance: Unintended Consequences in the Rhizosphere?” (45 attendees) and “Copper Sulfide Nanoparticles Suppress *Gibberella fujikuroi* Infection in Rice Seeds by Multiple Mechanisms: Contact-mortality, Nutritional Modulation and Phytohormone Regulation” (November 13); held a ZOOM call with Professor Marta Marmiroli of the University of Parma to discuss the *International Journal of Phytoremediation* (we are senior Board members) (November 16); participated in the SETAC North America 41st Annual Meeting (Virtual) and gave a presentation entitled “Nanoscale Micronutrients to Enhance Crop Disease Resistance: Unintended Consequences in the Rhizosphere?” (25 attendees) (November 15-16); participated in a Northeast Waste Management Officials Association (NEWMOA) call on PFAS soil leaching issues (November 19); participated in a CT Department of Public Health call on vaccination planning for state agencies (November 20); hosted a ZOOM call with collaborators at Johns Hopkins University to discuss ongoing experiments (November 20); as a member of her graduate committee, participated in Heping Shang’s Comprehensive Oral exam; Hep-

ing is a PhD student at the Stockbridge School of Agriculture at the University of Massachusetts (November 20); hosted a ZOOM call with **DR. WADE ELMER**, **DR. YU SHEN**, and CSN investigators at the University of Wisconsin Milwaukee to plan out collaborative experiments (November 23); as a member of his graduate committee, participated in the Proposal A Defense of Jesus Cantu, a PhD student at the University of Texas El Paso (November 24); along with **DR. CHRISTIAN DIMKPA**, hosted Special Agent John Souvlis of the FBI WMD Directorate in New Haven on a tour and discussion of programs (November 24); hosted a ZOOM call with collaborators at the University of Wisconsin, University of California Riverside, and Carnegie Mellon University to discuss a collaborative grant proposal (November 25); and participated in the FDA LFFM kick-off Web-Ex calls for our new Human Food and Animal Food cooperative agreement programs (November 30).

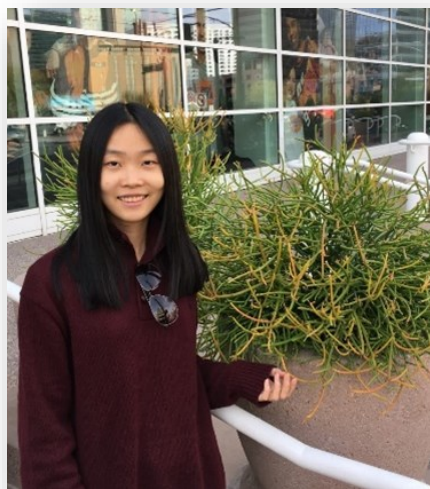
ANALYTICAL CHEMISTRY

DR. BRIAN EITZER participated in a webinar on the procedures used to close out the AFRPS program (November 11); participated in the APHL Cannabis Community of Practice monthly call focused on updates from across the United States on laboratory and regulatory activities (November 12); and participated in a webinar on the initiation of the Laboratory Flexible Funding Model’s Human Food and Animal Food and Feed Programs and the Food Defense Program (November 30).

DR. CHRISTINA ROBB attended the virtual Eastern Analytical Symposium (November 16-19). She also participated in the EAS board meeting and accepted election to the EAS executive committee; and participated in the FDA LFFM webinars on Animal and Human Food and Feed Program and the Food Defense Program (November 30).

MS. TERRI ARSENAULT gave a presentation to hemp growers for the CT Department of Agriculture entitled “Industrial Hemp: Crop for the Future?” The talk described our qualifications as a laboratory to analyze hemp for total delta-9 THC, and our experiences in growing hemp at Lockwood Farm. As an accredited laboratory, we have developed a quality system for generating defensible test results and are able to process samples within 1 or 2 business days. Unfortunately, at this time many varieties of hemp are prone to exceeding the limit of 0.3% total delta-9 THC allowed for harvest, which represents a serious concern for hemp growers.

DR. YI WANG joined the Station in November. Dr. Wang works as a Post-Doctoral Research Scientist in the Department of Analytical Chemistry. She received her PhD in Chemistry from the University of Texas at El Paso in 2020 and joined the Station afterwards. She is working on approaches to enhance growth and suppress disease in agricultural crops using sulfur nanomaterials. Her work would also involve assessing nutrient element accumulation in plant tissues, and the corresponding physiological, biochemical, metabolic, and genetic responses of the exposed plants.



ENTOMOLOGY

DR. KIRBY C. STAFFORD III presented a webinar entitled “Ticks: It’s Not Just Lyme Disease Anymore - Strategies and Challenges” for the Department of Entomology, Rutgers University (38 participants) (November 6); and presented a virtual paper at the Annual Meeting of the Entomological Society of America entitled “Integrated Tick Management for the Control of the Blacklegged Tick, *Ixodes scapularis* (Acari: Ixodidae),” which was available for on-demand viewing throughout the meeting (November 13-30).

DR. GALE E. RIDGE organized and ran an international symposium, part of the Entomological Society of America virtual annual meeting, with experts representing the media, entomology, hospital emergency rooms, veterinary entomology, neurology, medical parasitology, clinical parasitology, dermatology, dermatopathology, psychodermatology, and psychiatry addressing Delusions of Infestations. The thirteen speakers over a four-hour period addressed this not uncommon psychiatric/physiological disorder where people believe they are being parasitized by arthropods, fungi, nematodes, or other pathogens. Untreated, it can ravage sufferers’ lives (November 17).

DR. CLAIRE E. RUTLEDGE gave a livestream talk on the current state of Emerald Ash Borer in Connecticut for the White Memorial Conservation Center (November 7).

DR. VICTORIA L. SMITH participated in a meeting of the Yale Biosafety Committee via ZOOM (23 participants) (November 19).

DR. KIMBERLY A. STONER presented a poster at the Annual Meeting of the Entomological Society of America entitled “Honey Bees (*Apis mellifera* L.) at Ornamental Plant Nurseries Collect Very Little Pollen from Ornamental Plants,” which was available for on-demand viewing throughout the meeting and had 69 views (November 13-30); hosted a “Hot Topics” session on ZOOM as part of the Entomological Society of America Annual Meeting to discuss ways to make the ESA a leading source of information on pollinators (30 participants) (November 13); gave a presentation entitled “Amplifying the Buzz: Establishing the Entomological Society of America as a Leader in Developing and Disseminating Information on Pollinators” to the networking session of the Plant-Insect Ecosystems Section of the Entomological Society of America (145 attendees) (November 17); and participated in a meeting of the Soil/Agriculture subcommittee of the Working and Natural Lands Working Group of the Governor’s Council on Climate Change to discuss issues to bring forward in the final report of the Working and Natural Lands Working Group (8 participants) (November 18).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO gave a virtual talk entitled “Trapping and Destroying Fumigant Vapors in Fumigation Chamber Vent Streams” at the 2020 Methyl Bromide Alternatives Outreach Conference (November 3-5); gave a virtual talk entitled “Ring Cluster Size as an Important Intrinsic Driving Force for Sorption of Organic Compounds to Pyrogenic Carbons (Natural Chars and Biochars)” at the annual Soil Science Society of America meeting (November 9-13); attended a virtual meeting of the editorial board for *Soil Science Society of America Journal* (November 16); and met virtually with collaborators from Villanova University, Pacific Northwest National Laboratory, and Oregon Health and Science University on an SERDP grant project (November 23).

DR. PHILIP ARMSTRONG was a guest on Face Connecticut, WTIC radio, to speak about the results of his CAES study documenting an overall increase in mosquito abundance and diversity after two decades of statewide surveillance (November 12).

DR. DOUG BRACKNEY gave a talk entitled “Optimizing Community Scale Surveillance Ef-

forts for SARS-CoV-2” at the monthly Sigma Xi Quinnipiac Chapter at Quinnipiac University (20 student attendees, 35 attendees total) (November 11).

MS. ANGELA BRANSFIELD participated in the American Biological Safety Association’s SRA Approved Users-Regulatory Session workshop (November 18).

MR. GREGORY BUGBEE served as a panelist on the Northeast Aquatic Nuisance Species Panel at the 2020 annual virtual meeting (November 11); spoke on “Dogwood Lake - Aquatic Plant Survey Results and Management Options” at a ZOOM meeting of town officials and citizens from Trumbull (approx. 12 attendees) (November 5); and, with **MS. SUMMER STEBBINS**, spoke on “Hydrilla in the Connecticut River” at a virtual meeting of the Connecticut River Coastal Conservation District, and received the District’s 2020 Outstanding Environmental Project Award for invasive aquatic plant survey work and public outreach (approx. 20 attendees) (November 19).

DR. ANDREA GLORIA-SORIA gave a virtual talk entitled “Museum Specimens Reveal the Genomics of Extinct Populations of *Aedes aegypti* in the Mediterranean” (126 attendees); appeared as co-author of a virtual talk by her postdoc Andrés Gómez-Palacio entitled “Identifying and Accounting for Ascertainment Bias in the *Ae. aegypti* SNP-Chip Using Whole Genome Sequencing” (56 attendees); and was author of two papers highlighted, all during the Annual Meeting of the Entomological Society of America (November 11-25).

DR. SARA NASON gave a virtual talk entitled “Validation of Novel Software for Non-Targeted Analysis of PFAS”; gave two posters entitled “Non-Targeted Analysis of Primary Sewage Sludge Collected During the COVID-19 Pandemic” and “Establishing Shared Vocabulary and Reporting for Non-Targeted Studies: An Update from the Benchmarking and Publications for Non-Targeted Analysis Working Group”; served as a panelist at the Exploring Career Choices student event; and served as a judge for student presentations, all at the SETAC SciCon2 conference (November 15-19).

MS. SUMMER STEBBINS gave a virtual talk entitled “Using GIS to Map Invasive Aquatic Plants” at the CT GIS Day hosted by the Connecticut GIS Network (November 4).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD was interviewed about white pine cones by Robert Miller, Danbury News-Times (November 3); participated in the Audubon CT/NY Science Forum (November 5); gave an invited talk entitled “Directed Flaming to Control Invasive Plants” at the Upper Midwest Invasive Species Virtual Conference (180 attendees) (November 6); participated in a conference call with state and private foresters to discuss forest management and carbon storage/sequestration (November 9); led a field tour of silvicultural practices for Yale Forestry graduate students in North Madison (6 students) (November 18); spoke on “Oak Resiliency - Why and How” for the Rhode Island Woodland Partnership (24 attendees) (November 18); participated in a planning call for Oak Resiliency Virtual Town Hall for Landowners (November 18); and participated in an NESAF 2020 planning committee conference call (November 24).

DR. SUSANNA KERIÖ attended an Urban Forestry Today webcast on tree biomechanics (November 5); participated in a virtual Urban Forestry Working Group meeting of the Society of American Foresters (November 13); attended a virtual IUFRO seminar on forest monitoring (November 17); and participated in a ZOOM call to plan collaboration related to American chestnut resistance testing (November 17).

DR. ABIGAIL A. MAYNARD participated in a ZOOM meeting of the Soils and Agriculture subcommittee of the Governor’s Committee on Climate Change (November 2).

MR. JOSEPH P. BARSKY participated in an NESAF 2020 planning committee conference call (November 24).

PLANT PATHOLOGY AND ECOLOGY

DR. WADE ELMER, with **DR. JASON WHITE**, **DR. NUBIA ZUVERZA**, and **DR. CARLOS TAMEZ**, ZOOM-conferenced with Dr. Philip Demokritou (Associate Professor, Harvard) and his graduate students Zeynep Aytac and Tao Xu about using nanoparticles on plants (November 4); gave a presentation via ZOOM entitled “Nanotechnology in Plant Pathology” at the 4th Annual International NanoForAgri conference on Application of Nanotechnology for Sustainable, Productive and Safer Agriculture and Food Systems (17 attendees) (November 4); participated in a ZOOM conference with Mr. Andrew Bramante (Science teacher at Greenwich High School) and a Greenwich high school student, Isabella Gega, about projects (November 11); participated in a ZOOM conference with a sub-group of the APS Foundation committee (November 17); participated in a ZOOM conference with Dr. Rich McAvoy (UConn) and **DR. QUAN ZENG** about hosting graduate students at CAES (November 19); discussed nanoparticle research, via ZOOM, with Ines Karmous from Tunisia (November 19); and attended, via ZOOM, the CAES Council Association meeting (November 30).

DR. YONGHAO LI presented “All About Fungi and Fungicides - What Every Gardener Needs to Know” for UConn Master Gardener classes via ZOOM (31 adults) (November 10); participated in the National Plant Diagnostic Network Online Communication and Web Portal Committee Meeting via ZOOM (9 adults) (November 11); and attended the Northeast Greenhouse Conference & Expo Virtual Webinar 3 - Growing Garden Mums Without Disease Losses (November 18).

DR. ROBERT E. MARRA presented a talk entitled “Beech Leaf Disease: A New Disease for Connecticut” at the Sussex Plant Biology Symposium via ZOOM (November 6); presented a 2-hour talk entitled “Weather Extremes and Their Impacts on Tree Diseases” to the Fairfield County Cooperative Extension, for the UConn Master Gardener Certification program (56 adults) (November 10).

DR. NEIL SCHULTES presented the third lecture in a three-lecture series on “Genetically Modified Plants in Agriculture” in a Yale Course Scie 031 “Current Topics in Science” (13 students) (November 6); with **MR. CRAIG MUSANTE**, **MS. TERRI ARSENAULT**, **MS. VICKIE BOMBA-LEWANDOSKI**, **MR. MICHAEL LAST**, **DR. WADE ELMER**, and **DR. JASON WHITE**, conducted the CAES Association meeting (November 30).

DR. QUAN ZENG delivered a departmental seminar entitled “Flower microbiome and its impact to plant health” for the Department of Entomology and Plant Pathology at the University of Arkansas via ZOOM (40 adults) (October 5); gave an oral presentation entitled “Epiphytic Proliferation and Entry Points of the Fire Blight Pathogen *Erwinia amylovora* to Apple Leaves” at the Sussex Plant Symposium organized by Yale University via ZOOM (35 adults) (November 6); participated in the graduate admission committee meeting of the Department of Plant Science and Landscape Architecture at the University of Connecticut via ZOOM (10 adults) (November 24).

VALLEY LABORATORY

DR. JAMES LAMONDIA participated in an SCRI Boxwood Blight Grant project quarterly research update ZOOM meeting (November 18).

Cui, Zhouqi, Regan Huntley, Neil Schultes, Blaire Steven, and Quan Zeng. 2020. Inoculation of stigma colonizing microbes to apple stigmas alters microbiome structure and reduces the occurrence of fire blight disease. *Phytobiomes Journal* <https://apsjournals.apsnet.org/doi/abs/10.1094/PBIOMES-04-20-0035-R>.

Abstract- Flowers secrete nutrient rich exudates that support the growth of an assemblage of microorganisms, including both beneficial and pathogenic members, most of which belong to the phylum Proteobacteria. Given the potential role of the microbiome in plant health, manipulating the microbiome to promote growth of beneficial members holds promise in controlling plant diseases. In this study we inoculated four different bacterial strains that were originally isolated from apple stigmas, alone or in mixtures of increasing complexity, onto apple flowers during bloom. We tested if such treatments would influence fire blight occurrence, a disease caused by *Erwinia amylovora*, and if we could detect a shift in the structure of the microbiome due to the treatments. We show that various inoculations did influence the occurrence of fire blight, although the level of disease suppression was dependent upon specific bacterial strains. Furthermore, treatments using different strains or strain mixtures predominantly resulted in increased representation of the inoculated strains, suggesting that disease suppression was due to an alteration of the stigma microbiome structure. Compared to treatments with single strains, a *Pantoea-Pseudomonas* strain mixture produced a homogeneous microbiome structure with less inter-flower variability. Findings from this study suggest the microbiome on the flower stigma can be manipulated through microbial inoculation. Due to flowers' short life span yet important role in plant disease infection, even a short-term influence on microbiome composition may result in significant decreases in disease susceptibility.

Eastwood, G., John J. Shepard, Michael J. Misencik, Theodore G. Andreadis, and Philip M. Armstrong. 2020. Local persistence of novel regional variants of La Crosse virus in the Northeast USA. *Parasite Vectors* 13(1):569.

Abstract- La Crosse virus (LACV) (genus Orthobunyavirus, family Peribunyaviridae) is a mosquito-borne virus that causes pediatric encephalitis and accounts for 50-150 human cases annually in the USA. Human cases occur primarily in the Midwest and Appalachian regions whereas documented human cases occur very rarely in the northeastern USA. **Methods:** Following detection of a LACV isolate from a field-collected mosquito in Connecticut during 2005, we evaluated the prevalence of LACV infection in local mosquito populations and genetically characterized virus isolates to determine whether the virus is maintained focally in this region. During 2018, we detected LACV in multiple species of mosquitoes, including those not previously associated with the virus. We also evaluated the phylogenetic relationship of LACV strains isolated from 2005-2018 in Connecticut and found that they formed a genetically homogeneous clade that was most similar to strains from New York State. Our analysis argues for local isolation and long-term persistence of a genetically distinct lineage of LACV within this region. We highlight the need to determine more about the phenotypic behavior of these isolates, and whether this virus lineage poses a threat to public health.

Gatchell, I. T., Regan B. Huntley, Neil P. Schultes, and G. S. Mourad. 2020. The guanine-hypoxanthine permease GhxP of *Erwinia amylovora* facilitates the influx of the guanine toxic derivative 6-thioguanine. *J. Applied Microbiology* <http://doi.org/10.1111.jam.14925>.

Aim: *Erwinia amylovora* is the causal agent of fire blight, a devastating disease of apples and pears. This study determines if the *Erwinia amylovora* guanine-hypoxanthine transporter (EaGhxP) is required for virulence and if it can import the *E. amylovora* produced toxic analog 6-thioguanine (6TG) into cells.

Methods and Results: Characterization of EaGhxP in guanine transport deficient *Escherichia coli* reveals it can transport guanine, hypoxanthine and the toxic analogs 8-azaguanine (8AG) and 6TG. Similarly, EaGhxP transports 8AG and 6TG into *E. amylovora* cells. EaGhxP has a high affinity for 6TG with a K_i of $3.7 \mu\text{mol l}^{-1}$. An *E. amylovora* *DghxP::Cam^R* strain shows resistance to growth on 8AG and 6TG. Although

EaGhxP is expressed during active disease propagation, it is not necessary for virulence as determined on immature apple and pear assays.

Conclusions: *EaGhxP* is not required for virulence, but it does import 6TG into *E. amylovora* cells.

Significance and impact of the Study: As part of the disease establishment process *E. amylovora* synthesizes and exports a toxic guanine derivative 6TG. Our results are counter intuitive and show that *EaGhxP*, an influx transporter, can move 6TG into cells raising questions regarding the role of 6TG in disease establishment.

Li, J., Q. Li, C. E. W. Steinberg, Q. Zhao, B. Pan, **Joseph J. Pignatello**, and B. Xing. 2020. Reaction of substituted phenols with lignin char: Dual oxidative and reductive pathways depending on substituents and conditions. *Environmental Science & Technology*; doi.org/10.1021/acs.est.0c04991.

Abstract- Biomass chars are known to be intrinsically redox-reactive toward some organic compounds, but the mechanisms are still unclear. To address this, a char made anoxically at 500 °C from dealkaline lignin was reacted either in the fresh state or after 180-day aging in air with *p*-nitrophenol (NO₂-P), *p*-hydroxybenzaldehyde (CHO-P), phenol (H-P), or *p*-methoxyphenol (MeO-P). Reactions were carried out under oxic or anoxic conditions. Degradation occurred in all cases. Both oxidation and reduction products were identified, with yields dependent on the presence or absence of air during reaction or storage. They included oligomers, amines, and ring-hydroxylated compounds, among others. Exposure to air suppressed sorption, annihilated reducing sites, and provided a source of reactive oxygen species that assisted degradation. Sorption suppression was due to incorporation of hydrophilic groups by chemisorption of oxygen, and possibly blockage of sites by products. Fresh char contained comparable electron donating and accepting capacity, whereas aged char contained a preponderance of electron accepting over donating capacity. Under anoxic conditions, both oxidation and reduction occurred. Under oxic conditions or after aging in air, oxidation predominated and linear free energy relationships were found between the rate constant and the Hammett or Brown substituent electronic parameter or the standard electrode potential of the phenol. The results demonstrate that chars possess heterogeneous redox activities depending on reaction pairs, reaction conditions, and aging.

Machtinger, E. T., and **Scott C. Williams**. 2020. Practical guide to trapping *Peromyscus leucopus* and *Peromyscus maniculatus* for vector and vector-borne pathogen surveillance and ecology. *Journal of Insect Science* 20(6):1-19; <https://doi.org/10.1093/jisesa/ieaa028>.

Abstract- Arthropods pests are most frequently associated with both plants and vertebrate animals. Ticks, in particular the blacklegged ticks *Ixodes scapularis* Say and *Ixodes pacificus* Cooley & Kohls (Acari: Ixodidae), are associated with wildlife hosts and are the primary vectors of Lyme disease, the most frequently reported vector-borne disease in the United States. Immature blacklegged ticks in the eastern United States frequently use small mammals from the genus *Peromyscus* as hosts. These mice are competent reservoirs for *Borrelia burgdorferi*, the causative agent of Lyme disease, as well as other tick-borne pathogens. To conduct surveillance on immature ticks and pathogen circulation in hosts, capture and handling of these small mammals is required. While protocols for rearing and pest surveillance on plants are common, there are very few protocols aimed at entomologists to conduct research on vertebrate-arthropod relationships. The goal of this manuscript is to provide a practical template for trapping *Peromyscus* spp. for vector and vector-borne pathogen surveillance and ecology for professionals that may not have a background in wildlife research. Important considerations are highlighted when targeting *P. leucopus* Rafinesque and *P. maniculatus* Wagner. Specifically, for tick and tick-borne disease-related projects, materials that may be required are suggested and references and other resources for researchers beginning a trapping study are provided.

Nason, Sara L., J. Koelmel, **Nubia Zuverza-Mena**, C. Stanley, **Carlos Tamez**, J. A. Bowden, and K. J. G. Pollitt. 2020. Software comparison for nontargeted analysis of PFAS in AFFF-contaminated soil. *J. Am. Soc. Mass Spectrom.*; <https://doi.org/10.1021/jasms.0c00261>.

Abstract- Per- and polyfluoroalkyl substances (PFAS) are an emerging class of toxic environmental contaminants. Over 7500 PFAS exist, but reference standards are available for less than 2% of compounds. Nontargeted analysis using liquid chromatography-high-resolution tandem mass spectrometry is therefore an essential technique for increasing the analytical coverage of PFAS present in environmental samples. However, typical nontargeted data analysis is laborious and has a steep learning curve. Recently, FluoroMatch, a new open source, vendor neutral software, was published specifically for automating data processing for nontargeted analysis of PFAS and generating PFAS libraries. Here, we analyze soil contaminated with PFAS based aqueous film forming foam (AFFF) and compare the results produced by data analysis workflows using FluoroMatch and Compound Discoverer, an established nontargeted analysis program. High-confidence PFAS annotations were nearly identical between the methods, with 27 out of 32 compounds found using both Compound Discoverer and the modular version of FluoroMatch. Twenty-two high-confidence annotations were found using the comprehensive FluoroMatch Flow. The FluoroMatch method was faster and required significantly less manual curation than the Compound Discoverer method. Both platforms produced high-quality data that were useful for assessing PFAS contamination in the soil.

Petruff, Tanya A., Joseph R. McMillan, John J. Shepard, Theodore G. Andreadis, and Philip M. Armstrong. 2020. Increased mosquito abundance and species richness in Connecticut, United States 2001-2019. *Scientific Reports* 10(1):1-14; <https://doi.org/10.1038/s41598-020-76231-x>. Published online 11/6/2020.

Abstract- Historical declines in multiple insect taxa have been documented across the globe in relation to landscape-level changes in land use and climate. However, declines have either not been universally observed in all regions or examined for all species. Because mosquitoes are insects of public health importance, we analyzed a longitudinal mosquito surveillance data set from Connecticut (CT), United States (U.S.) from 2001 to 2019 to identify changes in mosquito community composition over time. We first analyzed annual site-level collections and metrics of mosquito community composition with generalized linear/additive mixed effects models; we also examined annual species-level collections using the same tools. We then examined correlations between statewide collections and weather variables as well as site-level collections and land cover classifications. We found evidence that the average trap night collection of mosquitoes has increased by ~60% and statewide species richness has increased by ~10% since 2001. Total species richness was highest in the southern portion of CT, likely due to the northward range expansion of multiple species within the *Aedes*, *Anopheles*, *Culex*, and *Psorophora* genera. How the expansion of mosquito populations in the north-east U.S. will alter mosquito-borne pathogen transmission in the region will require further investigation.

JOURNAL ARTICLES APPROVED NOVEMBER 2020

Cao, X., C. Ma, F. Chen, **Craig Musante, Jason C. White**, Z. Wang, and B. Xing. New insight into the mechanism of graphene oxide-enhanced phytotoxicity of different arsenic species. *Environmental Science: Nano*

Cowles, Richard S. 2020 Vision: Adjusting to climate change. *The Real Tree Line*

Gambhir, N., **Srikanth Kodati**, M. Huff, F. N. da Silva, O. Ajayi-Oyetunde, M. Staton, C. Bradley, A. Adesemoye, and S. E. Everhart. Prevention and detection of fungicide resistance development in *Rhizoctonia zeae* from soybean and corn in Nebraska. *Plant Health Progress*

LaMondia, James A. Management of lesion and dagger nematodes with rotation crops. *Nematropica*

Schultes, Neil P., R. F. Castañeda-Ruiz, **Robert E. Marra**, N. Strzalkowski, and **DeWei Li**. *Striatibotrys neoeucylindrospora*, a new species of *Stachybotrys*-like fungus from North America. *International Journal of Systematic and Evolutionary Microbiology*

Wang, D., A. Byro, R. Zepp, E. Sahle-Demessie, T. P. Luxton, K. T. Ho, **Jason C. White**, M. Lury, N. B. Saleh, and C. Su. Intelligent nanopesticides to achieve sustainable agriculture and global food security: Opportunities and challenges. *Nature Nanotechnology*

Wu, T., Y. Liu, K. Yang, L. Zhu, **Jason C. White**, and D. Lin. Synergistic remediation of PCB-contaminated soil with nanoparticulate zero-valent iron and alfalfa: Targeted changes in the root metabolite-dependent microbial community. *Environmental Science: Nano*

NEW STAFF, STUDENTS, AND VOLUNTEERS NOVEMBER 2020



Simon Dugan, an upcoming student at Naugatuck Community College, will intern with Dr. Wade Elmer and Peter Thiel on the role of nanoparticles on plant health.



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Griswold Research Center, Griswold



Valley Laboratory, Windsor

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