

# Station News

The Connecticut Agricultural Experiment Station  
Volume 10 Issue 9 September 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 AUGUST 2020

**DR. QUAN ZENG** (Co-PI) and Dr. Ching-Hong Yang (University of Wisconsin-Milwaukee, PI) received a grant from the USDA-NIFA-CPPM program to study using virulence inhibitors to manage fire blight disease. Dr. Zeng takes the lead of the extension aspect of this grant and will also participate in some field testing. CAES budget is \$110,000.

**DR. WADE ELMER** (Co-PI) and **DR. JASON C. WHITE** (PD), Om Parkash Dhankher (Co-PD) of the University of Massachusetts (UMass), and Baoshan Xing (Co-Pi) (UMass) received a USDA NIFA grant for “Nanoscale Sulfur for Plant Nutrition, Disease Suppression and Food Safety” for \$499,323 of which CAES will received \$250,020.

## ADMINISTRATION

**DR. JASON C. WHITE** participated in the Department of Public Health Laboratory Preparedness monthly conference call (August 3); spoke by phone with the US Drug Enforcement Agency regarding hemp/THC analysis and DEA Schedule 1 certification (August 3); hosted the 110th Annual Plant Science Day virtual event and gave a Director’s update (150 attendees) (August 5); hosted the quarterly CAES Board of Control meeting (August 5); participated in a ZOOM call for the Center for Sustainable Nanotechnology (CSN) Summer Undergraduate Research Experience (SURE) (August 6); participated in a Plant Science Day Committee meeting (August 6); participated in CSN strategic planning calls for workgroups focused on organisms, coatings/coronas, and transformations (August 10, 13, 14); hosted the monthly CSN Nanochem-Plant call (August 11); participated in CSN center-wide ZOOM calls (August 12, 19, 26); participated in the monthly FDA FERN cCAP conference call (August 13); with **DR. SARA NASON**, participated in a PFAS laboratory methods call organized by CT DPH and DEEP (August 14); as a committee member, participated in the Committee meeting of PhD student Jesus Cantu of the University of Texas El Paso (August 17); participated with collaborators from Harvard University, MIT, Louisiana State University, and UTEP in a ZOOM call with the National Science Foundation (NSF) regarding a proposed Engineering Research Center (ERC) (August 17); with **DR. PHILIP ARMSTRONG**, participated in a Teams call with the Office of the Governor, DPH, the Department of Agriculture, and DEEP regarding mosquito virus surveillance findings and EEE (August 17); with **DR. SARA NASON**, participated in a northeast regional call to discuss PFAS analysis methods (representatives from all New England states were present) (August 18); participated in a ZOOM call with collaborators at Johns Hopkins University regarding a joint project on nanoscale phosphorus delivery to crops (August 18); participated in a day-long CSN strategic planning meeting (August 24); participated in an FDA 50-states call (August 27); and with **DR. WADE ELMER**, participated in a ZOOM call with Dr. Indrajeet Chaubey (Dean of the College of Agriculture, Health and Natural Resources, UConn) to discuss funding of the National Plant Diagnostic Network (August 31).

## ANALYTICAL CHEMISTRY

**DR. BRIAN EITZER** was a participant in the Association of Public Health Laboratories (APHL) State Agricultural Chemist conference call with a presentation on the structure of the APHL and impacts of COVID-19 on the laboratories (August 11); participated in the monthly FERN cCAP conference call focused on the ending of the current 5-year grant cycle (August 13); and participated in the FDA-FERN OEIO assignment call; this assignment is a test of the new NFSDX system for exchange of data between the states and the FDA (August 17).

**DR. CHRISTINA ROBB** attended a long-term planning meeting of the Eastern Analytical Symposium (EAS) (August 18); and the FDA FERN wide call (August 27).

**MS. KITTY PRAPAYOTIN-RIVEROS** assisted with the production of virtual Plant Science Day (August 5); assisted with the production of CAES Seminar Series - Integrating Beyond Genomics: Cyberinfrastructure for Forest Health and Productivity (August 19); participated in the Sample Analysis Data Exchange - IT Implementation Phase Meeting on WebEx to discuss the NFSDX (National Food Safety Data Exchange) phase II Sample Data Elements Mapping File (August 4, 18); participated in the CT Weekly Office Hours for Teams with Microsoft Customer Success Manager (August 3, 17, 24); and participated in the Sample Data Exchange (DX) Phase II- ORA DX 7.0 UAT support session (August 18).

## ENTOMOLOGY

**DR. KIRBY C. STAFFORD III** participated in a conference call on the Asian longhorned tick (August 18).

**MS. JAMIE CANTONI**, with **DR. SCOTT WILLIAMS**, **DR. MEGAN LINSKE**, and **MS. HEIDI STUBER**, participated in an interview by Yehyun Kim, CT Mirror, at Lake Gaillard in Guilford and demonstrated tick sampling, mouse capture, and tissue sampling, and discussed the impact of climate change on new and emerging tick species (August 7).

**MS. KATHERINE DUGAS** gave a half-hour update on 2020 landscape pests submitted to the CAES Insect Information Office as part of a ZOOM webinar series hosted by the Connecticut Tree Protective Association (CTPA) (August 13).

**MR. MARK H. CREIGHTON** hosted a Beekeeping webinar for the Scoville Memorial Library in Salisbury (10 participants) (August 27).

**DR. GALE E. RIDGE** was interviewed about cicada killer wasps vs. Asian giant hornets by Mary Beikert of The Day (August 4); did a Station press release about the two insects (August 5); provided Lisa DeFeo, a copy editor for Voices News, information and images on cicada killer wasps and comparisons to the Asian giant hornet; was interviewed about yellowjackets and their medical significance by Robert Miller of the News-Times (August 25); and was interviewed about increased rat activity as a result of changes in human mediated waste stream, more particularly in the restaurant industry due to COVID-19, by Ed Stannard of the New Haven Register (August 27).

**DR. KIMBERLY A. STONER** presented a talk entitled “Planting for the Bees’ Needs,” sponsored by Planet New Canaan, the New Canaan Beautification League, and the New Canaan Pollinator Pathway, via ZOOM through the New Canaan Public Library (45 attendees) (August 20); hosted by Jim Randazzo of the Metropolitan District Commission, and team members Kelly Kennedy, Pete Picone, Louise Washer, and Laura Hart, visited the MDC grounds and reservoir in West Hartford to advise on possible locations for pollinator habitat, and to make recommendations about reducing mowing and introduction of invasive plant species (August 25); and was interviewed about pollinator habitat by Greta Burroughs for the national magazine Two Million Blossoms (August 28).

## ENVIRONMENTAL SCIENCES

**DR. JOSEPH PIGNATELLO** co-authored three pre-recorded talks for the Fall 2020 American Chemical Society Virtual Meeting and Exposition: “Picolinic Acid-Mediated Fenton Oxidation of Organic Compounds in Water,” “Importance of Ring Cluster Size of Carbonaceous Sorbents in their Sorption of Aromatic Compounds,” and “Effect of Oxidative Conditions During Pyrolysis and Ambient Aging on the Physico-Chemical Characteristics and Sorbent Properties of Chars Toward a Hydrophobic and a Cationic Compound” (August 16-20).

**DR. PHILIP ARMSTRONG** was interviewed about the first detection of EEE virus in Connecticut by NBC Connecticut, WTIC, WSHU, Patch Media, and Fox61 (August 11-12); was interviewed about the first human case of West Nile virus in Connecticut by WTIC and Fox61 (August 17); and was interviewed about the increased detection of West Nile virus in mosquitoes by News Channel 8 and WTIC (August 28).

**MS. ANGELA BRANSFIELD** participated in the American Biological Safety Association’s Select Agent webinar *Virtual Inspections - The 5 W’s* (August 20).

**DR. GOUDARZ MOLAEI** gave an invited virtual talk entitled “Climate Change and Vector-borne Diseases in Connecticut” to the CT Governor’s Council on Climate Change (August 7); was interviewed about the discovery of the Gulf Coast tick in Connecticut and its public health implication by NPR (August 26); and was interviewed about the Gulf Coast tick incursion into Connecticut by Patch Media (August 31).

**DR. SARA NASON** visited Prof. Krystal Pollitt, Yale University (August 6); attended virtual meetings of the Benchmarking and Publications for Non-Targeted Analysis working group (August 5-6); participated in a conference call on per- and polyfluoroalkyl substances (PFAS) analysis methods with scientists from CT DEEP, DPH, and the University of Connecticut (August 14); participated in a conference call with representatives from CT, MA, NY, NJ, VT, NH, and ME to discuss regulatory analysis of PFAS in municipal biosolids (August 18); participated in a call with collaborators from Yale and the University of Minnesota to discuss collaborative phytoremediation research (August 25); and participated in a call with collaborators from Yale and the University of Connecticut to discuss collaborative PFAS research (August 28).

## FORESTRY AND HORTICULTURE

**DR. JEFFREY S. WARD** along with **MR. JOSEPH P. BARSKY**, spoke on strategies for re-generating oak at the summer meeting of the Rhode Island Chapter - Society of American Foresters in Foster, RI (19 attendees) (August 6); spoke on reducing deer browse damage during regeneration harvests at the Rhode Island Forest Conservators Organization summer twilight meeting in Foster, RI (16 attendees) (August 6); was interviewed about managing street trees to reduce storm damage to infrastructure by Robert Miller, Danbury News-Times (August 11); with **MR. JOSEPH P. BARSKY**, met with McLean Game Refuge Director Connor Hogan and staff to discuss forest regeneration and deer browse (5 attendees) (August 13); and with **MR. JOSEPH P. BARSKY**, met with David Gumbart, The Nature Conservancy - Connecticut Director of Land Management, and Elizabeth Washburn to discuss forest regeneration and deer browse (2 attendees) (August 28).

**DR. SUSANA KERIÖ** attended the Beech Leaf Disease research update meeting coordinated by The Ohio State University via Zoom (August 4); attended the Forest Pathology Committee meeting of the American Phytopathological Society via Zoom (August 6); attended the Plant Health 2020 conference via Zoom (August 10-14); served as a reviewer on National Institute of Food and Agriculture (NIFA) Emergency Citrus Disease Research and Extension (ECDRE) Program grant panel (August 25).

**DR. ABIGAIL A. MAYNARD** visited Holbrook Farm in Bethel to discuss the New Crops Program (August 19); and discussed the New Crops Program at the Hamden Farmers Market (August 29).

**DR. SCOTT C. WILLIAMS** participated in a conference call for the Editorial Advisory Board for The Wildlife Society’s publication, *The Wildlife Professional* (August 5); was interviewed about the impacts of climate change on ticks, wildlife, and zoonotic diseases by Connecticut Mirror photographer/reporter Yehyun Kim: <https://ctmirror.org/2020/08/19/where-connecticut-covid-climate-change-and-critters-intersect/> (August 7); conducted a small mammal trapping demonstration to students in the Wildlife Management Techniques class in the Department of Natural Resources and the Environment at the University of Connecticut (18 students, 1 professor) (August 31).

## PLANT PATHOLOGY AND ECOLOGY

**DR. WADE ELMER** participated in the American Phytopathological Society (APS) Foundation Committee meeting (12 attendees) (August 3, 18); moderated as chair of the APS Diseases of Ornamental Plants Committee (via ZOOM) at the annual APS meeting (78 attendees) (August 3); attended the Academic Unit Leader & Faculty Meeting at the annual APS meeting (43 attendees) (August 4); gave the Introduction Presentation entitled “Charge and Form: Obstacles of Opportunities” at the Centerwide meeting for the Center for Sustainable Nanotechnology via ZOOM (43 attendees) (August 9); participated in the USDA NIFA plan of work briefing (44 attendees) (August 9, 19); and with the Connecticut Hiking Alliance, harvested eggplants, squash, and tomatoes at Lockwood Farm for the Connecticut Food Bank (25 participants) (August 30).

**DR. YONGHAO LI** presented “Plant Disease Updates 2020” at the Connecticut Tree Protective Association Summer Meeting via ZOOM (24 adult attendees) (August 13); participated in the National Plant Diagnostic Network Online Communication and Web Portal Committee Meeting via ZOOM (8 adult attendees) (August 18).

**DR. ROBERT E. MARRA** participated in a Beech Leaf Disease Working Group ZOOM meeting with collaborators from Ohio, West Virginia, Ontario (CA), New York, USDA-ARS, and the U.S. Forest Service (30 participants) (August 4).

**DR. STEPHEN J. TAERUM**, with **DR. LINDSAY TRIPLETT**, presented “An Improved Method for Profiling the Eukaryotic Diversity of the Phytobiome” for the American Phytopathological Society 2020 Plant Health Online meeting (August 3); presented “Development and Validation of a PNA Clamp to Increase Protist Diversity in Rhizosphere Microbiome Research” for the International Society of Protistologists 2020 Protistology meeting (August 14); organized the 2020 Plant Health Fellows final symposium that was presented by nine interns who each gave their five-minute presentations of their research and answered questions (38 attendees) (August 18).

**DR. QUAN ZENG** participated in the Plant Health 2020 Conference (online), participated in the Bacteriology Committee meeting (August 6), Phyllosphere Committee meeting (August 7), organized and moderated a special session “Let’s Work Together and Get Things Done: Pathogen Synergism During the Infection of Plants” where he gave a presentation entitled “*Dickeya dadantii* Differentiates into Two Subpopulations to Multitask on Virulence and Growth During the Infection of Potato” (August 13).



The Connecticut Hiking Alliance outline the grassy heart created by **Mr. Michael McHill** at Lockwood Farm on August 30.

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**STATION NEWS**



Plant Health Fellows posing for a virtual group picture after the completion of their research symposium.

## VALLEY LABORATORY

**DR. JATINDER S. AULAKH** gave a presentation entitled “Palmer Amaranth—A New Devastating Pigweed in Connecticut” during the virtual CAES Plant Science Day (August 5).

**MS. ROSE HISKES** co-chaired virtual Connecticut Invasive Plant Working Group symposium planning committee ZOOM meetings (August 11, 25).

**DR. JAMES LAMONDIS** participated in an SCRI Grant project meeting regarding extension and outreach for boxwood blight (August 24); and was interviewed about tobacco culture, history, and impacts of the pandemic on tobacco production in Connecticut by Miasha Lee for Reminder Publications (August 25).

## DEPARTMENTAL RESEARCH UPDATES AUGUST 2020

**LaMondia, James A., and K. Maurer.** 2020. *Calonectria pseudonaviculata* conidia dispersal and implications for boxwood blight management. *Plant Health Progress* 21:232-237.

**Abstract** - We investigated *Calonectria pseudonaviculata* conidial dispersal from sporulating lesions on boxwood leaves and sporulating cultures on half-strength PDA (½ PDA). *Botrytis cinerea*-infected blossoms were used as a control. Dispersal of *C. pseudonaviculata* or *Botrytis cinerea* conidia was confirmed by capture using an Allergenco air sampler at 15 liters/min and by microscopic observation of conidia and *C. pseudonaviculata* growth on 15-cm-d ½ PDA Petri dishes. *C. pseudonaviculata* conidia were not dispersed by either dry or moist air currents directed at conidia and conidiophores from 2 mm away at air speeds of 19.8 m/s for 10 min or by a fine mist with water droplets (mean diam. 20µ) with air speeds of 1.7 m/s. *C. pseudonaviculata* spores were dispersed by splash of water droplets at air speeds of 9.0 to 19.8 m/s. *C. pseudonaviculata* conidia released from phialides by water could not be wind-dispersed after the water had evaporated. Secondary water dispersal was reduced as conidia strongly adhered to a surface after drying. Boxwood leaves dropped from heights of 15, 33, or 66 cm landed with more than 60% of leaves facing abaxial surface up. The cupped shape of most boxwood leaves may result in

the abaxial surface with sporulation facing up. That orientation may also aid in retention of water films to wet and release conidia for splash dispersal. This is consistent with observations of increased disease severity in lower boxwood canopies and reinforces suggestions for best management practices including mulching and pruning lower branches to reduce the incidence and severity of disease.

Soghigian, J., Gloria-Soria A., Robert V., Le Goff, G., Failloux, A-B., Powell, J.R. (2020). Genetic evidence for the origin of *Aedes aegypti*, the yellow fever mosquito, in the southwestern Indian Ocean. *Mol Ecol.*; 00: 1- 14. <https://doi.org/10.1111/mec.15590>

**Abstract** - *Aedes aegypti* is among the best studied mosquitoes due to its critical role as a vector of human pathogens and ease of laboratory rearing. Until now, this species was thought to have originated in continental Africa, and subsequently colonized much of the world following the establishment of global trade routes. However, populations of this mosquito on the islands in the southwestern Indian Ocean (SWIO), where the species occurs with its nearest relatives referred to as the Aegypti Group, have received little study. We re-evaluated the evolutionary history of *Ae. aegypti* and these relatives, using three datasets: nucleotide sequence data, 18489 SNPs, and 12 microsatellites. We found that: (1) The Aegypti Group diverged 16 MYA (95% HPD: 7-28 MYA) from its nearest African/Asian ancestor. (2) SWIO populations of *Ae. aegypti* are basal to continental African populations. (3) After diverging 7 MYA (95% HPD: 4-15 MYA) from its nearest formally described relative (*Ae. mascarensis*), *Ae. aegypti* moved to continental Africa less than 85,000 years ago, where it recently (< 1,000 years ago) split into two recognized subspecies *Ae. aegypti formosus* and a human commensal, *Ae. aegypti aegypti*. (4) The Madagascar samples form a clade more distant from all other *Ae. aegypti* than the named species *Ae. mascarensis*, implying that Madagascar may harbor a new cryptic species. (5) There is evidence of introgression between *Ae. mascarensis* and *Ae. aegypti* on Réunion, and between the two subspecies elsewhere in the SWIO, a likely consequence of recent introductions of domestic *Ae. aegypti aegypti* from Asia.

Shang, H.; Ma, C.; Li, C.; White, J.C.; Chefetz, B.; Polubesova, T.; Xing, B. 2020. Copper sulfide nanoparticles suppress *Gibberella fujikuroi* infection in *Oryza sativa* seeds by multiple mechanisms: contact-mortality, nutritional modulation and phytohormone regulation. *Environ. Sci.: Nano* <https://doi.org/10.1039/D0EN00535E>.

**Abstract** - Copper sulfide nanoparticles (CuS NPs) were synthesized at 1:1 and 1:4 ratio of Cu and S and their respective antifungal efficacy was evaluated against the pathogenic activity of *Gibberella fujikuroi* (Bakanae disease) in rice (*Oryza sativa*). TEM images showed CuS particle size in the 5-10 nm range for both synthesized NPs. In a 2-d in vitro study, CuS (1:1) and CuS (1:4) NPs at 50 mg/L decreased *G. fujikuroi* CFU by 35.7 and 33%, respectively, compared to controls; CuO NPs caused an 18.7% inhibition. The CuS displayed greater initial dissolution rates in nanopure water than CuO NPs. In a greenhouse study, rice seedlings were treated with 50 mg/L Cu-based NPs via seed exposure or foliar application. In the seed treatment, both types of CuS NPs significantly decreased disease incidence by 35.1 and 45.9%, respectively. Comparatively, CuO NPs achieved only 8.1% disease reduction and the commercial Cu-based pesticide Kocide 3000 had no impact on disease. For foliar application, CuO NPs and CuS (1:1) NPs outperformed CuS (1:4) NPs and Kocide 3000. In addition, Cu exposure at the seed stage increased the root Cu content by 25.7-62.9%, with CuS (1:4) NPs giving the highest content. Similarly, foliar application of both CuS NPs resulted in greater root Cu than CuO NPs. CuS (1:4) NPs also modulated the production of two important phytohormones important to plant defense; salicylic acid (SA) and Jasmonic acid (JA). These findings provide useful information for improving the delivery efficiency of agrichemicals via nano-enabled strategies and advance our understanding of the defense mechanisms triggered by the NP presence in plants.

Sillen, W.M.A.; Thijs, S.; Abbamondi, G.R.; De La Torre Roche, R.; Weyens, N.; White, J.C.; Vangronsveld, J. 2020. Nanoparticle treatment of maize analyzed through the metatranscriptome: Compromised nitrogen cycling, possible phytopathogen selection, and plant hormesis. *Microbiome* In press.

**Abstract** - The beneficial use of nanoparticle silver or nanosilver may be confounded when its potent antimicrobial properties impact non-target members of natural microbiomes such as those present in soil or the plant rhizosphere. Agricultural soils are a likely sink for nanosilver due its presence in agrochemicals and land-applied biosolids, but a complete assessment of nanosilver's impact on this environment has yet to be done because of a lack of understanding of the impact on the natural soil microbiome. In a study assessing the use of nanosilver for phytopathogen control with

maize, we analyzed the metatranscriptome of the maize rhizosphere and observed multiple unintended effects of exposure to 100 mg kg<sup>-1</sup> nanosilver in soil during a growth period of 117 days. The Archaea population was negatively impacted with a more than 30% decrease in relative abundance observed, and as such, their involvement in nitrogen cycling and specifically, nitrification, was compromised. In addition, certain potentially phytopathogenic fungal groups showed significantly increased abundance, possibly due to the negative effects of nanosilver on bacteria that exert natural biocontrol against these fungi as indicated by negative interactions in a network analysis. Up to five fold increases in relative abundance have been observed for certain possibly phytopathogenic fungal genera. Separately, nanosilver exposure also caused a direct physiological impact on maize as illustrated by increased transcript abundance of aquaporin and phytohormone genes, resulting in a level of stress that yielded hormetically stimulated plant root growth. The occurrence of significant negative unintended effects of nanosilver use on corn clearly highlight the need to thoroughly characterize all mechanisms of action when assessing the risk associated with nano-enabled agriculture.

Sondreli, K.L., Keriö, S., Frost, K., Muchero, W., Chen, J.G., Haiby, K., Gantz, C., Tuskan, G., and LeBoldus, J.M. 2020. An outbreak of Septoria canker caused by *Sphaerulina musiva* on *Populus trichocarpa* in eastern Oregon. Plant Disease, June 2020 [online] doi.org/10.1094/PDIS-03-20-0494-PDN

**Abstract-** Branch and stem cankers were observed in a *Populus trichocarpa* L. plantation in late summer of 2018 near Boardman, Oregon USA. Stem cankers were flat faced with swollen margins and the bark in the center of the cankers was black and depressed. 254 out of 1054 trees (25%) observed had cankers. Symptomatic stems and branches from several trees were brought to Oregon State University (OSU) for identification. Cankers were surface-disinfested in a 5% NaOCl for 2 min and rinsed twice in deionized H<sub>2</sub>O for 2 min. Bark was removed from cankers and pieces of wood at the margin between healthy and necrotic tissue were plated on KV8 medium amended with streptomycin sulfate at 100 mg liter<sup>-1</sup> and chloramphenicol (Amresco) at 240 mg liter<sup>-1</sup>. Eight sporulating colonies typical of *Sphaerulina musiva* (Peck) Quaedvlieg, Verkley, and Crous (Syn. = *Septoria musiva* Peck) developed within 7 days of plating. *S. musiva* was identified by morphological characteristics (conidium size = 28-54 × 3.5-4 μm) and confirmed by comparing the sequence of the ITS region (accession numbers: MN275180-MN275187) to JX901814 with 99% identity. We tested 13 additional cankers collected from the plantation using *S. musiva* specific primers. Eight of the 13 samples were positive for *S. musiva* DNA. Dormant cuttings from three genotypes of *P. trichocarpa* (BESC-184; BESC-259; BESC-388) were collected in a field planting near OSU. These were planted in containers in the greenhouse at OSU and grown to approximately 30 cm in height. Four replicates of each of the three genotypes were inoculated in the greenhouse with one Oregon isolate using a suspension of 1x10<sup>6</sup> conidia ml<sup>-1</sup>. The entire tree was sprayed until runoff using a spray bottle. The experimental design was a completely randomized design with four replicates of each genotype. Sterile deionized H<sub>2</sub>O was sprayed on one control tree of each genotype. The mean number of resulting cankers were BESC-184 = 11, BESC-259 = 1, and BESC-388 = 13.75. The controls did not develop any cankers. The pathogen was successfully reisolated from one canker from each genotype. *Sphaerulina musiva* can cause severely damaging leaf spot and stem canker diseases in the eastern and central USA and Canada. Susceptible *Populus* species and hybrids develop cankers which can girdle and weaken stems, leading to breakage or tree death. A previous survey of the region did not detect *S. musiva*. This outbreak of Septoria canker underscores the potential threat of this pathogen to *P. trichocarpa* in the Pacific Northwest where it is a keystone species in riparian ecosystems.

Stafford, K. C., III, G. E. Ridge, G. Molaei, C. Zarb, and P. Bevilacqua. 2020. Rabbit Bot Fly Furuncular, Tracheopulmonary, and Human Bot Fly Infestations in Connecticut (Oestridae: Cuterebrinae). Journal of Medical Entomology. [EPub. ahead of print] 10.1093/jme/tjaa181

**Abstract -** Endemic and tropical human bot infestations are relatively uncommon or unreported in the United States. We report two cases in Connecticut: an unusual furuncular and respiratory myiasis by the rabbit bot *Cuterebra buccata* (Fab.) (Diptera: Oestridae) in a 74-yr-old male and a case of human bot fly, *Dermatobia hominis* (L.) (Diptera: Oestridae), myiasis in a 4-yr-old female with a tropical travel history with her family. Identification of *C. buccata* was based morphologically, in part, on spinal armature and further corroborated by DNA sequencing of the mitochondrial COI gene and comparison to the National Center for Biotechnology Information GenBank DNA sequence database. The resulting annotated sequence data were deposited into the National Center for Biotechnol-

ogy Information GenBank. The unique medical aspects, and limitations and specifics on bot fly larval habits and identification are discussed.

**Ward, J.S., Williams, S.C.** 2020. Influence of deer hunting and residual stand structure on tree regeneration in deciduous forests. *Wildlife Society Bulletin* 1-12. DOI: 10.1002/wsb.1120

**Abstract** - Chronically overabundant white-tailed deer (*Odocoileus virginianus*) populations have made it difficult to regenerate desirable woody species throughout much of their range in the eastern United States and southern Canada. Neither silvicultural prescriptions nor deer management alone have resulted in successful forest regeneration. We tallied woody stems ( $\geq 1$  m tall,  $< 10$  cm diameter) on 62 hunted and 46 nonhunted forest stands throughout Connecticut, USA, during autumn 2015 to spring 2018; all stands had a timber regeneration harvest from 2-12 years prior to our study (2003-2016). Our objective was to examine the influence of the combination of deer management and residual stand structure on woody regeneration diversity, density, and composition. After accounting for the influence of stand structures over a range of residual basal areas from 0-23 m<sup>2</sup>/ha, we found that deer had a negative effect on regeneration diversity, density, and species composition. Moreover, we found that the combination of state-regulated deer hunting and forest-overstory removal resulted in greater woody-plant regeneration rates with increased diversity. Stem densities of oak-hickory (*Quercus* spp.-*Carya* spp.), maple (*Acer* spp.), and minor species, as well as combined species, were greater in hunted versus non-hunted stands, and in clearcuts as opposed to 2-aged and shelterwood stands. American beech (*Fagus grandifolia*) and shrub species did not differ in stem density regardless of hunting or treatment prescription. Our study indicates that for properties where the management goal is to create dense vegetation with high tree, shrub, and herbaceous species diversity, managers should both encourage hunting to reduce pressure on browse-sensitive species and leave as few postharvest residual trees as possible to maximize growing space for regeneration. A lack of deer harvest and overstory removal in southern New England resulted in low diversity vegetation dominated by lesser preferred species such as birch (*Betula* spp.) or American beech. The use of hunting as a tool to relieve browsing pressure will improve both woody and herbaceous plant regeneration where light is not limited.

Zhang, Z.; Lin, H.; Ma, C.; Zhang, L.; Zelevinsky, J.; Xia, M; Xu, Y; **White, J.C.**; Tyson, J.; He, L. 2020. Integrating the Gutzeit method with X-Ray Fluorescence Spectroscopy for rapid quantification of inorganic arsenic in selected beverages. *Food Control* (in press).

**Abstract** - Inorganic arsenic (iAs) in foods has raised great concern given that the metal species is humans. Herein, we integrated the Gutzeit method with X-ray fluorescence (XRF) spectroscopy to measure iAs in selected beverages within 45 min. Briefly, iAs is first reduced to arsine gas under acidic conditions. The transformed arsine gas is then trapped on mercury bromide test strips and subsequently measured by XRF. Interference from dimethylarsinate on the test strips was eliminated by an acetone rinsing step. A standard curve with a linear range from 0-133.3 µg/L was established, and the limit of detection and quantification were 1.9 and 5.7 µg/L, respectively. This method was further evaluated with commercial beverages and the results were compared with those from both a commercial arsenic test kit and with analysis by inductively coupled plasma mass spectroscopy (ICP-MS). We demonstrated that this method is sensitive, reliable, fast, and comparatively cost-effective for use in iAs screening in the food industry.

## JOURNAL ARTICLES APPROVED AUGUST 2020

**Aulakh, Jatinder S., P. S. Chahal, V. Kumar, A. J. Price, and K. Guillard.** Multiple herbicide-resistant Palmer amaranth (*Amaranthus palmeri*) in Connecticut: Confirmation and response to POST herbicides. *Weed Technology Journal*

**Biganski, S., J. T. Wennmann, Charles R. Vossbrinck, R. Kaurc, J. A. Jehle, and R. G. Kleespies.** Molecular and morphological characterization of a novel microsporidian species, *Tubulinosema suzuki*, infecting *Drosophila suzukii* (Diptera: Drosophilidae). *Journal of Invertebrate Pathology*

**De La Torre-Roche, Roberto, J. Cantu, C. Tamez, Nubia Zuverza-Mena, H. Hamdi, Wade H. Elmer, J. Gardea-Torresdey, and Jason C. White.** Seed biofortification by engineered nanomaterials: A pathway to alleviate malnutrition? *Journal of Agricultural and Food Chemistry*

Ehrenbolger, K., N. Jespersen, H. Sharma, Y. Y. Sokolova, Y. S. Tokarev, **Charles R. Vossbrinck**, and J. Barandun. Differences in structure and hibernation mechanism highlight diversification of the microsporidian ribosome. *PLOS Biology*

Jin, G. Q., G. Y. Mao, **D. W. Li**, Y. Wan, and L. H. Zhu. First report of *Alternaria alternata* causing leaf spots of *Liriodendron chinense* x *tulipifera* in China. *Journal of Plant Pathology*

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## NEW STAFF, STUDENTS, AND VOLUNTEERS AUGUST 2020



Annabelle Pan is a collaborator employed by Yale who will be volunteering with Dr. Doug Brackney on a part-time basis for a few months. Annabelle graduated from Yale this past May with a degree in Environmental Engineering. She is currently working as a laboratory assistant on the COVID-19 wastewater tracking project with Drs. Doug Brackney and Jordan Peccia. For the next few months, she will occasionally be running qPCR in the first floor laboratory; you may also find her huffing and puffing as she bikes up Science Hill, or joyfully coasting as she rides down.

Kelly Hagadorn is a first year PhD student in the Yale School of Public Health, Epidemiology of Microbial Disease Program, who will be working with Dr. Andrea Gloria-Soria this semester. Her interests are in human infectious diseases focusing on a One Health perspective. Her main interest is in reducing vector-borne and/or zoonotic diseases by identifying social, biological, and environmental risk factors using molecular epidemiology to gain insight into pathogenesis. The project with Andrea will focus on surveying for *Dirofilaria* parasites in mosquitoes collected through the Statewide Monitoring Program, determining transmission potential, and identifying mosquitoes that are transmitting disease.





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