Station News

The Connecticut Agricultural Experiment Station
Volume 7 Issue 11 November 2017

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

DR. THEODORE ANDREADIS hosted State Senators Kevin Kelly, George Logan, Tony Hwang, and State Representatives Jason Perillo and Ben McGorty and gave an overview of the Station's research, regulatory and public service programs followed by a tour of several laboratories (October 2); presented a seminar entitled, *Reflections on the ecology and epidemiology of mosquito-borne viruses in Connecticut: an analysis from 20 years of research and surveillance* to the Department of Biology at Fordham University in New York (25 attendees) (October 4); presented an update on Station activities at a Board Meeting of the Experiment Station Associates (October 11); presented an invited talk entitled, *Ecology and epidemiology of mosquito-borne viruses in Connecticut* at the annual meeting of the Connecticut Valley Branch of the American Society of Microbiology, held at UCONN in Storrs (50 attendees) (October 13); presided over a quarterly meeting of the Station's Board of Control held at the Valley Laboratory in Windsor (October 18); and was awarded the Bronze Medal by the Federated Garden Clubs of Connecticut at their annual meeting held in Southington (200 attendees) (October 25).

ANALYTICAL CHEMISTRY

DR. JASON C. WHITE, along with **DR. THEODORE ANDREADIS**, met with several legislators to discuss CAES programs and provide a tour of the Station (October 2); attended the annual "all hands" meeting for the NSF funded Center for Sustainable Nanotechnology at the University of Illinois-Urbana Champaign and gave a presentation entitled "The use of nanoscale micronutrients to suppress disease" (70 attendees) (October 6-8); along with **DR. BRIAN EITZER, DR. CHRISTINA ROBB, DR. WALTER KROL, MS. TERRI ARSENAULT, MR. CRAIG MUSANTE, MR. MICHAEL AMMIRATA** and **MS. KITTY PRAPAYOTIN-RIVEROS,** participated in the monthly FDA FERN cCAP teleconference call (October 12); met with Professor Joel Pedersen of the University of Wisconsin and the Center for Sustainable Nanotechnology to discuss collaborative research projects (October 17); spoke by phone with Professor Greg Lowry of Carnegie Mellon University regarding a joint USDA grant submission (October 19, 31); was interviewed by Ms. Janet Pelley of *Chemical and Engineering News* regarding a just published paper focusing on the use of Surface Enhanced Raman Spectroscopy (SERS) to detect and map pesticides on apples (October 23); and was an invited attendee at the AgroBio Nanotechnology Conference in Saltillo Mexico which was organized for the Center for Applied Analytical Chemistry (CIQA) and gave a presentation entitled "Nanomaterials in agriculture: Assessing the balance between applications and implications" (200 attendees) (October 24-28).

DR. CHRISTINA S. ROBB did science outreach at the John Trumbull Primary School in Watertown and taught an experiment on the topic of solids, liquids, and gases to a kindergarten class (20 children, 4 adults) and a first grade class (20 children, 4 adults) (September 18); and attended the Eastern Analytical Symposium (EAS) meeting in Plainsboro, NJ (October 30).

DR. BRIAN EITZER attended the monthly Laboratory Preparedness meeting at the CT Department of Public Health Laboratory in Rocky Hill (October 2), was a participant in the North American Chemical Residue Workshop organizing committee call (October 12), and the 50 state FERN wide call (October 26).

Dr. Jason C. White was an invited speaker at the AgroBio Nanotechnology Conference in Saltillo Mexico and toured the Center for Applied Analytical Chemistry (CIQA) along with other colleagues from the United States.

ENTOMOLOGY

DR. KIRBY C. STAFFORD III was interviewed by John Voket, Connoisseur Media, about the lone star tick (October 5); spoke on ticks and tick-borne diseases at the 52nd annual regional meeting of the American Society for Microbiology at the University of Connecticut in Storrs (35 attendees) (October 13); presented a tick training session for pest management professionals and Maine Cooperative Extension (122 attendees) and visited the Maine Medical Center Research Center group to discuss collaborative research in Portland, ME (October 18); was interviewed about lone star ticks by Chris Woodside, Connecticut Health Initiative (October 23); presented two talks for an EPA webinar on Healthy Schools: Managing Ticks in Your School District (342 registered attendees) (October 24); and presented a talk on ticks and tick-borne diseases for the Bethany Land Trust in Bethany (50 attendees) (October 26).

MS. KATHERINE DUGAS gave a talk to the Old Lyme Lion Club titled "The Gypsy Moth in Connecticut" (20 attendees) (October 11); with **MS. VICKIE BOMBA-LEWANDOSKI**, conducted an apples and honey bees workshop as part of the Farm City program to visiting Grade 3 -5 students at the Blue Slope Farm Museum in Franklin (100 students from Norwich participated) (October 24); and with **DR. GALE RIDGE**, attended and staffed a CAES/CCABB booth at the University of Bridgeport Health and Wellness Fair (October 26).

MR. MARK H. CREIGHTON spoke on "Bees and Pollination" at the Middlesex Institute for Life Learning Education at Middlesex Community College in Middletown (55 attendees) (October 9) and attended the UCONN Native Plants and Pollinator Conference in Storrs (October 19).

DR. CHRIS T. MAIER displayed copies of *Fly Times*, the newsletter of the North American Dipterists Society, at a meeting of the Connecticut Entomological Society at Yale University, New Haven (October 20).

DR. GALE E. RIDGE discovered a new state record for citrus leafminer *Phyllocnistis citrella*, which was confirmed by the Systematic Entomology Laboratory; was interviewed by Tracy Phelan, CBS News, on the increase of Hickory Tussock Moth caterpillar reports and their medical significance (October 6); was interviewed by Harlan Levy of the Journal-Inquirer about pantry pests found in pet food (October 16); presented a talk about bed bugs to the DCF Regional Resource Group of nurses in Rocky Hill (34 attendees) (October 24); and with **MS. KATHERINE DUGAS** had a bed bug table at the annual Bridgeport University Health Fair (200 attendees) (October 26).

DR. CLAIRE E. RUTLEDGE taught "Insects that Attack Trees" for CTPA's Arboriculture 101 in Wallingford (40 adults) (October 18); was a guest on WNPR's show "Where We Live" along with Patrick Skahill, WNPR science reporter and Chris Martin, CT State Forester, for a program entitled "What's Eating Our Trees" http://wnpr.org/post/whats-eating-trees (October 24); taught "Tree Conditions Laboratory, Insects" for CTPA's Arboriculture 101 in Wallingford (40 adults) (October 25); and with **MS. KATHERINE DUGAS,** ran "Dr. Rutledge's Insectorium and Petting Zoo" exhibit at the Brooklyn Botanical Garden's Ghouls & Gourds event in Brooklyn, NY (12,000 attendees, youth and adults) (October 28).

DR. VICTORIA L. SMITH participated in a meeting of the Yale Biosafety Committee, held at 135 College Street, New Haven (20 participants) (October 19); and participated in the annual meeting of the US Forest Service Durham Field Office cooperators, held at Rhode Island Department of Environmental Management Office in Providence, RI, with a presentation on CT forest conditions, including the recent gypsy moth outbreak (40 participants) (October 24-25).

DR. KIMBERLY A. STONER presented a poster, "Pesticides in Trapped Honey Bee Pollen from Ornamental Plant Nurseries" at the Protecting Urban Pollinators Conference, Traverse City, MI (October 11); met with George Davis, a member of the board of directors of the Edgerton Park, in New Haven, to discuss possibilities for a pollinator meadow at Edgerton Park (October 16); provided Maria Vogel-Short, graduate student at Quinnipiac University, with information on the economic value of pollination services, honey production, and honey bee colony numbers for the US and spoke to the annual meeting of the North Central Conservation District on "Planting for the Bees' Needs" at the Tolland Agricultural Center in Vernon (20 attendees) (October 25).

MS. TIA M. BLEVINS attended the 2017 HIS-Eastern Chapter's Interstate Inspection held in College Park, MD. Participants discussed Pennsylvania's boxwood blight compliance agreements and issues dealing with exporting to PA. The group reviewed the process for addressing non-conformance in SANC (Systems Approach to Nursery Certification) program facilities. Attendees toured three USDA/APHIS facilities; The National Agricultural Library, Plant Germplasm and Quarantine Facility, and the US National Arboretum South Farm (22 participants) (October 24-26).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO hosted Prof. Joel Pedersen, University of Wisconsin for the Lockwood Lecture (October 17); and gave a talk, "Gastrointestinal Bioaccessibility of PAHs and PAH Derivatives Natively Present in Soot Particles Using an in Vitro Model: Effects of Soot Aging with Soil," at the annual Soil Science Society of America Meeting in Tampa, FL (approx. 25 attendees, 15 students) (October 25).

DR. PHILIP ARMSTRONG gave the talk, "Zika Virus and Mosquitoes: Assessing the Threat" to the Mystic Aquarium in Mystic (30 attendees) (October 4); gave the presentation "Northern Range Expansion of the Asian Tiger Mosquito" at the Northeastern Epidemiology Conference in Northampton, MA (50 attendees) (October 19); and was interviewed by the Connecticut Post about the extended mosquito season this year (October 19).

MR. GREGORY BUGBEE was interviewed by the Danbury News Times on invasive aquatic plants in nearby lakes (October 3); and gave the talk, "What Your Soil Needs to Support a Healthy Landscape" at the Healthy Yards Workshop sponsored by the Town of Greenwich (approx. 75 attendees) (October 18).

DR. GOUDARZ MOLAEI visited the Faculty of Agricultural Sciences and Engineering at the University of Tehran and met with Dr. Reza Talaei Hassanlouei, Associate Dean, and other faculties and students to discussed mutual research interests (October 14); and was interviewed by NBC Connecticut, "*Found a Tick on Yourself? How to Submit it for Testing and Identification,*" published online at https://www.nbcconnecticut.com/news/local/Found-a-Tick-on-Yourself-How-to-Submit-it-for-Testing-and-Identification-454165273.html (October 30).

DR. CHARLES VOSSBRINCK gave a CAES Seminar Series talk on "Genomic Ecology of the Microsporidia" (approx. 50 attendees) (October 11).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD met with Karen Bennet (University of New Hampshire), Mark Ashton (Yale University), and Kyle Lombard (New Hampshire Forest and Lands) to discuss oak management in Union (October 9); was interviewed by Fox-61 about the effect of drought on fall color (October 17); led an interpretative walk "Forest Bathing with a Forester" at Steep Rock Preserve in Washington (26 attendees) (October 21); presented an invited talk "Crop tree management in fully and poorly stocked stands" at the Oak Symposium: Sustaining Oak Forests in the 21st Century through Science-based Management in Knoxville, TN (70 attendees) (October 24-26); was interviewed about the impact of warm weather on late fall colors by John Burgeson of the Connecticut Post (October 26); and gave invited co-lectures with Dr. Mark Ashton (Yale) on "Silvics of individual species and stand dynamics" and "Silvicultural systems and practices " along with leading a field workshop on oak management and ecology at the Northeast Silviculture Institute for Foresters Mixed Oak-Hickory Symposium in Sturbridge, MA (October 30).

DR. ABIGAIL A. MAYNARD spoke on “Composting and Utilization of Compost” to a sustainability class at Hamden Hall Country Day School in Hamden (1 teacher, 12 students) (October 3); spoke on “Composting and Utilization of Compost” to another sustainability class at Hamden Hall Country Day School in Hamden (1 teacher, 15 students) (October 3); spoke about Station activities at a quarterly meeting of the Council of Soil and Water Conservation in Vernon (12 adults) (October 5); spoke on “Composting and Utilization of Compost” at the Healthy Yards Workshop in Greenwich (75 adults) (October 18); spoke about growing vegetables and gave a tour of Lockwood Farm to a preschool class from Hamden Hall Country Day School (2 teachers, 8 adults, 13 children) (October 23); and attended a semi-annual meeting of the State Technical Committee in Tolland (October 25).

DR. SCOTT C. WILLIAMS attended the fall meeting of the Northeast Section of the Wildlife Society in Howard, PA (October 11); gave an invited lecture about environmental employment opportunities at Middlesex Community College in Middletown (12 students, 1 teacher) (October 16); with **MS. MEGAN LINSKE** and **MR. MICHAEL SHORT**, was interviewed by NBC-30 Troubleshooters reporter Shyang Puri about the blacklegged tick and Japanese barberry relationship (https://www.nbcconnecticut.com/news/local/Popular-Shrub-Linked-to-Rising-Rates-of-Lyme-Disease-in-Ticks-447990093.html) (October 18); interviewed by WNPR environmental reporter Patrick Skahill about Japanese barberry and blacklegged ticks (http://wnpr.org/post/invasive-shrub-deer-tick-haven) (October 19); and gave an invited co-lecture with DEEP Wildlife Division Biologist Michael Gregonis titled "Acorn Abundance Patterns and Their Implication for Wildlife" at the Northeast Silviculture Institute for Foresters Mixed Oak-Hickory Symposium in Sturbridge, MA (62 attendees) (October 30).

MR. JOSEPH P. BARSKY elected to serve as Vice Chair of the Connecticut State Consulting Committee for Agricultural Science and Technology Education during the quarterly meeting (October 12).

PLANT PATHOLOGY AND ECOLOGY

DR. WADE ELMER met with six Connecticut state legislators from Fairfield County and Mr. Terry Jones and provide a brief description of the "Plant Disease Information Office" (October 2); and presented an invited seminar to the Department of Plant Biology at Rutgers University on "Nanoparticles of metallic oxides for plant disease suppression" (25 attendees) (October 20).

DR. YONGHAO LI presented "Bonsai Tree Disease Management" to the Bonsai Society of Greater Hartford in Rocky Hill (15 adults) (October 9); staffed the Station booth in the College & Career Night event at Nonnewaug High School in Woodbury (80 youths) (October 10); was interviewed by Dan Amarante at Fox 61 News about the foliage this fall (October 17); and staffed the Tree Conditions Laboratory for CTPA's Arboriculture 101 class in Wallingford (40 adults) (October 25).

DR. LINDSAY TRIPLETT was interviewed for Plantae.org, a blog of the American Society of Plant Biologists, for an article titled, "I don't know how she does it: Stories of plant scientists with children" (September 5); and met with students and faculty at the Department of Plant Pathology and Environmental Microbiology at Penn State University, State College, PA and presented an invited seminar titled "A weapon of suicide or warfare: Understanding the functions of a bacterial virulence effector and universal toxin" (28 attendees) (October 23).

DR. QUAN ZENG was interviewed by Mr. Luther Turmelle, from the New Haven Register about the recently funded USDA-NIFA project (October 17); met Dr. Joel Pedersen from the University of Wisconsin-Madison (October 17); presented " Evaluation of organic management options for fire blight in Connecticut" at the Third Annual Integrated Pest Management (IPM) Online Conference (October 23); attended the 79th New England, New York and Canadian Fruit Pest Workshop in Burlington, VT (October 24-25); gave a research presentation "Genotyping and migration of fire blight pathogen, *Erwinia amylovora*" (50 adults) (October 24); and had research conferences about fire blight research with Drs. Srdjan Acimovic, Daniel Cooley, David Rosenberger, and Alan Eaton.

VALLEY LABORATORY

DR. JATINDER S AULAKH participated in the CIPWG steering committee meeting at the Valley Laboratory (October 5); gave a Pesticide Applicator Certification training session with **MR. THOMAS RATHIER** and **MS. ROSE HISKES** to Christmas Tree Growers at the Valley Laboratory (October 12, 26 people); and participated in the IR-4 Ornamental Horticulture Workshop held in San Diego, CA (October 17 to 19).

DR. RICHARD COWLES presented "What's wrong with our bees," for a continuing education class at Quinnipiac Valley Community College in Danielson (40 attendees) (October 10).

MS. ROSE HISKES with **MR. TOM RATHIER** and **DR. JATINDER AULAKH** gave a Pesticide Applicator Certification training session to Christmas Tree Growers at the Valley Laboratory (14 attendees) (October 12, 26); and staffed an Experiment Station Discovery table at the Kennedy School, grades 3, 4 and 5, Family Science Night in Windsor (60 attemdees) (October 27).

DR. JAMES LAMONDIA taught a class on identification, biology and management of tree diseases to students in the Connecticut Tree Protective Association's Arboriculture 101 class in Wallingford (40 attendees) (October 4); participated in the quarterly CT Hop Growers Association meeting held at the Valley Laboratory and spoke about the recently developed IPM Guideline Bulletin for growers (25 people) (October 12); and spoke about nematode management research results at the annual meeting of the Northeast Regional Multistate Nematology Technical Committee (NE-1640) held in Newport RI (15 attendees) (October 18-20).

DEPARTMENTAL RESEARCH UPDATES OCTOBER 2017

Leak, W.B., M. Yamasaki, **J.S. Ward,**, J. Desmarais, and K. Bennett. 2017. Ecology and management of northern red oak in New England. University of New Hampshire Cooperative Extension, Durham, NH. 50p. https://extension.unh.edu/resources/files/Resource006927_Rep9991.pdf

Abstract- Northern red oak (*Quercus rubra* L.) is one of the highest-valued species in New England for both timber production and wildlife amenities. However, the species is declining due to regeneration difficulties, dwindling farmland abandonment, and losses from deer browsing. Much of the available research information is from regions outside of New England, and may not apply. This publication is an attempt to assemble and evaluate information on red oak ecology, management, and habitat especially applicable to New England.

Williams, S.C., **M.A. Linske**, and **J.S. Ward**. 2017. Long-term effects of *Berberis thunbergii* (Ranunculales: Berberidaceae) management on *Ixodes scapularis* (Acari: Ixodidae) abundance and *Borrelia burgdorferi* (Spirochaetales: Spirochaetaceae) prevalence in Connecticut, USA. *Environmental Entomology* nvx146, https://doi.org/10.1093/ee/nvx146.

Abstract- Japanese barberry (*Berberis thunbergii* de Candolle; Ranunculales: Berberidaceae) is an exotic invasive shrub that escaped cultivation in the United States and is now permanently established in many eastern and midwestern states. This study examined the long-term impacts of Japanese barberry management on blacklegged tick (*Ixodes scapularis* Say; Acari: Ixodidae) abundances and associated prevalence of *Borrelia burgdorferi* (Johnson, Schmid, Hyde, Steigerwalt, and Brenner; Spirochaetales: Spirochaetaceae), the etiologic agent of Lyme disease. At six locations across Connecticut, adult *I. scapularis* were sampled for up to 10 yr. At each location, we sampled an area where barberry infestations were unmanipulated, adjacent areas where barberry was virtually nonexistent, and areas where barberry was managed utilizing a variety of techniques. Barberry management reduced *B. burgdorferi*-infected adult *I. scapularis* (BBIAIS) abundances (191/ha ± 64 SE) over 6 yr to statistically indifferent from that of no barberry areas (140/ha ± 47 SE; P = 0.080) and significantly less than intact barberry stands (458/ha ± 80 SE; P = 0.026). Over 9 yr, BBIAIS abundances in managed barberry remained lower than intact bar-

berry stands (P = 0.037), but increased to be significantly greater than no barberry areas (P = 0.007) as cover increased over time. Longer-term data further document that Japanese barberry infestations are favorable habitat for *I. scapularis*. Control of Japanese barberry and other invasives should be at least on a 5-yr rotation to maintain low levels of invasive cover and eliminate humidity refugia to expose juvenile *I. scapularis* to more hostile environmental conditions in the interest of public health.

Kirby Stafford III, Scott Williams, and **Goudarz Molaei**, Integrated Pest Management in Controlling Ticks and Tick-Associated Diseases, Journal of Integrated Pest Management, (2017) 8(1): 28; 1–7 doi: 10.1093/jipm/pmx018.

Abstract-The increasing prevalence of Lyme disease and the emergence of other tick-associated human diseases in the United States have become a major public health concern. A wide variety of personal protection measures and tick control strategies have been used or investigated to reduce contact between ticks and humans, reduce tick abundance, or lower the prevalence of tick-borne agents in the ticks. These methods have generally been applied or evaluated as single interventions and other than some early computer model simulations, studies applying integrated tick management approaches are few. In this paper, we review surveyed human behaviors and risks for exposure to ticks, concepts pertinent to integrated pest management for ticks, simulation models, various tick control strategies, integrated tick management studies, and highlight what is needed going forward. Increased education and communication between physicians and veterinarians is essential to address tick-associated diseases in a 'one health' approach and unify the animal and human branches of medicine to identify, treat, and implement preventive measures. Novel simulation models using more recent empirical data on tick population dynamics, hosts, efficacy of various combinations of interventions, human exposure elements, and utilization of personal and environmental measures will help us better understand the interactions of integrated strategies for tick population management. Many questions remain related to the ecology of ticks and tick-borne pathogens, observed and modeled efficacy of various integrated interventions, human behavior and exposure to tick bite and disease risk, comparative cost of interventions, and the acceptance and use of prevention and tick control tools.

Yi Yang and **Joseph J. Pignatello**,* Participation of the Halogens in Photochemical Reactions in Natural and Treated Waters. *Molecules*, 2017, 22(10): 1684. doi:10.3390/molecules22101684

Abstract- Halide ions are ubiquitous in natural waters and wastewaters. Halogens play an important and complex role in environmental photochemical processes and in reactions taking place during photochemical water treatment. While inert to solar wavelengths, halides can be converted into radical and non-radical reactive halogen species (RHS) by sensitized photolysis and by reactions with secondary reactive oxygen species (ROS) produced through sunlight-initiated reactions in water and atmospheric aerosols, such as hydroxyl radical, ozone, and nitrate radical. In photochemical advanced oxidation processes for water treatment, RHS can be generated by UV photolysis and by reactions of halides with hydroxyl radicals, sulfate radicals, ozone, and other ROS. RHS are reactive toward organic compounds, and some reactions lead to incorporation of halogen into byproducts. Recent studies indicate that halides, or the RHS derived from them, affect the concentrations of photogenerated reactive oxygen species (ROS) and other reactive species; influence the photobleaching of dissolved natural organic matter (DOM); alter the rates and products of pollutant transformations; lead to covalent incorporation of halogen into small natural molecules, DOM, and pollutants; and

give rise to certain halogen oxides of concern as water contaminants. The complex and colorful chemistry of halogen in waters will be summarized in detail and the implications of this chemistry for global biogeochemical cycling of halogen, contaminant fate in natural waters, and water purification technologies will be discussed.

Medina-Velo, I.A.; Dominguez, O.E.; Ochoa, L.; Barrios, A.C.; Hernández-Viezcas, J.A.; **White, J.C.**; Peralta-Videa, J.R; Gardea-Torresdey, J.L. Nutritional quality of bean seeds harvested from plants grown in different soils amended with coated and uncoated zinc oxide nanomaterials. ES: Nano DOI: 10.1039/c7en00495h.

Abstract- Effects of soil properties on nanomaterials (NMs) interactions with plants are not well understood. Bean (Phaseolus vulgaris) plants were grown to maturity in natural soil (NS) or organic matter (OM)-enriched soil (ES) amended with either uncoated (Z-COTE) or hydrophobically coated (Z-COTE HP1) ZnO NMs, bulk ZnO, or ZnCl2 at 0-500 mg/kg. At harvest, yield and seed nutrient composition were assessed. The interaction of soil × compounds reduced the maturation time by ~25 days and increased seed yield (~155%) in ES, compared to NS. In NS, bulk ZnO and Z-COTE reduced in a similar way the maturation time (12 days), and independently of the soil properties they increased Zn (~69%), K (~24%), S (~39%), Cu (~125%), Mo (~228%), and Ni (~98%), compared with Z-COTE HP1 and ZnCl2. In NS, Z-COTE produced the most sugar, ~43% higher than bulk and ZnCl2; while in ES, bulk ZnO resulted in ~85% more sugar than the rest of the compounds. In NS, Z-COTE HP1 at 250 and 500 mg/kg produced ~152% more biomass of empty pods than Z-COTE. Compared with control, Z-COTE HP1 reduced Cu at all concentrations (57%), while ZnCl2 reduced pods-with-seeds by 52% in NS. The uncoated Z-COTE impacted the nutritional composition of beans similarly to the bulk ZnO, while the coated Z-COTE HP1 behaved like ionic ZnCl2. In general, the soil OM reduced the negative effects of coated Z-COTE HP1 on the production of bean seeds.

Han, J.; Qiu, W.; Campbell, E.C.; **White, J.C.**; Xing, B. Toothbrush components retain significant levels of triclosan and other chemicals from toothpastes: Assessment of contaminant accumulation and release. Environ. Sci. Technol. DOI: 10.1021/acs.est.7b02839.

Abstract- Triclosan (TCS), a broad-spectrum antimicrobial agent, is used in a range of commercial toothpastes due to reported dental benefits. Our study on 22 popular manual toothbrushes in the U.S. showed that common toothbrush head components can accumulate substantial amounts of TCS after brushing with toothpaste slurries of TCS-formulated antibacterial toothpastes (TCS-TPs). After simulated 3-month brushing with a commercial TCS-TP, over 1/3 of the adult toothbrushes analyzed showed an accumulation of 21–37.5 mg or 7–12.5 equivalent doses of TCS per brushing. Similar results were observed on children's toothbrushes with smaller size heads. Elastomer components were found to be the main contributor while nylon bristles and elastomers both acted as absorptive sinks for TCS. Studies on six popular TCS-TPs containing 0.3 wt.% TCS showed similar profiles of TCS accumulation. The absorbed TCS was readily released into toothpaste slurries after switching to TCS-free alternatives. Releases of TCS, which typically measured at a fraction of the standard dose using TCS-TPs, continued for more than two weeks and was most rapid in peroxide-containing 'whitening' toothpastes, followed by alkaline and surfactant-rich toothpastes. The accumulating effect was not exclusive to TCS but was commonly observed on several other chemicals identified in TCS-TPs and regular toothpastes.

Lohse, S.E.; Abadeer, N.S.; Zoloty, M.; **White, J.C.**; Newman, L.A.; Murphy, C.J. 2017. Nanomaterial probes in the environment: Gold nanoparticle (AuNP) stability and soil retention as a function of surface chemistry. ACS Sustain. Chem. Eng. 10.1021/acssuschemeng.7b02622.

Abstract- The increased prevalence of functionalized nanomaterials in a range of applications will inevitably lead to nanoparticle contamination of soil and groundwater. Here, we investigate how gold nanoparticles' (AuNPs) shape and surface chemistry influence their retention in soil columns and stability in simulated groundwater. When AuNPs are eluted from soil columns with simulated groundwater, spherical particles are more strongly retained in the soil than the rod-shaped AuNPs, regardless of the surface chemistry (as determined by ICP-OES). In a deionized water eluent, however, the same AuNPs showed a retention profile dependent upon surface chemistry (positively-charged AuNPs are strongly retained by soil, while negatively-charged particles are quickly eluted). This change in retention behavior suggests that the spherical AuNPs may undergo a physiochemical transformation (likely aggregation) during the elution process which reduces their mobility. AuNP stability against aggregation in simulated groundwater was investigated using absorbance spectroscopy and dynamic light scattering. We find that AuNP surface chemistry has a strong influence on AuNP stability against homoaggregation in simulated groundwater. The stability of the AuNPs depends primarily on the nature of the interaction between the AuNP surface and the capping agent (not simply the ligand charge). AuNPs protected with relatively labile capping agents are more susceptible to irreversible homoaggregation in groundwater than polyelectrolyte-coated AuNPs. However, in the presence of alginate, the AuNPs form heteroaggregates with the alginate

JOURNAL ARTICLES APPROVED OCTOBER 2017

Aulakh, Jatinder S., P. S. Chahal, and A. J. Jhala. Glyphosate-resistant weed control and soybean tolerance to PPO-herbicides applied at two different growth stages. *Proceedings, Northeastern Plant, Pest, and Soils Conference 2016*

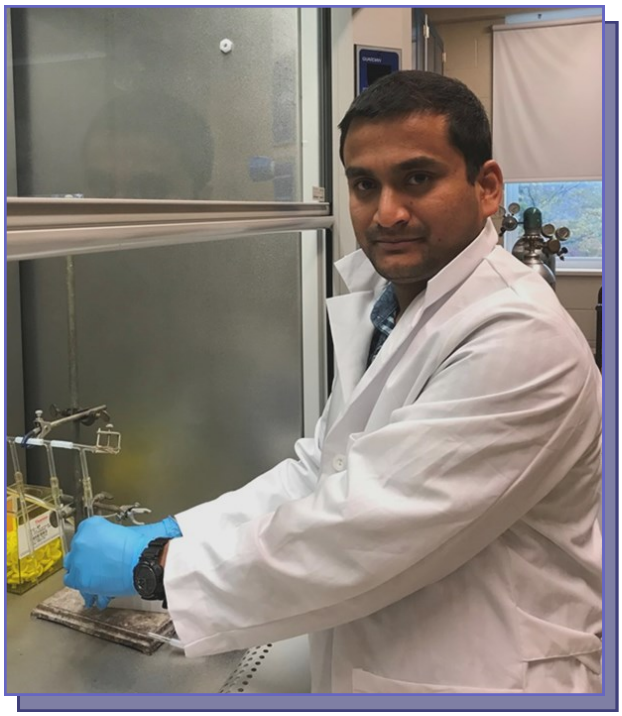
Hassan, J. A., **R. De La Torre-Roche**, **Jason C. White**, and J. D. Lewis. Soil type affects resistance to *Pseudomonas syringae* infection in *Arabidopsis thaliana*. *Applied and Environmental Microbiology*

Krol, Walter J., **Brian D. Eitzer**, **Christina S. Robb**, **Michael J. Cavadini**, **Terri Arsenault**, and **Jason C. White**. Pesticide residues in produce sold in Connecticut from 2014 to 2016: ISO/IEC 17025:2005 accreditation for the Food Safety Modernization Act (FSMA). *CAES Technical Bulletin 16*

Rui, M., Chuanxin Ma, **Jason C. White**, X. Tang, J. Yang, F. Jiang, B. Xing. Metal oxide nanoparticles alter peanut (*Arachis hypogaea* L.) physiological response and reduce nutritional quality: a life cycle study. *Environmental Science & Technology*

Servin, Alia D., H. Castillo-Michel, J. A. Hernandez-Viezcas, W. De Nolf, **Roberto De La Torre-Roche**, Luca Pagano, **Joseph Pignatello**, M. Uchimiya, J. Gardea-Torresdey, and **Jason C. White**. Bioaccumulation of CeO_2 nanoparticles by earthworms in biochar amended soil: a synchrotron microspectroscopy study. *Journal of Agricultural and Food Chemistry*

NEW STAFF, STUDENTS, AND VOULENTEERS OCTOBER 2017



DR. SANTANU BAKSHI joined the Department of Environmental Sciences as a Postdoctoral Research Scientist in early October. He will be working with Joe Pignatello on the development of novel applications of biochar combined with animal wastes for nutrient capture and subsequent fertilizer value in collaboration with researchers at UC Davis. Santanu was born in Kolkata, India from where he achieved his bachelor's and master's degree. He earned his PhD degree in Soil and Water Science at the University of Florida in 2013. Before joining CAES, he spent three and a half years in a postdoctoral position at the Iowa State University, where he acquired expertise on carbon negative biomass-bioenergy systems and soil chemistry. He has experience working with large multiple disciplinary teams in plant breeding, ecology, agronomy, soil science, engineering, economics, and statistics, and has expertise with numerous instrumentational techniques. Santanu lives in New Haven with his lovely wife, Chumki. The couple is expecting their first baby at the end of November.

Alita Burmeister is a postdoc in the Ecology and Evolutionary Biology Department at Yale University. Her research investigates the role of bacteriophage viruses on bacterial evolution, including the evolution of resistance to viruses and antibiotics. At the CT Agricultural Research Station, Alita is collaborating with Dr. Blaire Steven to investigate the role of bacteriophage on nutrient cycles in microbial communities.

Sylvie Estrela's work combines theory and experiments to study microbe-microbe and host-microbe interactions. Sylvie pursued a PhD at the University of Edinburgh (UK), followed by a postdoc at the University of Washington working on the origins and maintenance of microbial mutualisms and interdependencies. Now a postdoc in the Sanchez lab (Yale University), Sylvie is conducting experiments with soil microbial communities to understand how microbial species assemble into complex multi-species communities, and will be currently collaborating with Dr. Blaire Steven in his lab to investigate how microbial communities assemble within the mosquito host.

GRANTS RECEIVED OCTOBER 2017

Drs. Quan Zeng, Blaire Steven, and **Jason White** received a three-year grant from USDA-NIFA-ORG ($459,978). In this grant, scientists will characterize the apple flower microbial ecology and develop of effective biological control of fire blight.

CAES

The Connecticut Agricultural Experiment Station

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The Connecticut Agricultural Experiment Station

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