

Station News

The Connecticut Agricultural Experiment Station
Volume 7 Issue 5 May 2017



This Issue

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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ADMINISTRATION

DR. THEODORE ANDREADIS presided over a quarterly meeting of the Station’s Board of Control held at the Station (April 12); presented welcoming remarks and an overview of the Experiment Station and its various research, regulatory and public service programs at the Annual Meeting of the Experiment Station Associates held at the Station (April 12); presented a seminar entitled “Global Climate Change and Mosquito Borne Diseases” as part of the Yale Climate Change and Health Initiative Program at the Yale School of Public Health (April 19); held a news conference at the Station on ticks and tick-borne diseases and to announce the establishment of the Northeast Center for Excellence in Vector-Borne Diseases in Connecticut with US Senator Richard Blumenthal (April 20); was interviewed about Powassan virus and the first confirmed human case in Connecticut by Greg Hladky, Hartford Courant (April 20); with **DR. JASON WHITE** hosted legislative aides, Emily Boushee and Ben Florsheim from US Senator Chris Murphey’s office and gave an overview and tour of the Experiment Station (April 25); presented an overview of the Experiment Station and its research, regulatory and public service programs at a quarterly meeting of the Council of the Connecticut Academy of Science and Engineering (21 attendees) (April 26); was interviewed about ticks and tick-borne disease threats in Connecticut by Mike Puffer, Republican American (April 27); and with **DR. JASON WHITE** hosted State Representative Steven Stafstrom from Bridgeport and gave an overview and tour of the Experiment Station (April 27).



DR. JASON C. WHITE attended the monthly Laboratory Preparedness meeting at the CT Department of Public Health Laboratory in Rocky Hill (April 3); attended the 253rd American Chemical Society National Meeting in San Francisco, CA and presented a lecture entitled “Accumulation and transfer of engineered nanomaterials in terrestrial food chains: Correlating physiological and molecular response” (30 attendees) and participated in the Editorial Advisory Board Meeting for *Environmental Science & Technology* and *Environmental Science & Technology Letters* (April 4-6); spoke by phone with Professor Achintya Bezbaruah of North Dakota State University and discussed a collaborative grant submission to the USDA Nanotechnology program (April 10); participated in an APHL-sponsored teleconference call regarding a peer reviewed manuscript submission focused on nanotechnology and water treatment to the Journal of the American Water Works Association (JAWWA) (April 11); spoke with Michael Farrow of FDA FERN to assist in the planning of an upcoming food surveillance assignment (April 11); participated in a “Red Team” meeting at the University of Minnesota as part of preparations for the upcoming NSF site visit of the Center for Sustainable Nanotechnology (the Center will be funding a CAES Post-doctoral Associate) (April 12-13); along with **DR. WADE ELMER** participated in a teleconference call with Professor Greg Lowry of Carnegie Mellon University and discussed collaborative research projects (April 20); participated in a WebEx with Michael Farrow of FDA FERN and several other state cCAP laboratories to plan an upcoming food surveillance assignment (April 21); participated with Katrina Varner of the EPA regarding participation this summer in a Gordon Conference focused on environmental nanotechnology (April 24); along with **DR. THEODORE ANDREADIS** met with two representatives of US Senator Chris Murphy’s office and discussed CAES programs and research (April 25); along with Dr. Wade Elmer met with reporter Ms. Jan Spiegel on research involving the use of nanoscale nutrients to suppress crop disease (April 26); along with **DR. THEODORE ANDREADIS** met with State Representative Steven Stafstrom (Bridgeport) and discussed CAES research and programs (April 27); and met with Ms. Jasmin Perez of SCSU to discuss an internship in the Department of Analytical Chemistry (April 28).

DR. BRIAN D. EITZER was a participant in the conference call of the North American Chemical Residue Workshop’s Organizing Committee (April 13) and was one of the instructors for the course “LB511 FDA/FERN Training for LC-MS” held in Cincinnati (12 attendees) (April 17-21).

DR. KIRBY C. STAFFORD III assisted and was interviewed by Lauren Schneiderman, visual journalist for the Hartford Courant, with locating and photographing gypsy moth egg masses (April 7); participated on a Center of Excellence in Vector Biology control group conference call (April 6); participated on a gypsy moth conference call with state foresters for CT, MA, and RI (April 6); participated on a Center of Excellence in Vector Biology general conference call (April 11); interviewed by John Silva, WTIC News/Talk 1080 about current and upcoming tick activity (April 11); participated on a conference call with U.S. Biologic Inc. and colleagues in New York and Michigan on the rodent targeted vaccine (April 12); participated on the Tick IPM Working Group conference call (April 12); interviewed by Marlese Lessing, UConn Daily Campus, about Powassan virus and other tick-borne diseases (April 18); consulted by Brian Sauvageau, Conn-OSHA, about occupational exposures to ticks and tick-borne diseases and tick-bite prevention (April 19); participated in news conference on Lyme disease by Senator Richard Blumenthal at CAES (April 19); presented a talk on gypsy moths in Sterling sponsored by the Sterling Ag Commission (120 attendees) (April 20); attended the meeting of the Connecticut Entomological Society (April 21); presented a talk on tick-borne diseases and tick management at a vector biology forum at the New England Natural History Conference in Cromwell (18 attendees) (April 22); with **DRS. THEODORE ANDREADIS AND JASON WHITE** met with representatives from Senator Chris Murphy's office in tour of entomology research (April 25); interviewed by Cynthia Drummond about tick-borne diseases and tick management (April 25); interviewed by Ray Dunaway, WTIC radio, about gypsy moth (April 27); and with **DR. THEODORE ANDREADIS** met with State Representative Steven Stafstrom of Bridgeport during a tour of the Station (April 27).

MS. TIA M. BLEVINS participated in the 43rd annual Horticultural Inspection Society - Eastern Chapter's meeting in Martinsburg, WV. As Archivist, she presented the archival report to the members (19 participants) (April 3-6) and toured the USDA Agricultural Research Service Laboratory at the Appalachian Fruit Research Station (76 participants) (April 5).

MS. KATHERINE DUGAS staffed a display table at the Hunting and Fishing Expo at the CT Convention Center in Hartford. The table covered invasive insect topics, including Forest Pests and Don't Move Firewood (March 31-April 2); with **MR. JEFFREY FENGLER, DR. VICTORIA SMITH,** and **MS. TIA BLEVINS** attended the combined meeting of the Eastern Plant Board, the Horticultural Inspection Society, and the Cooperative Agricultural Pest Survey, held in Martinsburg, WV (90 attendees) (April 3-6); staffed a Forest Pest Outreach booth at North Haven Earth Day (100 people stopped by the booth) (April 8); staffed a Forest Pest Outreach booth at Hamden Earth Day (200 people stopped by the booth) (April 22); and attended the CT Tree Wardens Association 25th Anniversary Meeting held at the Omni Hotel in New Haven (April 28). Topics discussed with tree wardens included the spread of EAB, invasive insects, and the prospects of gypsy moth activity in the state for 2017.

MR. MARK H. CREIGHTON attended the Connecticut Beekeepers Association meeting at The Connecticut Agricultural Experiment Station in New Haven speaking on honey bee health issues and a queen rearing grant (60 attendees) (April 8); participated in a panel and spoke at the Sustainability Symposium on bees at Central Connecticut State University in New Britain (80 participants) (April 13); set up a bee infor-

mation table for an Arbor Day event at the UCONN Storrs Campus and spoke to 80 students on honey bee related topics (April 18); met several teachers at Amity High School in Woodbridge to discuss starting an apiary at the school and curriculum development for the beekeeping project (April 19); spoke at the Hamden County Beekeepers Association Bee School in Chicopee, MA on our honey bee registration program and Queen Rearing Project (approximately 80 attendees, many from Connecticut) and also met with the Chief Apiary Inspector for Massachusetts and discussed how our programs may collaborate in the future (April 20); attended an Earth Day event titled “Science Matters” at the Old Town Hall in East Haddam and staffed an information booth on CAES programs and honey bee topics. Spoke with approximately 49 visitors (April 22); and installed honey bees at the newly established apiary at West Rock Nature Center with support from Common Ground High School students. A Top Bar hive was also installed at this location and the Common Ground High School apiary (April 24).

DR. CHRIS T. MAIER exhibited live adults of the Japanese cedar longhorn beetle, a classic 1928 book on leafminers, and a collection of adults of tentiform leafminers at the Annual Meeting of the Connecticut Entomological Society in Jones Auditorium (April 21).

DR. GALE E. RIDGE spoke to the Residence Service Coordinators of Connecticut in North Haven about the management of bed bugs (35 attendees) (April 4); a troop of boy scouts from Bridgeport visited the office and were introduced to insects (April 10); interviewed by Tina Detelj from Channel 8 about how not to behave when bed bugs are discovered (April 11); presented a lunchtime seminar to Station staff about bed bugs, which included a display by Charlie and Christi Mastroberti, and George the dog on bed bug canine scent detection (April 12); presented a talk about bed bugs at Luther Ridge, Middletown (45 attendees) (April 12); spoke to 16 delegates from the Northeast Natural History Conference that visited the insect inquiry office (April 21); had an interview published in the Boston Globe Magazine, Pest Control Technology, and interviewed by Guiliano Aluffi from “La Repubblica,” Italy about her work with Delusory Parasitosis sufferers (April 25); and presented a 3-hour program about bed bugs, hoarding, and delusional parasitosis to police, EMT’s, and other emergency personnel in Vernon (50 attendees) (April 25).

DR. CLAIRE E. RUTLEDGE presented “Using a Native Wasp to Catch an Invasive Beetle” at Housatonic Valley Regional High School’s Science day in Salisbury (150 youth) (April 7) and presented “Southern Pine Beetle in Connecticut: Discovery and Distribution” at the New England Natural History Conference in Cromwell (25 adults) (April 22).

DR. VICTORIA L. SMITH attended and participated in the 92nd annual meeting of the Eastern Plant Board, held at the Holiday Inn in Martinsburg, West Virginia (120 participants) (April 3-6) and participated in a meeting of the Yale University Biological Safety Committee, held at 135 College Street, New Haven (20 participants) (April 20).

DR. KIMBERLY A. STONER participated in a charrette at the White Memorial Conservation Center in Litchfield to design a trail with visitor displays of pollinator habitat and other ecological practices (14 participants) (April 3); conducted a site assessment for pollinator habitat on land owned by the town of Newtown, formerly the grounds of the Fairfield Hills State Hospital, with Mary Wilson and Holly Kocet of

Protect Our Pollinators (April 10); spoke on Pollinators in the Garden to the Milford Garden Club (67 participants) (April 11); conducted a site assessment for pollinator habitat and habitat for other wildlife at the Housatonic Regional Valley High School in Canaan with a team of 5 people (April 12); conducted a site assessment for pollinator habitat at Yellow House Farm in Middletown (April 17); conducted a site assessment for pollinator habitat at the Henrietta House in Ashford (April 24); met with two legislative aides for US Senator Chris Murphy and discussed pollinator research (April 25); gave a talk, Pollinators in the Garden, to the Institute for Learning in Retirement (7 participants) (April 26); and met with State Representative Steven Stafstrom of Bridgeport and discussed pollinator research (April 27).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO gave the talk, “Forces holding organic matter molecules together: Involvement of exceptionally strong hydrogen bonds,” in the Environmental Chemistry Division at the 253rd American Chemical Society National Meeting, San Francisco (approximately 200 attendees, about half students) (April 2); gave the talk, “Thermal air oxidation during biomass char formation and its effects on adsorption of organic compounds,” in the Environmental Chemistry Division at the 253rd American Chemical Society National Meeting, San Francisco (approximately 200 attendees, about half students) (April 3); was co-author on a talk by Dr. Yi Yang, “Activation of peroxides by phosphate ion for water purification,” in the Environmental Chemistry Division at the 253rd American Chemical Society National Meeting, San Francisco (approximately 200 attendees, about half students) (April 2); conferred via Skype with Prof. Fernando Rosario-Ortiz from the University of Colorado, Boulder on joint research (April 18); and judged posters for the Sigma Xi Quinnipiac Local Chapter Science Fair (April 19).

MS. ANGELA BRANSFIELD participated in the 2017 Federal Select Agent Program webinar (April 28).

DR. PHILIP ARMSTRONG gave a talk, “West Nile virus: ecology and epidemiology of an invasive virus” to the Department of Ecology and Evolutionary Biology, Yale University (40 student attendees) (April 19); and gave the presentation “Mosquitoes and Zika Virus: Assessing the Threat” at the Northeastern Natural History Conference in Cromwell (30 attendees) (April 23).

DR. GOUDARZ MOLAEI was interviewed by News 8, “*Rough tick season expected after mild winter*” <http://fox61.com/2017/04/26/with-increase-in-ticks-comes-possibility-of-more-dangerous-diseases/> (April 20); was interviewed by the Connecticut Radio Network on high tick abundance and prevalence of infection (April 21); organized and moderated the symposium, “*Challenges and Advances in Disease Vector Biology in the 21st Century*”, and presented a talk, “*A Feathery Tale of Close Encounters: Mosquitoes, Birds, and Human Health*”, to the Northeast Natural History Conference 2017 (approx. attendees, 30) (April 23); was interviewed on “Lunch Break's Tanya Rivero” of Wall Street Journal TV the rapid resurgence of tick populations and tick-associated diseases, <https://www.wsj.com/articles/prepare-for-a-bad-summer-for-ticks-1493050961> (April

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24); was interviewed by Fox61 Connecticut, “*With increase in ticks comes possibility of more dangerous diseases*” <http://fox61.com/2017/04/26/with-increase-in-ticks-comes-possibility-of-more-dangerous-diseases/> (April 26); and was interviewed by Republican American, “*We’re thick with ticks; State scientists expect another boom year for the bugs, with more carrying diseases*” <http://www.rep-am.com/news/news-local/2017/04/28/were-thick-with-ticks/> (April 28).

MR. GREGORY BUGBEE gave a talk, “Soils and Fertilizers” as part of the Institute for Learning in Retirement’s Care and Maintenance of Landscape Plants seminar series at CAES (approximately 12 attendees) (April 19); and hosted the 2017 Connecticut Federation of Lakes Conference at CAES, gave a brief history of CAES and the talk, “Connecticut’s Invasive Plant Problem—the State of the State” (approximately 110 attendees) (April 29).

DR. CHARLES VOSSBRINCK judged posters for the Sigma Xi Quinnipiac Local Chapter Science Fair (April 19).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD spoke on "Oak health and mortality after gypsy moth defoliation and drought" and gave an afternoon tour of Lockwood Farm at the CT Professional Timber Producers Association Annual meeting in Hamden (68 attendees) (April 29); and spoke on "The importance of trees" for a combined meeting of Lake Waramaug Association, Warren Land Trust, and Steep Rock Association in Washington (24 attendees) (April 30).

DR. ADRIANA ARANGO VELEZ gave a lecture "Physiological, anatomical and molecular adaptations of plants to drought and insect/pathogens" at Quinnipiac University (30 students) (April 4); gave a talk for the NENHC 2017 "Southern pine beetle expansion into pitch pine areas" (30 attendees) (April 22); co-presenter of poster "Development of a robust gas chromatography - mass spectrometry method for determination of monoterpenes in pitch pine against southern pine beetle" at the annual meeting of Connecticut Valley Section of the American Chemical Society (CVS-ACS), Storrs (April 22); and gave a lecture "Why Science Matters? A Plant Physiologist's Tale" at Central Connecticut State University (40 students) (April 27).

DR. ABIGAIL A. MAYNARD gave a talk "Unusual Garden Vegetables" to the Caudatowa Garden Club in Ridgefield (55 adults) (April 11); participated in a meeting in Wethersfield organizing and forming a new Connecticut Vegetable & Berry Growers Association (16 adults) (April 18); assisted in preparing and planting Learning Garden at Hamden Hall Country Day School (33 children, 4 teachers) (April 5, 6, 26); discussed the New Crops Program at Medlyn's Farm in Stony Creek (April 10); and discussed the New Crops Program at Rose's Berry Farm in Glastonbury (April 21).

DR. SCOTT C. WILLIAMS participated in the Annual Meeting of the Executive Board of the Northeast Section of The Wildlife Society, Norfolk, VA (April 9); hosted the Annual Meeting of the membership of the Northeast Section of The Wildlife Society, Norfolk, VA (April 10); gave an invited lecture titled "Bugs and Bushes; Connecticut Ag Station Research on SCCRWA Lands" at the South Central Connecticut Regional Water Authority's recreation permit holders meeting in New Haven (20 attendees) (April 12); presented "Diversity and Dilution: Impacts of Medium-Sized Mammal Diversity on *Borrelia burgdorferi* Prevalence in Fragmented and Unfragmented Habitats in Connecticut" at the Northeast Natural History Conference in Cromwell (25 attendees) (April 23); and interviewed by Mike Puffer of the Waterbury Republican American about tick resurgence in CT (April 27).

MS. JOAN L. BRAVO spoke with the new owners of Franklin Vineyard on best training methods, drainage procedures, and trellising systems for the 10,000 newly planted vines (April 11).

MR. MICHAEL R. SHORT attended the 73rd Annual Northeast Fish & Wildlife Conference in Norfolk, VA (April 10-12); presented a poster "Diversity and Dilution: The impact of medium-sized mammal diversity on *Borrelia burgdorferi* prevalence in fragmented and unfragmented habitats in Connecticut, USA" the 73rd Annual Northeast Fish & Wildlife Conference in Norfolk, VA (300 attendees) (April 11); and attended a workshop hosted by The Northeast Section of The Wildlife Society,

titled “Designing camera-trap surveys and analyzing your data using occupancy models” (April 9).

PLANT PATHOLOGY AND ECOLOGY

DR. WADE ELMER along with **DR. DEWEI LI** met with Ms. Paula Schenck, Director of the Indoor Environment and Health Program at UCONN Health Center, to discuss benefits of restoring salt marshes (April 4); served as a judge for the Sigma Xi Science fair at Quinnipiac University (30 students participated) (April 19); participated with **DR. JASON WHITE** in a teleconference call with Dr. Greg Lowry of Carnegie Mellon University, Pittsburgh, PA on nanoparticle research; and was interviewed along with **DR. JASON WHITE** by Ms. Jan Spiegel of *The CT Mirror* on the NIFA Nanoparticle grant.

DR. FRANCIS FERRANDINO along with **MS. JOAN BRAVO** visited a 10,000 vine new vineyard at Franklin Farms in North Franklin to discuss pruning, training, drainage issues, and proper trellising for 2nd year wine transplant (April 11).

DR. YONGHAO LI organized a four-week 2017 spring course ‘for the Institute for Learning in Retirement at Albertus Magnus College in New Haven and presented the first lecture in the series “Care and Maintenance of Landscape Plants” (8 adult attendees) (April 5); talked about the Plant Disease Information Office to a group of Cub Scouts from Bridgeport (5 children and 5 Adult attendees) (April 10); and participated in a meeting of the CT Nurserymen’s Foundation Scholarship Committee and interviewed candidates for the scholarship in New Haven (April 11).

MS. LINDSAY PATRICK presented “Pruning 101” as part of The Institute for Learning in Retirement course on Care and Maintenance of Landscape Plants in New Haven (8 attendees) (April 5), gave a tour of the PDIO to a visiting group of Boy Scouts (10 attendees) (April 10), staffed a plant disease/CAES information booth at the Guilford Earth Fest in Guilford (April 22), and gave a tour of the PDIO to the Classroom in the Community group visiting CAES (10 attendees) (April 26).

DR. ROBERT MARRA attended the New Haven Science Fair Volunteer Appreciation Dinner at Amarante’s Sea Cliff Restaurant, New Haven (75 attendees) (March 25); and was an invited speaker and panelist for the 25th Annual Meeting of the Tree Wardens’ Association of Connecticut at the Omni Hotel, New Haven

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and presented a talk titled “Drought: Impact on Trees and Implications for Management,” followed by a panel discussion (120 attendees) (March 28).

DR. NEIL SCHULTES served as a Master’s thesis examiner for Amanda Stoffer in the Department of Biology at the University of Indiana, Ft. Wayne (April 12) and hosted Ms. Rebecca Goger, an undergraduate student in the Department of Biology at The University of New Haven, for a semester-long laboratory internship. Rebecca completed her studies on April 28.

DR. JATINDER S. AULAKH talked about Identification and Control of Weeds in Container and Landscape Roses at the annual meeting of the CT Rose Society in Glastonbury (50 attendees) (April 1); talked about Identification and Control of Weeds in Cool Season Turf in East Windsor (15 attendees) (April 18); and talked to the Prospect Land Trust about Identification and Control of Non-native Invasive Plants in Prospect (14 attendees) (April 26).

DR. CAROLE CHEAH presented a talk on climate change influence on mile-a-minute and hemlock woolly adelgid biological control at the Forest Health Monitoring Workshop at the CAES New Haven (50 attendees) (March 7); presented a talk on climate change impacts on hemlock woolly adelgid biological control at the North East Natural History Conference in Cromwell (65 attendees) (April 23); spoke about climate change influence on biological control of hemlock woolly adelgid at the Connecticut Association of Biology Teachers Conference at Northwest Community College, Winsted (20 attendees) (April 29); and manned a booth for the CAES on invasive insect threats to Connecticut forests and presented a talk on hemlocks and the biological control program for HWA at the 47th Barkhamsted Earth Day Nature Festival (55 attendees) (April 30).

DR. RICHARD COWLES presented “Honey bee health, and the SCBG project” to the CT Beekeeper’s Association meeting, New Haven (40 attendees) (April 8) and discussed “Conserving eastern hemlock” at the CT Chapter of the Appalachian Mountain Club annual meeting in Wallingford (50 attendees) (April 8).

MS. ROSE HISKES gave a tour of the Information Office to four Suffield High School Vocational Agriculture students (April 12) and gave a tour of the Information Office to 5th Graders visiting the Valley Laboratory for Arbor Day and a tree planting (15 students and 15 adults) (April 28).

DR. JAMES LAMONDIA met with Dr. Larissa Smith, Syngenta Research and Development Scientist, to discuss research projects and tour the Valley Laboratory farm (April 4); met with Dr. Angelica Sandoval Prando, plant propagator from Ireland to discuss boxwood blight management and resistance in boxwood species in New Haven (April 10); met with Sean Redding of the Connecticut Tree Protective Association to discuss the upcoming Arbor Day event at the Valley Laboratory (April 17); participated in an American Phytopathological Society Division Forum conference call meeting (April 21); participated in the CT Hop Growers Association meeting held at the Valley Laboratory (12 attendees) (April 26); and welcomed participants, spoke about Station research and services, and with **MR. JAMES PRESTE** and CTPA Board Member Sean Redding assisted 5th grade winners of the Arbor Day poster contest plant a hop hornbeam as a part of the CTPA Arbor Day Celebration and tree planting held at the Valley Laboratory (15 students, 15 adults) (April 26).

DEPARTMENTAL RESEARCH UPDATES APRIL 2017

Zhao, B.; Yang, T.; Cao, X.; **De La Torre-Roche, R.**; **White, J.C.**; Xiao, H.; Xing, B.; He, L. 2017. A Green, facile, and rapid method for microextraction and Raman detection of titanium dioxide nanoparticles from milk powder. *RSC Advances* 7:21380-21388.

Abstract: Titanium dioxide (TiO₂) has been widely used as a common ingredient in numerous food products. Recently, the analysis of TiO₂ nanoparticles (NPs) has attracted increasing attention due to potential risks to human health and the environment. Herein, we present a green, facile, and rapid method using flavonoid-assisted microextraction and Raman spectroscopy for TiO₂ NPs (anatase, 21 nm) detection in real food samples. Flavonoids can bind onto TiO₂ NPs, enabling the microextraction of the particles by ethyl acetate and sodium chloride. The extracted TiO₂ NPs concentrate at the interlayer and are easily removed for analysis by Raman spectroscopy. By taking advantage of surface-enhanced Raman spectroscopy (SERS), we evaluated and selected the best binding flavonoid, myricetin (MYC) bound onto TiO₂ NPs, and were able to achieve detection at concentrations as low as 0.2 mg L⁻¹ TiO₂ NPs in water. The method was successfully challenged in the presence of various interferences from common food components and different pH conditions. The recoveries determined using inductively coupled plasma mass spectrometry (ICP-MS) ranged from 66.6% to 88.3%. More important, the method showed good capability for the extraction and quantification of TiO₂ NPs from infant milk powder dilutions. As flavonoids, ethyl acetate, and sodium chloride have low toxicity and are relatively abundant in the environment, this may be considered a green approach for TiO₂ NP extraction and detection. The developed method in this study holds great potential for rapid (<1 h) detection of TiO₂ NPs from food products.

White, J.; Krol, W. (CAES); Willig, M.; Perkins, C.; Provas, A. (UCONN CESE); Giannini, C. (BNR MFD), 2016. Investigating the Presence of Pesticides in American Lobster from Long Island Sound.

http://www.ct.gov/deep/lib/deep/fishing/fisheries_management/ctdeep_investigating_the_presence_of_pesticides_in_american_lobster_from_long_island_sound.pdf

Abstract: A large and well documented lobster die-off occurred in Long Island Sound during late 1999. Since then, mortality events continue to be an annual fall occurrence in the Sound. Many lobstermen, concerned citizens and elected officials have expressed concern that pesticides might be somehow related to these lobster die-off events. In September 2011, following reports of dead and dying lobsters in the western basin, 13 weak and lethargic lobsters were collected and held on ice overnight prior to necropsy. The next day, all 13 lobsters were lively and submitted to the CT Veterinary Medical Diagnostic Laboratory. Pathology results showed that all of those lobsters had a variety of local tissue abnormalities (lesions), which were indicative of normal active immune system responses to infection or disease. Such responses would not have been expected if their immune systems had been compromised by pesticides. House Bill 5260 was introduced by the Connecticut General Assembly in 2012, intending to prevent the application of malathion or methoprene into any waterway, catch basin or storm drain. Following this and using legislative funds made available through the Lobster Restoration account (PA 05-281), the Connecticut Department of Energy and Environmental Protection developed a laboratory assessment and monitoring strategy in 2012 to document the health of lobster from Long Island Sound. This involved seasonal collections of lobster from the three basins of Long Island Sound and testing for the presence of bifenthrin, cyhalothrin, permethrin, and resmethrin, and methoprene. A total of 91 lobsters were collected between July and December of 2012. Analyses of those lobster tissues by the UCONN Center for Environmental Science and Engineering (UCONN CESE), indicated there may have been pesticides present. In laboratory experiments, impaired immune system function has been documented as a sub-lethal effect of pes-

ticide exposure. However, pathology results for those 91 animals collected in 2012 were not indicative of exposure to pesticides, as they exhibited normal active immune system responses to infection or disease. Ultimately, the analytical results for those animals were considered inconclusive when a second laboratory did not detect the presence of pesticides and sample quality came into question. These findings warranted the funding of a second, more comprehensive study to both determine the levels at which these pesticides could be confidently detected using advanced techniques and to test additional lobsters from Long Island Sound for the presence of pesticides. As with the first study, the pesticides of concern were bifenthrin, cyhalothrin, permethrin, and resmethrin (pyrethroid pesticides), and methoprene (insect growth regulator). Before this study was completed, the Connecticut General Assembly passed House Bill 6441 in 2013. Public Act 13-197 restricted the use of resmethrin and methoprene in the state. A steering committee was formed to design and guide this study. Their job was to identify the best scientific methods necessary to achieve reliable, consistent and accurate results for testing the presence of the five aforementioned pesticides in lobster tissue. The steering committee was comprised of analytical chemists from: the Federal Environmental Protection Agency (EPA), pesticide industry, UCONN, and Connecticut Agricultural Experiment Station (CAES). Additionally, the committee included a member of an environmental advocacy group with a focus on LIS issues and staff from the Marine Fisheries and Pesticide Divisions of the CT DEEP. Prior to testing lobster samples collected from Long Island Sound, an extensive method validation study was completed where clean lobster tissues were fortified with measurable levels of each pesticide (using standards provided by the pesticide manufacturers). These samples were then analyzed by both laboratories contracted to do the work using conventional, state of the art Gas Chromatography Tandem Mass Spectrometry (GC/MS/MS) procedures. The results of the fortification study from each laboratory were demonstrated to be within acceptable accuracy established for this project. The percent recoveries for each pesticide for both laboratories were within the industry standard for environmental work. The acceptance criteria, consistent with that used in standard EPA methods in the method validation phase, were employed during testing of the wild samples from Long Island Sound. Comprehensive quality assurance / quality control steps were applied during actual sample analysis. These steps included analyzing blank samples (preparation and calibration), sample duplicates and triplicates, matrix spikes and matrix spike duplicates, and laboratory controls. These processes were taken to ensure that none of the target chemicals inadvertently contaminated the samples during preparation and analysis, as well as to make sure the method was performing as expected. Both laboratories used a “standard addition” technique as part of their comprehensive quality assurance protocol. Standard addition is a powerful method used to rule out false positives. Both laboratories used multiple ions to identify compounds. The use of multiple ions increases ability to confirm the presence or absence of the compound. The laboratories used different sample preparation and clean-up methods for the GC/MS/MS analysis but found similar results for each sample. The results of quality control samples for each laboratory were within acceptable parameters. Though CAES did find contamination in one of their sample blanks they were able to identify the source of contaminant and eliminate it. In October 2014, a total of forty five lobsters were collected (15 from each of the three basins of LIS) during an ongoing lobster mortality event. To ensure there would be no sample quality issues, and at the recommendation of the steering committee, tissues were stored at -80oC until the time they were processed. Each of the 45 LIS lobsters had hepatopancreas (tomalley) and claw/tail muscle evaluated for the presence of methoprene, resmethrin, bifenthrin, cyhalothrin and permethrin using methods previously identified by the steering committee. These analytical tests employed GC/MS/MS techniques capable of detecting the subject compounds in trace quantities. Detection limits ranged from 6 parts per billion (ppb) to 20 ppb, depending on the pesticide. No detectable levels of any of the five pesticides at or above their established detection limits were found by either laboratory in any of the hepatopancreas or claw/tail muscle samples. Based on the quality control results of this study, these data are considered to be of high quality.

Gent, M.P.N., and Seginer, I. 2016. Dynamic Carbohydrate Supply and Demand Model of Vegetative Growth. *Acta Horticulturae* 1154:73-81

Abstract: We previously developed a steady-state model of vegetative growth based on the hypothesis that growth is the minimum of the supply of non-structural carbohydrate, NSC, from photosynthesis, and the demand of NSC to synthesize new tissue. Here we incorporate sink inhibition of photosynthesis in a dynamic model of growth hour by hour, and assume that starch synthesis and breakdown provides sufficient NSC for growth and respiration during both day and night. It is not clear whether photosynthesis inhibition changes within the photoperiod or only from one day to the next. When this dynamic model was applied to tomato plants which had been pre-adapted under high or low light, respiration in darkness was first predicted to be constant, and then decreased with time, when NSC fell below the value needed for maximum growth. When predicting growth for tomato seedlings in a growth chamber at various temperatures between 9 and 36°C, the correlation between predicted and actual minimum values of NSC was greater for the dynamic model ($R^2 = 0.83$) than the steady-state model ($R^2=0.65$). A large fraction of photosynthesis must be inhibited to predict NSC accurately under demand-limited conditions, in contrast with little inhibition under supply-limited conditions. This combination could be achieved only by relating inhibition to the minimum NSC content over a diurnal cycle, rather than NSC hour by hour during the day.

Lin Chuan-Gen, Eric H. C. McKenzie, Darbhe J. Bhat, Shuang-Fei Ran, Yun Chen, Kevin D. Hyde, **De-Wei Li**, Yong Wang 2016. *Stachybotrys*-like taxa from karst areas and a checklist of stachybotrys-like fungi of Thailand. *Mycosphere* 7(9) 1273–1291. Doi 10.5943/mycosphere/7/9/3

Abstract: During a survey of hyphomycetes from karst areas in Thailand, four stachybotrys-like taxa, viz., *Cymostachys Garethjonesii* sp. nov., *Memmoniella oblongispora* sp. nov., *M. nilagirica* comb. nov. and *Stachybotrys microspora* were identified and are provided with descriptions in this paper. The new species are introduced based on morphological and molecular differences and compared with similar or related taxa. *Memmoniella nilagirica* and *Stachybotrys microspora* are new records for Thailand. An annotated checklist of stachybotrys-like taxa in Thailand is provided based on previous publications and database searches.

- Aulakh, Jatinder S. and Rose T. Hiskes.** Crabgrass (*Digitaria* spp.) control in home lawns. *CAES Fact Sheet*
- Bazzano, Magali and **Wade H. Elmer.** Influence of silicon and *Fusarium palustre* on DMSP levels in *Spartina alterniflora* and on herbivory by *Sesarma reticulatum*. *Estuarine, Coastal and Shelf Science*
- Brackney, Douglas E.** Implications of autophagy on arbovirus infection of mosquitoes. *Current Opinion in Insect Sciences*
- Dodds, K. J., C. F. Aoki, **Adriana Arango-Velez**, J. Cancelliere, A. W. D'Amato, M. F. DiGirolomo, and R. J. Rabaglia. Uncharted territory: expansion of Southern pine beetle into pine forests of the 13 Northeastern United States. *Journal of Forestry*
- Elmer, Wade H.** Improving plant disease resistance: can nanoparticles deliver? *Scientia*
- Maurer, Katja, Richard S. Cowles, and James A. LaMondia.** Sensitivity of *Calonectria pseudonaviculata*, the pathogen of boxwood blight, to strobilurin and demethylation inhibitor fungicides. *Plant Disease*
- Maynard, Abigail A.** Cumulative effect of annual additions of uncomposted oak and maple leaves on the yield of vegetables. *Compost Science & Utilization*
- McGovern, Robert J. and **Wade H. Elmer.** Diseases of tulips. In: *Handbook of Florists' Crops Diseases*. R. J. McGovern and W. H. Elmer (Eds.). Springer Publishing Co.
- Steven, Blaire** (Ed.). *The Biology of Arid Soils*. De Gruyter Publishers.
- Steven, Blaire.** An introduction to arid soils and their biology. In: *The Biology of Arid Soils*. Blaire Steven (Ed.), De Gruyter Publishers.
- Steven, Blaire**, T. McHugh, and S. Reed. The response of arid soil communities to climate change. In: *The Biology of Arid Soils*. Blaire Steven (Ed.), De Gruyter Publishers.
- Trolinger, J. C., R. J. McGovern, **Wade H. Elmer**, N. A. Rechcigl, and C. M. Shoemaker. Diseases of chrysanthemum. In: *Handbook of Florists' Crops Diseases*. R. J. McGovern and W. H. Elmer (Eds.). Springer Publishing Co.
- Williams, Scott C., Kirby C. Stafford III, Goudarz Molaei, and Megan A. Linke.** Integrated control of *Ixodes scapularis*: effectiveness of white-tailed deer reduction, the entomopathogenic fungus *Metarhizium anisopliae*, and fipronil-based rodent bait boxes. *Vector-Borne and Zoonotic Diseases*
- Williams, Scott C., Kirby C. Stafford III, Goudarz Molaei, and Megan A. Linke.** Long-term effects of Japanese barberry management on *Ixodes scapularis* abundance and *Borrelia burgdorferi* prevalence in Connecticut, USA. *Environmental Entomology*

ARTICLES OF INTEREST APRIL 2017

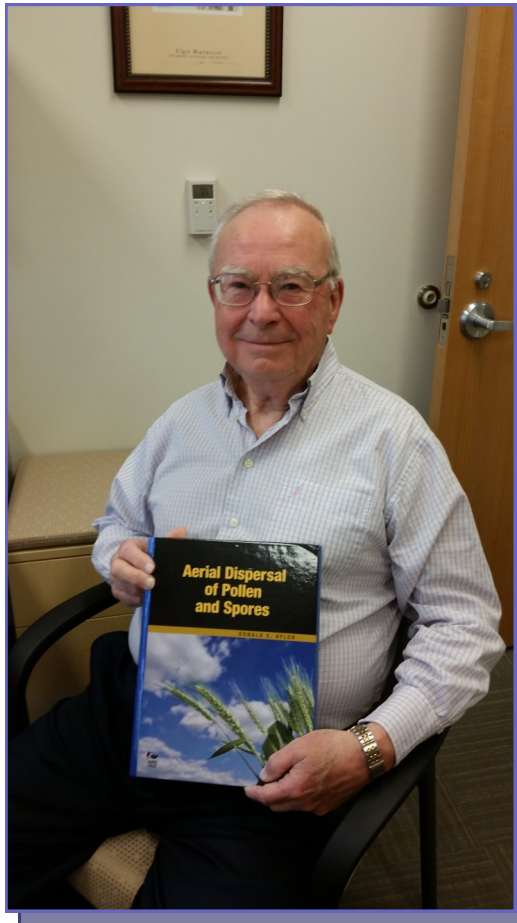
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STATION NEWS

GRANTS RECEIVED APRIL 2017

DR. JOSHEPH J. PIGNATELLO, co-Investigator with Sanjai Parikh, University of California, Davis, “Development of Novel Applications of Animal Wastes and Biochar for Nutrient Capture and Subsequent Fertilizer Value” USDA NIFA Agricultural and Food Research Initiative Program; Award Number 2017-67019-26334; March 15, 2017 to March 14, 2020; \$499,997 total; CAES award, \$244,606.

Co-composting of animal wastes with biochar is proposed as a new and transformative way to utilize the nutrients within animal manures to reduce nutrient leakage and provide agronomic benefits through improved nitrogen and phosphorus use efficiency in crop production. Although biochar has shown potential to improve soil fertility its benefits are often inconsistent and unimpressive. Through the unique on-farm management approach of composting tailored biochars with animal wastes, we hypothesize that specific alterations in biochar physical and chemical properties can provide novel materials for use in co-composting with animal manures to retain bioavailable nutrients. Therefore, the objectives are to 1) tailor biochars for enhanced capacity and affinity for orthophosphate, ammonium, nitrate, and phytate by various novel means encompassing cation exchange, anion exchange, hydrogen bonding, and metal coordination; 2) develop biochar-supported phosphatase catalysts (phytase) to convert org-P to $PO_4\text{-P}$; 3) test tailored biochar mixtures for efficacy in nutrient retention and stabilization through co-composting with dairy and chicken manures; and 4) evaluate nutrient use efficiency of co-composted biochar amendments on plant growth and nutrition. These objectives will be achieved through a series of biochar production approaches, batch studies, and greenhouse bioassays to clarify the potential for biochar to solve on-farm challenges associated with N and P cycling. Project outcomes include stakeholder engagement at UC Cooperative Extension and CAES field days, peer-reviewed publications, and presentations at regional/national meetings. Long-term consequences include potential benefits for climate change, pollution of natural waters, and the agricultural and economic sustainability of a broad range of farm systems.



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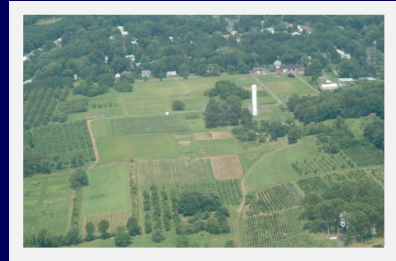
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Volume 7 Issue 5
May 2017

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