

Station News

The Connecticut Agricultural Experiment Station
Volume 9 Issue 1 January 2019



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 presented a talk entitled “*Jamestown Canyon Virus Revisited: Are We Neglecting an Under Recognized Vector-Borne Disease*” at the 64th Annual Meeting of the Northeastern Mosquito Control Association held in Nashua, NH (150 attendees) (December 3-5).

ANALYTICAL CHEMISTRY

DR. JASON C. WHITE attended the Laboratory Preparedness Advisory Group monthly meeting at the CT DPH Laboratory in Rocky Hill (December 3); participated in a teleconference call for the US FDA Sample Analysis Workgroup Meeting (December 4); hosted Dr. Michael Rickenbach of the State of CT - Department of Emergency Services & Public Protection Division of Scientific Services for the CAES Seminar Series (December 5); participated in weekly “All Hands” ZOOM calls as part of the Center for Sustainable Nanotechnology (CSN) (December 5, 12, 19); co-hosted potential Dr. Sara Nason of Johns Hopkins University during her interview for the CAES Environmental Chemist Assistant Scientist II position (December 6-7); participated in the 2019 FDA AFRPS Face-to-Face Planning Committee Calls (December 6, 13, 20); participated in a teleconference call with the Department of Consumer Protection, Department of Agriculture, and Department of Public Health on the formation of an FDA-funded Rapid Response Team in CT (December 11); along with **DR. BRIAN EITZER**, **DR. CHRISTINA ROBB**, **DR. WALTER KROL**, **MR. CRAIG MUSANTE**, AND **MS. TERRI ARSENAULT**, participated in the monthly FDA FERN cCAP WebEx call (December 13); chaired the quarterly CAES Safety Committee Meeting (December 14); participated in a monthly Faculty/PI ZOOM call for the Center for Sustainable Nanotechnology (December 14); and spoke by phone with Prof. Philip Demokritou of Harvard University about a new collaborative project with Nanyang Technological University in Singapore (December 28).

DR. BRIAN EITZER was a participant in the conference call of the organizing committee of the North American Chemical Residue Workshop (December 13)

DR. CHRISTINA ROBB attended the Eastern Analytical Symposium (EAS) board meeting in Princeton, NJ (December 7).

DR. NUBIA ZUVERZA-MENA was a co-principal investigator (Co-PI) recipient of the Louis A. Magnarelli Post-Doctoral Program along with **DR. WASHINGTON DA SILVA** as the PI. The project will bring a postdoctoral scientist to conduct research on the use of nanoparticles as a delivery system for dsRNAs to combat plant viruses (December 14).

ENTOMOLOGY

DR. KIRBY C. STAFFORD III was interviewed about rodent targeted vaccines by Angus Chen for Scientific American (December 20).

MR. MARK H. CREIGHTON presented beekeeping information to The Sound School Beekeeping program in New Haven (20 student attendees) (December 10); was interviewed at CAES by a student from Fairfield Wheeler Interdistrict Magnet School in Bridgeport for an honors project on honey bee health-related topics (December 13); and met with the President of The Connecticut Beekeepers Association in Lyme to discuss and plan topics for the upcoming Beekeeping School being offered here at CAES on January 12 (December 21).

MS. KATHERINE DUGAS conducted a training at the Rhode Island DEM office in Providence in the use of the NAPIS database for the State Survey Coordinators of RI and MA at USDA-APHIS-PPQ request (December 4).

DR. MEGAN LINSKE participated in a conference call with US Biologic on data management and future research opportunities for large-scale tick and tick-borne disease predictive management modeling and applications (December 6); and participated in a conference call with US Biologic on current, collaborative manuscripts and future publications (December 10).

DR. GALE E. RIDGE spoke about bed bugs to staff at the Connecticut Department of Mental Health in Stamford (45 attendees) (December 11); and was interviewed in a Yale University podcast “When we talk about animals” with a focus on delusions of parasitosis (December 12).

DR. CLAIRE E. RUTLEDGE talked with forestry students from Nonnewaug High School in Woodbury about invasive insects in Ansonia (30 youths) (December 7); and served as an examiner for the oral portion of the state arborist license exams in New Haven (December 12).

ENVIRONMENTAL SCIENCES

DR. PHILIP ARMSTRONG gave a talk entitled “Evaluation of Novel Trapping Methods for Monitoring *Aedes* spp.” at the Annual Meeting of the Northeastern Mosquito Control Association, Nashua, NH (approx. 150 attendees) (December 4).

DR. GOUDARZ MOLAEI was interviewed by WTNH Channel 8 (<https://www.wtnh.com/news/health/invasive-tick-species-has-made-its-way-to-connecticut/1639780124>); by New Hampshire Public Radio; and by The Public Radio, Rhode Island on the activity of the East Asian longhorned tick *Haemaphysalis longicornis* in Connecticut and New England (December 4).

DR. BLAIRE STEVEN gave an invited talk entitled “Biological Soil Crusts as a Model for Soil Carbon Cycling” in the Department of Molecular and Cellular Biology at the University of Connecticut in Storrs (15 faculty and 45 student attendees) (December 4).

MR. JOHN SHEPARD gave two invited talks entitled “Arbovirus Activity in Connecticut, 2018” and “Entomologist Challenge - *Aedes cinereus*” at the 64th Annual Meeting of the Northeastern Mosquito Control Association held in Nashua, NH (approx. 150 attendees) (December 3-5).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD, along with **MR. JOSEPH P. BARSKY**, met with David Gumbart and Wayne Woodard with CT-TNC and Larry Rousseau (CT DEEP) to discuss forest management options after severe storm damage (December 5); administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board (December 12); hosted a New England Society of American Foresters Executive Committee quarterly meeting (December 19); and was interviewed about ice storm damage by Bob Miller of the Danbury News-Times (December 19).

DR. ABIGAIL A. MAYNARD spoke about winter botany to 3rd graders at Hamden Hall Country Day School (18 children, 2 teachers) (December 10); participated in a planning meeting of the New England Vegetable and Fruit Conference in Goffstown, New Hampshire (December 12).

DR. SCOTT C. WILLIAMS participated in a conference call for the Editorial Advisory Board of The Wildlife Professional (December 6); and participated in a conference call with US Biologic, Inc. on research and data management for large-scale tick and tick-borne disease predictive and adaptive modeling frameworks (December 6).

PLANT PATHOLOGY AND ECOLOGY

DR. ROBERT MARRA administered oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board at in New Haven (3 adults) (December 12); met via conference call with fellow members of the Steering Committee for the Connecticut Conference on Natural Resources (8 adults) (December 20); and met via conference call with fellow members of the Executive Committee of the Northeastern Division of the American Phytopathological Society (5 adults) (December 20).

DR. NEIL SCHULTES gave a lecture entitled “Genetically Modified Plants in Agriculture” to Science Course Sci 031 at Yale University (10 adults) (December 7).

VALLEY LABORATORY

MS. ROSE HISKES presented an invasive insect scenario to Connecticut Tree Protective Association Arboriculture 101 students during review night in Wallingford (39 students) (December 5); and participated in a Connecticut Invasive Plants Working Group Symposium Planning Committee meeting at the Connecticut Forest and Parks Association in Middlefield (December 6).

DR. JAMES LAMONDIA participated in the Connecticut Agricultural Information Council meeting regarding Agriculture Day at the Capitol and the Connecticut Outstanding Young Farmer Award held at the Valley Laboratory in Windsor (December 4); and conducted oral exams for candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven (December 12).

DEPARTMENTAL RESEARCH UPDATES DECEMBER 2018

Bird, G., G. S. Abawi and J. A. LaMondia. 2018. Plant Parasitic Nematodes of New York, New Jersey and Pennsylvania. Chapter 2, Pp. 27-55. Plant Parasitic Nematodes in Sustainable Agriculture in North America Volume 2” edited by S. A. Subbotin and J. J. Chitambar, Springer.

Elmer, W. 2018. Fusarium crown and root rot: A look back and a look forward at strategies for mitigating losses. Acta Horticulturae 1223:195-204

Abstract- Asparagus decline and the replant problem were both defined in the 1950s, but had been noted in asparagus fields long before. Although both conditions share many of the same features, there are distinct differences in the host symptoms and in the age of the field during the onset of symptoms. A number of factors contribute to both disorders. Abiotic factors, such as allelopathic residues, acidic soils, soil compaction, winter crown injury, and excessive harvest pressure, along with biotic agents like insects, weeds, and diseases contribute to decline and the replant problem. Toxic asparagus residues remain the major stressor in the replant problems. Although cultivar improvements along with close attention to reducing stress and disease outbreaks has lessened the damage from asparagus decline and the replant problem, these disorders still make serious inroads into field longevity and yield potential. The presentation will synthesize the results of numerous studies designed to enhance soil health and reduce asparagus decline and the replant problem. An assessment of the direction for future research projects will be presented.

Grubaugh ND, Gangavarapu K, Quick J, Matteson NL, De Jesus JG, Main BJ, Tan AL, Paul LM, Brackney DE, Grewal S, Gurfield N, Van Rompay KKA, Isern S, Michael SF, Coffey LL, Loman NJ, Andersen KG. An amplicon-based sequencing framework for accurately measuring intrahost virus diversity using PrimalSeq and iVar. Genome Biol. 2019 Jan 8;20(1):8. doi: 10.1186/s13059-018-1618-7.

Abstract- How viruses evolve within hosts can dictate infection outcomes; however, reconstructing this process is challenging. We evaluate our multiplexed amplicon approach, PrimalSeq, to demonstrate how virus concentration, sequencing coverage, primer mismatches, and replicates influence the accuracy of measuring intrahost virus diversity. We develop an experimental protocol and computational tool, iVar, for using PrimalSeq to measure virus diversity using Illumina and compare the results to Oxford Nanopore sequencing. We demonstrate the utility of PrimalSeq by measuring Zika and West Nile virus diversity from varied sample types and show that the accumulation of genetic diversity is influenced by experimental and biological systems.

Hao, Y.; Fang, P.; Ma, C.; **White, J.C.**; Xiang, Z.; Duan, P.; Zhao, Z.; Adeel, M.; Ali, A.; Yang, J.; Li, D.; Wang, H.; Zhang, Z.; Rui, Y.; Xing, B. 2019. Engineered nanomaterials inhibit *Podosphaera pannosa* infection on rose leaves by regulating phytohormones. *Environ. Res.* 170:1-6.

Abstract- In the present study, we investigated the antifungal effects of engineered nanomaterials (NMs) against *Podosphaera pannosa* (*P. pannosa*), a fungal pathogen that causes powdery mildew on plants in the rose family. Rose leaves were placed in water-agar plates and foliar-exposed to suspensions of four commonly used nanomaterials (NM), including multi-wall carbon nanotubes (MWCNTs), reduced graphene oxide (rGO), copper oxide (CuO) nanoparticles (NPs) and titanium oxide (TiO₂) NPs, which was also inoculated with *P. pannosa* conidia. After a 19-day standard infection test, the growth of *P. pannosa* on rose leaves was evaluated. All four NMs inhibited infection by *P. pannosa* at the concentration 200 mg/L, whereas only CuO NPs decreased fungal growth at 50 mg/L. The phytohormone content of the leaves was measured across all treatments to investigate potential NMs antifungal mechanisms. The results suggest that NMs increased plant resistance to fungal infection by altering the content of endogenous hormones, particularly zeatin riboside (ZR). Our study demonstrates that NMs exhibited distinctly antifungal effects against *P. pannosa* on rose, and could be utilized as a novel plant protection strategy after a comprehensive assessment of potential environmental risk.

Huang, Lin, Ji-Yun Yang, Ya-Nan Zhu, Li-Hua Zhu, Yue-Feng Zhang, Jian-Ren Ye, **De-Wei Li***, 2018 [2019]. A new disease, canker on culm of *Bambusa multiplex*, caused by *Fusarium incarnatum* s.l. *Journal of Phytopathology* 167: 91-97. DOI: 10.1111/jph.12776

Abstract - *Bambusa multiplex* has been broadly cultivated in China and has significant economical, ecological and ornamental importance. A canker on the culm of *B. multiplex* was first time discovered in 2015 in Shanghai, China. In this study, the fungal isolate XSZ-1 isolated from the infected tissues was determined to be a pathogen of canker on the culm of *B. multiplex* by fulfilling Koch's postulates. The fungal pathogen was identified as *Fusarium incarnatum* based on the morphological characteristics and phylogenetic analyses with the sequences of ITS, *TEF-1a* and *RPB2*. To our knowledge, this is the first report of a canker on the culm of *B. multiplex* caused by *F. incarnatum* world wide.

LaMondia, J. A., R. L. Wick and N. A. Mitkowski. 2018. Plant Parasitic Nematodes of

New England - Connecticut, Massachusetts and Rhode Island. Chapter 1, Pp. 1-25. Plant Parasitic Nematodes in Sustainable Agriculture in North America Volume 2” edited by S. A. Subbotin and J. J. Chitambar, Springer.

Singh, S.; Wohlleben, W.; De La Torre Roche, R.; White, J.C.; Demokritou, P. 2019. Thermal decomposition/incineration of nano-enabled coatings and effects of nanofiller/matrix properties and operational conditions on byproduct release dynamics: Potential environmental health implications. *NanoImpact*. 13:44-55.

Abstract- Nano-enabled coatings (NECs) are a growing class of nano-enabled materials used in buildings or wooden structures and other applications that are likely to be thermally decomposed at their end-of-life via incineration of construction/renovation waste or accidental fires in buildings, raising concern about potential release of engineered nanomaterials (ENMs) used as nanofillers. This is especially important for NECs as they have a larger surface to volume ratio compared to bulk nano-enabled products. In addition, questions remain about effects of intrinsic nanofiller properties such as chemical composition and size and nanofiller loading on NECs’ thermal decomposition behavior. Different incineration/thermal decomposition conditions such as industrial incineration vs. building fire vs. open waste burning may modify the byproduct properties significantly. In this study, the recently developed Integrated Exposure Generation System (INEXS) was utilized to address these hypotheses, identify important factors governing thermal decomposition of NECs and assess potential environmental health implications. Findings confirm that nanofiller type, size and loading as well as operational parameters influence the release of nanofiller into the aerosol whereas the host coating matrix and operational conditions determine the released aerosol number concentration. The released aerosol morphology, mass-size distribution and the overall partitioning of elemental and organic carbon in the released aerosol are primarily governed by the host coating matrix. On the other hand, the physicochemical and morphological properties of the remaining residual ash are strongly influenced by the nanofiller intrinsic properties (chemical composition and size).

JOURNAL ARTICLES APPROVED DECEMBER 2018

Allan-Perkins, Elisha, De-Wei Li, Neil P. Schultes, S. Yavuz, and James A. LaMondia. First Report of the Resurgence of Hop Powdery Mildew (*Podosphaera macularis*) in New England. *Plant Disease*

Aulakh, Jatinder S. Weeds of Ornamental Plants and Their Control. *CAES Fact Sheet*

Cao, X., Chuanxin Ma, J. Zhao, Craig Musante, Jason C. White, Z. Wang, and B. Xing. Interaction of Graphene Oxide with Co-Existing Arsenite and Arsenate: Adsorption, Transformation and Joint Toxicity. *ACS Nano*

Dimkpa, C. O., U. Singh, P. S. Bindraban, I. O. Adisa, Wade H. Elmer, J. L. Gardea-Torresdey, and Jason C. White. Comparative Omissions of ZnO, CuO, and B₂O₃ Nanoscale and Bulk Particles Demonstrate Size-Specific Response of Soybean to Trace Element Exposure. *Chemosphere*

He, F., A. Kange, Y. Jia, P. Laborda, B. Li, Y. Zhao, **Quan Zeng**, and F. Liu. Identification and Characterization of a Stem Canker and Twig Dieback Disease of Pear Caused by *Neofusicoccum parvum* in China. *Plant Disease*

He, Q., **Charles R. Vossbrinck**, Q. Yang, X. Z. Meng, J. Luo, G. Q. Pan, Z. Y. Zhou, and T. Li. Evolutionary and Functional Studies on Microsporidian ATP-Binding Cassettes: Insights into the Adaptation of Microsporidia to Obligated Intracellular Parasitism. *Infection, Genetics and Evolution*

Li, Yonghao. Peach Leaf Curl. *CAES Fact Sheet*

Li, Yonghao. Stemphylium Gray Leaf Spot of Tomato. *CAES Fact Sheet*

Schachterle, J., **Quan Zeng**, and G. Sundin. Three Hfq-Dependent Small RNAs Regulate Flagellar Motility and Modulate Virulence in the Fire Blight Pathogen *Erwinia amylovora*. *Environmental Microbiology*

Sillen, W. M. A., S. Thijs, G. R. Abbamondi, **Roberto De La Torre Roche**, N. Weyens, **Jason C. White**, and J. Vangronsveld. Unintended Effects of Nanoparticle Silver on Maize: Compromised Nitrogen Cycling, Possible Phytopathogen Promotion, and Plant Hormesis. *Proceedings of the National Academy of Sciences*

Yang, J., C. Xie, Y. Ma, **Chuanxin Ma**, **Jason C. White**, Y. Wang, X. He, P. Zhang, Y. Ding, Y. Rui, B. Xing, and Z. Zhang. Effect of Ceria and Cerium(III) Ions on Soil Enzyme Activity and Bacterial Community Structure in a Soil-Plant System. *Environmental Chemistry*

Yuan, X., **Quan Zeng**, D. Khokhani, F. Tian, G. Severin, C. Waters, J. Xu, X. Zhou, F. Liu, and C. H. Yang. A Feed-Forward Signaling Circuit: Hfq Controls Bacterial Virulence Through Linking c-di-GMP and Two Mechanistically Distinct sRNAs ArcZ and RsmB. *Nucleic Acid Research*

ARTICLES OF INTEREST DECEMBER 2018

Louis A. Magnarelli Post-Doctoral Award

The annual Louis A. Magnarelli Post-Doctoral Award was announced at the CAES Annual Recognition Awards Tea held on December 14. The award was given to Washington da Silva, Ph.D. and Nubia Zuverza-Mena, Ph.D., from the Department of Plant Pathology and Ecology and the Department of Analytical Chemistry, respectively. The title of their project is “Using Nanoparticles to Deliver dsRNA for Controlling Destructive Plant Viruses.” This year, seven proposals were submitted to the program and these were evaluated by a panel of five reviewers.



Dr. Lindsay Triplett, with husband Preston and son Charles, welcomed their new daughter Veronica on October 20, 2018.

Mr. Ernesto Magaña Lopez and Ms. Mona Elamin will be working in the Department of Analytical Chemistry Laboratories for the first half of 2019. Ernesto is a graduate student from the Universidad Autónoma de Querétaro in Mexico and will be completing experiments related to his M.S. degree on the toxicity of mesoporous silica nanoparticles to pepper plants. Mona is a student from Gateway Community College and is completing an internship for her Environmental Science and Toxicology Course.



Mr. Darlan Ferreira Borges is a third year Ph.D. student at the Universidade Federal Rural do Semi-Árido (UFERSA) in Brazil. His internship at CAES will be from December 15, 2018 to July 15, 2019 under the guidance of Dr. Washington da Silva. He will work on the detection of viruses from symptomatic grapevine samples collected from several Connecticut vineyards during the summer and fall of 2018.

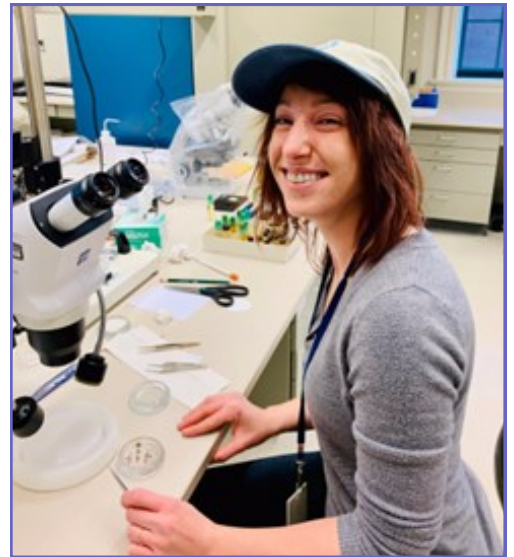


Mr. James Durrell

James has been working for Dr. Kimberly Stoner on a variety of bee projects during the summer of 2017 and again in 2018, continuing on into the winter. James has a B.A. in biology and a B.S. in English Literature from the University of Bridgeport. He currently works part-time at CAES. He is a part-time faculty member at the University of Bridgeport where he has had a variety of roles: teaching a seminar on Northeastern bees, developing laboratory exercises and manuals, and restoring the insect collection. He hopes to go to graduate school to continue his studies in insect ecology.

Ms. Jamie Cantoni

Jamie has been with the Station since the Spring of 2014, where she started her career as a mosquito trapper for the Center for Vector Biology and Zoonotic Diseases. She remained with the Station through the Spring of 2016 under the direction of the Department of Forestry and Horticulture, but left to pursue her passion for marine science, working for several zoos and aquariums in both Connecticut and Australia. Eventually, Jamie realized how much she missed the Station, and returned the Summer of 2018 to work in the Department of Entomology under Dr. Kirby Stafford III. In addition to handling ticks and bedbugs, Jamie is a volunteer Rescue Responder and in-house rescue clinic volunteer for Mystic Aquarium's Animal Rescue Program, and hopes to progress further in the field of marine animal rescue and rehabilitation.



Mr. Zhichao Yang

Zhichao is a visiting student in the laboratory of Dr. Joseph J. Pignatello. He is a Ph.D. candidate at Nanjing University in Nanjing, China. He will be working on advanced oxidation processes for removal of pollutants in water based chelator-mediated Fenton-type reactions. His office is in room 312 of the Slate Building.



Ms. Jingjing Yang is a visiting student for a period of 12 months in the laboratory of Dr. Joseph J. Pignatello in the Department of Environmental Sciences. She is currently a PhD student at the School of Environment and Energy in South China University of Technology. Her research focuses on the development and testing of modified carbonaceous catalysts that can mediate the oxidation and degradation of organic pollutants in water.

GRANTS RECEIVED DECEMBER 2018

Dr. DeWei Li's study of wine cap (*Stropharia rugoso-annulata*), a gourmet wild mushroom as an intercrop of Christmas trees. Specialty Crop Block grant (USDA Agreement No. AM180100XXXXG009) 2019-2021 \$75,000



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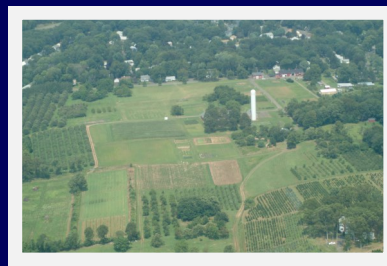
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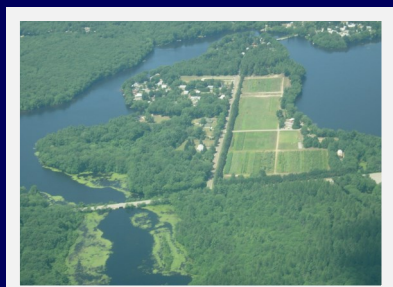
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