

Station News

The Connecticut Agricultural Experiment Station
Volume 8 Issue 3 March 2018



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.



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ADMINISTRATION

DR. THEODORE ANDREADIS participated in a meeting of the Connecticut Invasive Plant Council held at the Valley Laboratory in Windsor (February 13); attended a meeting of Connecticut Agricultural Leaders held at the Connecticut Farm Bureau in Rocky Hill (February 15); participated in a round table discussion with Dr. Anne Schuchat, Acting Director of the Centers for Disease Control and Protection, held at Yale University (February 22); and presented an invited talk, “*The Northeast Regional Center of Excellence in Vector-Borne Diseases*” at the 84th Annual Meeting of the American Mosquito Control Association held in Kansas City, MO (800 attendees) (February 26-28).

ANALYTICAL CHEMISTRY

DR. JASON C. WHITE attended the Laboratory Preparedness Advisory Group monthly meeting at the CT DPH Laboratory in Rocky Hill (February 5); spoke with Becky Curtis, a PhD student at the University of Wisconsin, concerning joint experiments as part of the Center for Sustainable Nanotechnology (February 6); participated in weekly Center for Sustainable Nanotechnology WebEx meetings (February 7, 21, 28); visited with collaborators at the Harvard School of Public Health and discussed ongoing and future work (February 8); along with the rest of the Analytical Chemistry Department hosted the FBI Weapons of Mass Destruction Coordinator (New Haven Field Office) and the 14th Civil Support Team of the CT National Guard and discussed an upcoming field training exercise involving a chemical terrorism threat and analysis of samples by Department staff (February 9); gave an invited lecture at the University of Massachusetts Department of Food Science entitled “Nanomaterials and the Food Supply: Assessing the Balance Between Applications and Implications” and served as a judge in the Hultin Scholarship graduate student platform presentation competition (February 12); attended the CAES Art in Public Spaces presentation in Jones Auditorium (February 13); gave an invited lecture on the Center for Sustainable Nanotechnology at Georgia Southern University and recruited students for the Center REU program (February 14-15); and hosted Professor Yangchao Luo of the UConn Department of Nutritional Sciences for the CAES Seminar Series (February 21).

DR. BRIAN EITZER attended the Principal Investigators and Stakeholders meeting of the SCRI grant on “Protecting Pollinators with Economically Feasible and Environmentally Sound Horticulture” in St. Louis, MO (February 7).

DR. CHRISTINA ROBB attended board meetings of the Eastern Analytical Symposium for which she is the 2018 Program Chair (February 1, 2).

ENTOMOLOGY

DR. KIRBY C. STAFFORD III, with **DR. VICTORIA SMITH**, participated in the US Forest Service forest health program review in Hartford (15 participants) (February 6); presented a talk on ticks and tick management at the NOFA Land Care course at Three Rivers Community College in Norwich (40 attendees) (February 10); was interviewed about tick activity in winter by Ketirah Selder-Hogan, NPR (February 23); and presented a talk on tick-associated disease and integrated tick management at the American Mosquito Control Association annual meeting in Kansas City, MO (March 2).

MS. KATHERINE DUGAS hosted an Entomology table activity as part of the Girl Scouts STEMagination Family Science Night held at Naugatuck Valley Community College (over 50 scouts and 34 scout leaders were in attendance) (February 9); and staffed the CAES booth at the CT Flower Show in Hartford (February 23, 25). The display included Station information and a display on honey bees.

MR. MARK H. CREIGHTON staffed the CAES booth at the CT Flower Show in Hartford (February 24). The display included Station information and a display on honey bees.

DR. MEGAN LINSKE gave an invited lecture titled “Diversity and Disease: The Role of Wildlife in Lyme Disease Ecology” at the Living with Wildlife Speaker Series co-hosted by the Town of Guilford Conservation Commission and the Guilford Land Conservation Trust (100 attendees) (January 17); received conferral of her Ph. D. in Natural Resources and the Environment from the University of Connecticut (January 19); discussed careers in wildlife biology and management with Girls Scouts for STEM guest speaker series at Nathan Hale middle school in Norwalk (12 students) (January 23); participated in the Northeast Regional Center for Excellence in Vector-Borne Diseases meeting hosted by CAES in New Haven (75 attendees) (January 26); spoke to Lyman Hall high school students about career paths and research opportunities at the Connecticut Agricultural Experiment Station (10 students) (January 29); presented current research projects for Northeast Regional Center for Excellence in Vector-Borne Diseases Trainee Seminar Series (10 attendees) (February 26); hosted a wildlife biology and management learning station for Girl Scout’s STEMagination Family Science Day (100 attendees) (February 25); and participated in a conference call with members of the Wildlife Society Awards Committee (5 participants) (February 28).

DR. GALE E. RIDGE presented a webinar about bed bugs to mattress recyclers throughout the United States and Canada from the DEEP auditorium in Hartford (February 27); and presented a bed bug workshop to numerous agencies under the leadership of the Connecticut Coalition Against Domestic Violence on the psychological impacts of bed bugs as well as an introduction to Delusions of Parasitosis in Wethersfield (38 attendees) (February 27).

DR. CLAIRE E. RUTLEDGE taught “Insects that Attack Trees” for Arboriculture

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101 for the Connecticut Tree Protective Association in Wallingford (45 adults) (February 14); and gave a guest lecture ‘Emerald Ash Borer’ for 674b Seminar in Forest Ecosystem Health and Climate Change at the Yale School of Forestry and Environmental Studies in New Haven (20 adults) (February 21).

DR. VICTORIA L. SMITH, with **DR. KIRBY STAFFORD**, participated in the Cooperative Management Review of programs at CAES in cooperation with USDA-US Forest Service. The review was held at DEEP Headquarters in Hartford (15 participants) (February 10).

DR. KIMBERLY A. STONER was interviewed on the Organic Farmstand program on WPKN, 89.5 FM, Bridgeport, by Bill Duesing and Guy Beardsley about habitat for bees (February 1); spoke at the Biennial Specialty Crop Research Initiative Stakeholder-Researcher Conference about current research evaluating the attractiveness of ornamental plants to pollinators and the analysis of trapped pollen from ornamental plant nurseries to determine sources of hazardous pesticides held in St. Louis, MO (20 attendees, with 6 more listening to conference audio) (February 7); organized the 3rd annual day-long “Creating and Improving Pollinator Habitat Conference” and spoke on Protecting Bees from Pesticides held at CAES in New Haven (75 attendees) (February 27); and met with Carrie Folsom-O’Keefe and Genevieve Nuttall of CT Audubon about methods to measure insect diversity in Urban Oases throughout New Haven (February 28).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO met with Prof. William Dichtel, Northwestern University, to discuss mutual research interests (February 21).

MR. GREGORY BUGBEE, with Summer Stebbins, gave two Invasive Aquatic Plant Workshops as part of the 2018 Envirothon held at Goodwin Community College in East Hartford (approx. 70 attendees) (February 10); gave the talk “Container Gardening Indoors and Out” to the Caudatowa Garden Club in Ridgefield (approx. 45 attendees) (February 13); spoke on CAES IAPP lake surveys to the South Central Connecticut Regional Water Authority Land Use Board at their headquarters in New Haven (approx. 12 attendees) (February 21); and hosted a meeting of the Connecticut River Watershed Water Chestnut and Hydrilla Workgroups at the Valley Lab, spoke to the Hydrilla workgroup on “Hydrilla Morphology, Reproduction and Distribution in Connecticut,” and was named chairman of the hydrilla workgroup (approx. 25 attendees) (February 23).

DR. GOUDARZ MOLAEI participated at the Central Connecticut State University, Department of Biology Internship and Career Fair, New Britain and presented a short talk on his research and services offered at the CAES Tick Testing

Laboratory (38 attendees) (February 26); was interviewed by WTNH News 8 on “Tick problems already starting” <http://wtnh.com/2018/02/27/tick-problems-already-starting/> (February 27); and was interviewed by WFSB 3 on “Mild temps means ticks are coming back” <http://www.wfsb.com/story/37614141/mild-temps-means-ticks-are-coming-back> (February 28).

MR. JOHN SHEPARD met with Christine Meehan, BSN, MA and four undergraduate students from the Healthcare Innovations Program at the UConn School of Nursing, to discuss the development and evaluation of a novel mosquito repellent (February 2).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD met with Ms. Vicky Carrier (Adjunct Professor, Gateway College) to discuss internship possibilities (February 14); was interviewed about crown shyness by Will Rowlands of the Connecticut Gardener (February 15); was interviewed by Hallie Metzger about rehabilitating high-graded forest by Hallie Metzger of the Cutting Edge (CT-TIMPRO Quarterly) (February 16); gave the invited talk “Rehabilitation of degraded hardwood stands” at the Yale Forest Forum (February 22); was interviewed about the effect of weather and climate change on maple syrup production by Bob Miller of the Danbury News-Times (February 27); and along with **MR. JOSEPH P. BARSKY**, met with David Irvin (DEEP Forestry) to discuss evaluating regeneration success (February 28).

DR. ABIGAIL A. MAYNARD assisted with lessons in the greenhouse with various classes at Hamden Hall Country Day School (6 teachers, 48 students) (February 5,13,20,27); and advised Wesleyan University students and staff on composting operation at Long Lane Farm in Middletown (2 staff, 8 students) (February 9,14,23).

DR. SCOTT C. WILLIAMS met with new Connecticut Urban Forest Council Treasurer Katie Beecham to begin to transition (February 9); with **DR. MEGAN LINSKE** and **MR. MICHAEL SHORT**, met with DEEP Wildlife Biologist Michael Gregonis about a collaborative poster for presentation at the Northeast Fish and Wildlife Conference in April (February 14); and with **DR. MEGAN LINSKE** and **MR. MICHAEL SHORT**, met with DEEP Wildlife Biologists Dr. Howard Kilpatrick, Michael Gregonis, Andrew Labonte, and William Embacher about a collaborative lone star tick management project (February 28).

PLANT PATHOLOGY AND ECOLOGY

DR. WADE ELMER presented the invited seminar “Nanoparticles in Plant Disease Control” to the Department of Plant Science at the University of Connecticut (32 attendees) (February 9); and presented the webinar “Using Mineral Nutrition to Prevent Root-borne Pathogens” for the Webinar Series: Rooting for Success: Managing the Root Zone for Healthy Plants (44 attendees) (February 28).

DR. YONGHAO LI staffed the CAES booth at the Wallingford Public Library Agricultural Open House in Wallingford (February 15); presented “Disease Management of Spring Greenhouse Crops” in the UConn Spring 2018 Bedding Plant Programs for Greenhouse Growers in Torrington (35 adults) (February 13) and in Vernon (30 adults) (February 22) respectively; staffed the CAES booth at the CT Flower and Garden Show in Hartford (February 24); gave a talk “Pruning 101” to The Orchard Valley Garden Club in Southington (40 adults) (February 27); and staffed the CAES booth at the CGGA Winter Conference in Cromwell (February 28).

DR. ROBERT E. MARRA presented “Fungi of the Forest: Friends and Foes” to the Cheshire Garden Club (15 adults) (February 5); and presented “Tropical Storms, Hurricanes, Superstorms: Impacts on Trees,” followed by “Drought and Its Impact on Tree Health,” to the Master Gardener Program at Bartlett Arboretum (30 adults) (February 15).

DR. NEIL SCHULTES presented three lectures as a module on “Genetic Modification in Agriculture” in a Yale Undergraduate course (Scie031) “Topic in Science” (14 students) (January 26, February 2,9).

DR. LINDSAY TRIPLETT presented a general interest program titled “The rice that helped America grow” at the Cheshire Library (11 attendees) (February 26).

DR. QUAN ZENG hosted Ms. Caitlyn Guererra, a Cheshire High school student, for a Job Shadow Day (February 2); visited Nanjing Agricultural University, Jiangsu, China (February 12); and met Drs. Baojian Hang and Kang Tao, and discussed collaboration opportunities.



Dr. Lindsay Triplett presenting a talk “The rice that helped America grow” to the Cheshire Library (February 26).

VALLEY LABORATORY

DR. JATINDER S. AULAKH attended the Weed Science Society meeting in Arlington, VA and presented a research paper on “Response of Some Herbaceous Ornamentals to Two Pre-packaged Herbicide Mixtures”; and got elected to serve as co-chair for the Turf and Ornamental section and chair for the extension and teaching session for the WSSA meeting in Oregon 2019 (~60 attendees) (January 28-February 2); attended the Northeastern Pest, Plant and Soil Conference (NEPPSC) in Philadelphia, PA (January 8-January 12); served as judge for the NEPPSC graduate student poster competition; and was elected to serve as co-chair for the turf and ornamental section for the NEPPS conference in 2019.

DR. CAROLE CHEAH was interviewed by William Hobbs of The Day (February 2) and Experiment Station Associates on hemlocks and hemlock woolly adelgid (February 5); was interviewed by Will Langhorne for the Yale Daily News on the effects of the recent cold outbreak on hemlock woolly adelgid (February 14); and gave a presentation on hemlocks and other trees under siege to the New Hartford Land Trust (25 attendees) (February 22).

DR. RICHARD COWLES presented “Methods for obtaining nectar and pollen samples” for the SCRI research meeting in St. Louis, MO (25 attendees) (February 7); presented “Spotted wing drosophila in grapes” to the CT Vineyard and Winery Association (20 attendees) (February 12); spoke on the subject “Organic management of turf insects” to the CGKA Association, New Haven (40 attendees) (February 22); discussed “Diversionary plantings and fixed land honey production,” at the 3rd Annual Creating and Improving Pollinator Habitat Conference, New Haven (70 attendees) (February 27); and presented “Natives vs. exotics: insect pest management considerations” to the CGKA winter meeting, Cromwell (250 attendees) (February 28).

MS. ROSE HISKES explained and demonstrated the Information Office functions and procedures to a high school job shadower (February 2); and participated in the Symposium Planning Committee meeting of the Connecticut Invasive Plant Working Group in Windsor (February 13).

DR. JAMES LAMONDIA spoke about “Fungicide management of boxwood blight” as a part of the American Boxwood Society meeting “Boxwood management, today and tomorrow” in Beltsville, MD (170 attendees) (February 20); spoke about “Hidden menace: Alternate hosts and tolerant boxwood as pathogen refugia,” presented “Fungicides and sterilants” and discussed future research objectives and priorities during the Boxwood Research Summit held in Beltsville, MD (25 attendees) (February 21); participated in the Connecticut Vegetable and Small Fruit Conference Steering Committee meeting in Tolland (February 26); spoke about research and services at the Station and Valley Lab summer employment opportunities at the Central Connecticut State University Biology Department Career Fair (40 attendees) (February 26); spoke about management of tobacco pathogens including Fusarium wilt, viruses, black shank, target spot, cyst nematodes and blue mold and spoke about strategies to reduce pesticide residues in broadleaf and shade tobacco wrapper leaves while managing fungicide resistance (120 attendees) (February 27); and 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 (32 attendees) (February 28).

DR. DEWEI LI gave a lecture “Introduction to Mycology” to 15 graduate students at Yale School of Forestry and Environmental Studies (January 26); participated in the PAAA meeting and Spore Camp in Clearwater, FL and gave a presentation “New species and records of hyphomycetes from indoor environments” (16 attendees and unknown number of people on line via webinar) (March 1-3).

DEPARTMENTAL RESEARCH UPDATES FEBRUARY 2018

Castiblanco, L., Triplett, L. R., and Sundin, G. W. Regulation of effector delivery by type III secretion chaperone proteins in *Erwinia amylovora*. *Frontiers in Microbiology*, doi: 10.3389/fmicb.2018.00146

Abstract- Type III secretion (TTS) chaperones are critical for the delivery of many effector proteins from Gram-negative bacterial pathogens into host cells, functioning in the stabilization and hierarchical delivery of the effectors to the type III secretion system (TTSS). The plant pathogen *Erwinia amylovora* secretes at least four TTS effector proteins: DspE, Eop1, Eop3, and Eop4. DspE specifically interacts with the TTS chaperone protein DspF, which stabilizes the effector protein in the cytoplasm and promotes its efficient translocation through the TTSS. However, the role of *E. amylovora* chaperones in regulating the delivery of other secreted effectors is unknown. In this study, we identified functional interactions between the effector proteins DspE, Eop1, and Eop3 with the TTS chaperones DspF, Esc1 and Esc3 in yeast. Using site-directed mutagenesis, secretion, and translocation assays, we demonstrated that the three TTS chaperones have additive roles for the secretion and translocation of DspE into plant cells whereas DspF negatively affects the translocation of Eop1 and Eop3. Collectively, these results indicate that TTS chaperone proteins exhibit a cooperative behavior to orchestrate the effector secretion and translocation dynamics in *E. amylovora*.

Drummond, F. A., Ballman, E. S., Eitzer, B D., Du Clos, B., and Dill, J., (2018). Exposure of Honey Bee (*Apis mellifera* L.) Colonies to Pesticides in Pollen, A Statewide Assessment in Maine. *Environmental Entomology*, 2018, 1-10 doi: 10.1093/ee/nvy023

Abstract- In 2015, we conducted a statewide assessment of honey bee exposure to pesticides with assistance of volunteer beekeepers. Pollen trapping was conducted at 32 sites in the spring, summer, and early fall. Apiary locations ranged from unmanaged natural landscapes to managed agricultural or urban landscapes. Pollen samples at each site were aggregated over the collection dates and chemical residue analysis was conducted on each pollen sample for 190 pesticides and metabolites using HPLC/MS. Twenty-five different residues were detected for an average of 2.9 detections per site. Detections were dominated by fungicides, but risk, calculated as: ppb residue concentration/ LD50, was mostly due to insecticides. Beekeeper perceived land-use in the vicinity of each apiary was associated with significant differences in the number of detections and residue concentrations, agricultural landscapes greater than nonagricultural. However, there was no significant difference in oral or contact risk quotients due to land-use type. The landscape composition surrounding apiaries, derived with GIS, determined pesticide exposure for honey bees when total detections, log pesticide residue concentration, and log contact risk quotients were used as measures. Partial least squares explained 43.9% of the variance in pesticide exposure due to landscape composition. The best predictors describing pesticide exposure were: area (ha) of blueberry, coniferous forest, and urban/developed land cover types. Maine is

the most forested state in the United States (as determined by % land area forested, 93%) and a negative exponential decay was observed between land area in conifer forest and the number of pesticide detections per apiary.

Elmer, W., De La Torre-Roche, R. Pagano, L., Majumdar, S., Zuverza-Mena, N., Dimpka, C., Gardea-Torresdey, J., and White, W. 2018. Effect of metalloid and metal oxide nanoparticles on *Fusarium* wilt of watermelon. *Plant Disease* (<https://doi.org/10.1094/PDIS-11-17-1707-RE>).

Abstract-This study explored the use of foliar sprays with nanoparticles (NPs) of B, CuO, MnO, SiO, TiO, and ZnO to protect watermelon against *Fusarium* wilt. Leaves of young watermelon plants were sprayed (1 to 2 ml per plant) with NP suspensions (500 to 1,000 µg/ml) and were planted in in potting mix infested with *Fusarium oxysporum* f. sp. *niveum*. In five out of eight greenhouses experiments, CuO NPs suppressed disease, and in six out of eight experiments, CuO NPs increased biomass or yield more than in untreated controls or other tested NPs. More root Cu was detected in CuO NP-treated plants than other treatments ($P = 0.015$). In Griswold, Connecticut (CT), plants treated with CuO NPs yielded 39% more fruit than untreated controls. In Hamden, CT, treatment with CuO NPs produced 53% more fruit when compared to controls ($P = 0.02$) and was superior to other Cu fungicides. Gene expression in watermelon roots revealed strong up-regulation of polyphenol oxidase (PPO) and PR1 genes when CuO NPs and *F. oxysporum* f. sp. *niveum* were both present. Enzymatic assays for PPO supported the gene expression results. CuO NPs may serve as a highly effective delivery agent for this micronutrient to suppress disease.

Gent, Martin P.N. 2018. Dynamic carbohydrate supply and demand model of vegetative growth: response to temperature, light, carbon dioxide, and day length. *Agronomy* 8(2): 21p. doi:10.3390/agronomy8020021.

Abstract- Predicting the growth response of seedlings from the environmental responses of photosynthesis and metabolism may be improved by considering the dynamics of non-structural carbohydrate (NSC) over a diurnal cycle. Attenuation of growth metabolism when NSC content is low could explain why some NSC is conserved through the night. A dynamic model, incorporating diurnal variation in NSC, is developed to simulate growth of seedlings hour-by-hour. I compare predictions of this model to published growth and NSC data for seedlings that varied according to temperature, light, day length, or CO₂. Prolonged-darkness experiments show a temperature dependent upper limit on the respiration capacity. Respiration is attenuated as NSC is depleted. Furthermore, when NSC is high at dawn, inhibition of photosynthesis could attenuate the accumulation of NSC under low temperature, high light, or high CO₂. These concepts are used to simulate plant metabolism and growth rates and diurnal variation of NSC in tomato seedlings under two light levels and various temperatures. Comparison of other results using the same model parameters show the dynamic model could predict results for starch and starch-less plants, and when growth was affected by CO₂ enrichment and day length.

Hassan, J.A.; De la Torre-Roche, R.; White, J.C.; Lewis, J.D. 2017. Soil mixture composition alters *Arabidopsis* susceptibility to *Pseudomonas syringae* infection. *Plant Direct*. DOI: 10.1002/pld3.44.

Abstract- *Pseudomonas syringae* is a Gram-negative bacterial pathogen that causes disease on more than 100 different plant species, including the model plant *Arabidopsis thaliana*. Dissection of the *Arabidopsis thaliana*-*Pseudomonas syringae* pathosystem has identified many factors that contribute to successful infection or immunity, including the genetics of the host, the genetics of the pathogen, and the environment. Environmental factors that contribute to a successful interaction can include temperature, light and the circadian clock, as well as the soil environment. Since silicon-amended Resilience soil is advertised to enhance plant health, we sought to examine the extent to which this soil might affect the behavior of the *A. thaliana*-*P. syringae* model pathosystem, and to characterize the mechanisms through which these effects may occur. We found that plants grown in Si-amended Resilience soil displayed enhanced resistance to bacteria compared to plants grown in non-Si-amended Sunshine soil, and salicylic acid biosynthesis and signaling were not required for resistance. Although silicon has been shown to contribute to broad spectrum resistance, our data indicate that silicon is not the direct cause of enhanced resistance, and that the Si-amended Resilience soil has additional properties that modulate plant resistance. Our work demonstrates the importance of environmental factors such as soil in modulating interactions between the plant and foliar pathogens, and highlights the significance of careful annotation of the environmental conditions under which plant-pathogen interactions are studied.

Huang, Lin, Ya-Nan Zhu, Yang, J, De-Wei Li, Yong Li, Li-Ming Bian, Jian-Ren Ye. 2018. Shoot blight on Chinese fir (*Cunninghamia lanceolata*) is caused by *Bipolaris oryzae*. *Plant Disease* 102 (3): 500-506 <https://doi.org/10.1094/PDIS-07-17-1032-RE>

Abstract– Chinese fir (*Cunninghamia lanceolata*) is a significant timber species that has been broadly cultivated in southern China. A shoot blight disease on Chinese fir seedlings was discovered in Fujian, China and a fungus was then consistently associated with the symptoms. This fungus was determined to be causing this disease, among others by fulfilling Koch's postulates. Based on morphological characteristics and multilocus phylogenetic analyses with the sequences of the internal transcribed spacer, partial glyceraldehyde-3-phosphate dehydrogenase gene, partial translation elongation factor 1- α gene, and partial 28S large subunit ribosomal RNA gene, the fungus was identified as *Bipolaris oryzae*. These characteristics and phylogenetic analyses clearly support that this pathogen is different from *B. sacchari*, which was, until now, considered to be the causal agent of a similar blight on Chinese fir in Guangdong, China. The fungus was also shown to be strongly pathogenic to rice, one of the most susceptible hosts to *B. oryzae*. Crop rotation involving rice is often carried out with Chinese fir in southern China, a practice that most likely increases the risk of shoot blight on *C. lanceolata*. To our knowledge, shoot blight caused by *B. oryzae* is reported for the first time in a gymnosperm species.

Linske, M. A., Williams, S. C., Stafford III, K. C. and Ortega, I. M. 2018. *Ixodes scapularis* (Acari: Ixodidae) Reservoir Host Diversity and Abundance Impacts on Dilution of *Borrelia burgdorferi* (Spirochaetales: Spirochaetaceae) in Residential and Woodland Habitats in Connecticut, United States. *Journal of Medical Entomology*. doi: 10.1093/jme/tjx237.

Abstract- The dilution effect in the zoonotic disease transmission cycle

theorizes that an increased diversity of host species will alter transmission dynamics, result in a decrease in pathogen prevalence, and potentially lower human disease incidence. The interrelationship of *Borrelia burgdorferi* (Johnson, Schmid, Hyde, Steigerwalt, and Brenner) (Spirochaetales: Spirochaetaceae), the etiological agent of Lyme disease (LD), and its primary vector, blacklegged ticks (*Ixodes scapularis* Say) (Acari: Ixodidae), is a commonly used example of the dilution effect, suggesting that an increased diversity of host species will be found in large, undisturbed forested tracts and lower diversity in fragmented forests. Given that Connecticut woodlands are mature with heavy upper canopies and generally poor habitat quality, we hypothesized there would be higher diversity of host species resulting in lower prevalence of *B. burgdorferi* in white-footed mice (*Peromyscus leucopus* Rafinesque) (Rodentia: Cricetidae) in forested residential areas. Using camera and live small mammal trapping techniques, we determined there was a greater richness of reservoir host species, significantly higher encounters with hosts, and significantly lower *B. burgdorferi* host infection in residential areas as compared to large, intact forested stands. Furthermore, we determined that the driving factor of pathogen dilution was not host species diversity, but rather overall encounter abundance with alternative hosts, regardless of habitat type. Our study challenges major concepts of the dilution effect within the Connecticut landscape and calls for new managerial actions to address the current state of our woodlands and abundance of host species in the interest of both forest and public health. This paper was featured on the Entomological Society of America's Entomology Today blog (1/12/2018) <https://entomologytoday.org/2018/01/12/why-the-variety-of-tick-hosts-in-your-back-yard-might-be-a-good-thing/>

Molaei G., Andreadis, T. G., Anderson, J. F., and Stafford III, K. C., An Exotic Hitchhiker: A Case Report of Importation into Connecticut from Africa of the Human Parasitizing Tick, *Hyalomma truncatum* (Acari: Ixodidae), *Journal of Parasitology*, 2018. doi: 10.1645/18-13 (Published February 7).

Abstract- We report the importation into Connecticut, U.S.A. of an exotic tick, *Hyalomma truncatum* (Koch) (Acari: Ixodidae) on a human with recent travel history to Africa. The tick was identified using key morphological characters and through DNA sequencing. This case report highlights continuing risk associated with the importation of exotic tick vectors of medical and veterinary significance on international travelers returning to the United States from abroad.

Maynard, Abigail A. 2018. Cumulative effect of annual additions of uncomposted oak and maple leaves on the yield of vegetables. *Compost Science & Utilization*. <http://www.tandfonline.com/eprint/yzv4gZl6QFjCy3uqezc8/full>.

Abstract- For 22 years, plots were amended annually with oak (*Quercus velutina* Lam.) or sugar maple leaves (*Acer saccharum* Marsh.) in Mt. Carmel, CT on a loamy upland soil. Leaves were incorporated into the soil immediately after application in the fall. Yields of 12 different vegetable crops (lettuce, peppers, eggplant, tomatoes, edamame, delicata squash, spaghetti squash, onions, leeks, rutabaga, carrots, and beans) from these plots were compared to yields from unamended controls. All plots received equal amounts of fertilizer. There were no significant differences in vegetable yields with any of the crops between any of the treatments indicating there are no deleterious effects of annual applications of uncomposted leaves. Some soil

characteristics such as organic matter and pH improved on the leaf amended plots. Study shows that annual applications of leaves to cropland (sheet composting) is a viable alternative for the disposal of leaves.

Yuan, X., Tian, F., He, C., Severin, G.B., Waters, C.M., Zeng, Q., Liu, F., Yang, C.-H. (2018) The diguanylate cyclase GcpA inhibits the production of pectate lyases via the H-NS protein and RsmB regulatory RNA in *Dickeya dadantii*. *Mol. Plant Path.* doi: 10.1111/mpp.12665.

Abstract- *Dickeya dadantii* 3937 secretes pectate lyases (Pels) to degrade the plant cell wall. Previously, we have demonstrated that EGcpB and EcpC function as cyclic-di-GMP (c-di-GMP) specific phosphodiesterases (PDEs) to positively regulate Pel production. However, the diguanylate cyclase (DGC) responsible for the synthesis of c-di-GMP and dichotomously regulation of Pel has remained a mystery. Here, we identified GcpA is the dominant DGC to negatively regulate Pel production by specifically repressing pelD gene expression. Quantitative real-time PCR (qRT-PCR) assays revealed that the expression levels of histone-like nucleoid-structuring protein encoding gene hns and the post-transcriptional regulator encoding genes rsmA and rsmB were significantly affected by GcpA. Deletion of hns or rsmB in the gcpAD418A site-directed mutant restored its Pel production and pelD expression, demonstrating that H-NS and RsmB contribute to GcpA-dependent regulation of Pel in *D. dadantii*. In addition, RsmB expression was subject to positive regulation by H-NS. Thus, we propose a novel pathway consisting of GcpA-H-NS-RsmB-RsmA-pelD that controls Pel production in *D. dadantii*. Furthermore, we showed that H-NS and RsmB are responsible for the GcpA-dependent regulation of motility and T3SS gene expression, respectively. Among the two PDEs involved in the regulation of Pels, only EGcpB regulates pelD expression through the same pathway as GcpA.

JOURNAL ARTICLES APPROVED FEBRUARY 2018

Adisa, I. O., V. Laxma Reddy Pullagurla, S. Rawat, J. A. Hernandez-Viezcas, C. O. Dimkp, **Wade H. Elmer**, **Jason C. White**, J. R. Peralta-Videa, and J. L. Gardea-Torresdey. Role of cerium compounds in Fusarium wilt suppression and growth enhancement in tomato (*Solanum lycopersicum*). *Journal of Agricultural and Food Chemistry*

Aulakh, Jatinder S. Optimizing preemergence weed control in Christmas tree plantations. *CAES Fact Sheet*

Aulakh, Jatinder S. Yellow nutsedge (*Cyperus esculentus*) control in home lawns with cool season turfgrasses. *CAES Fact Sheet*

Maier, Chris T. Larval hosts of Cerambycidae (Parandrinae, Prioninae, Lepurinae, Spondylidinae, and Cerambycinae) in Connecticut and nearby states. *The Coleopterists Bulletin*

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ARTICLES OF INTEREST FEBRUARY 2018

Tobacco Research Meeting

One hundred and twenty people attended The Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the East Windsor Scout Hall on February 27, 2018. **Dr. James LaMondia** welcomed growers and spoke about recent developments at the Experiment Station. The meeting addressed a wide variety of topics of interest to growers. Joe Bonelli (UConn Cooperative Extension) and Colleen Kisselburgh (Arthur Carroll Insurance) discussed risk management in tobacco and the tobacco insurance program. **Dr. LaMondia** spoke about management of tobacco pathogens including Fusarium wilt, viruses, black shank, target spot, cyst nematodes and blue mold and presented strategies to reduce pesticide residues in broadleaf and shade tobacco wrapper leaves while managing fungicide resistance. He provided an overview of the breeding program with the objective of incorporating plant resistance to pathogens through traditional breeding techniques. **Mr. Thomas Rathier** spoke about the effects of cultural practices, the environment and weather events on carbon and nitrogen in tobacco soils. Candace Bartholomew, Cooperative Extension, spoke about pesticide safety for growers. Martha Dorsey of the Farm Services Administration provided updates on FSA services to growers. Andrew Urbanowicz, Dave Arnold and Paul Polek presented an update on the Connecticut-Massachusetts Tobacco Growers Association. **Ms. Jane Canepa-Morrison, Mr. James Preste and Ms. Michelle Salvas** assisted with much of the behind the scenes work for the meeting. The meeting qualified for pesticide applicator re-certification credit in Connecticut and Massachusetts and 65 persons received credit.

GRANTS RECEIVED FEBRUARY 2018

Mr. Gregory Bugbee, \$2,260 from the Town of Middlefield for an aquatic plant survey of Lake Beseck.



CAES

The Connecticut Agricultural Experiment Station

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