Station News

The Connecticut Agricultural Experiment Station
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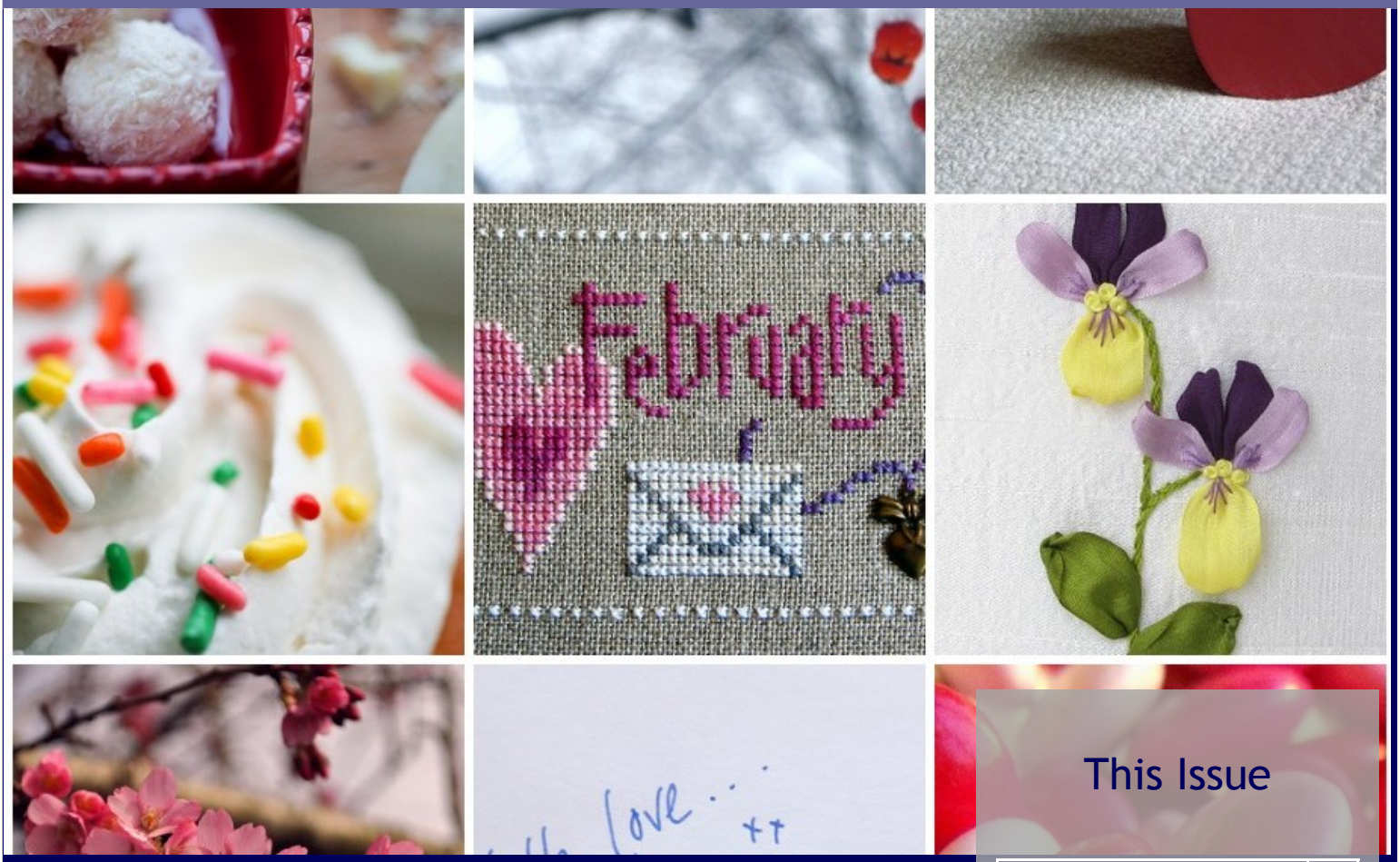


The mission of The Connecticut Agricultural Experiment Station is to develop, advance, and disseminate scientific knowledge, improve agricultural productivity and environmental quality, protect plants, and enhance human health and well-being through research for the benefit of Connecticut residents and the nation. Seeking solutions across a variety of disciplines for the benefit of urban, suburban, and rural communities, Station scientists remain committed to "Putting Science to Work for Society", a motto as relevant today as it was at our founding in 1875.

CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875

This Issue

ADMINISTRATION

DR. THEODORE ANDREADIS presided over a quarterly meeting of the Station's Board of Control held in Hartford (January 19); hosted and participated in the first annual meeting of the Northeast Regional Center for Excellence in Vector-Borne Diseases, held at the Station (75 attendees) (January 26); and presented an update on Experiment Station activities at a meeting of the Experiment Station Associates Board of Directors in Jones Auditorium (8 attendees) (January 31).

ANALYTICAL CHEMISTRY

DR. JASON C. WHITE participated in Skype calls with collaborators at the University of Parma regarding the potential visit of an Italian graduate student and on a joint book currently being prepared (January 3, 23); participated in WebEx presentations for the Center for Sustainable Nanotechnology (January 3, 17); attended the Laboratory Preparedness Advisory Group monthly meeting at the CT DPH Laboratory in Rocky Hill (January 8); participated in a WebEx call for the Center for Sustainable Nanotechnology Nanoagriculture group (January 9, 12); along with **MR. MICHAEL CAVADINI**, appeared in front of the Commission on Human Rights and Opportunities (CHRO) at the Legislative Office Building in Hartford to answer questions about the CAES Affirmative Action Plan (January 10); participated in the FDA FERN Northeast Regional bi-monthly call (January 11); participated in the monthly FDA FERN cCAP WebEx and conference call (January 11); attended the New Haven County Farm Bureau annual meeting at the Sound School in New Haven and provided an update on CAES projects and funding issues (January 16); met with a student and faculty member from Gateway Community College to discuss possible internship opportunities at CAES (January 24); along with all Department of Analytical Chemistry staff, hosted Ms. Susan Audino of the American Association for Laboratory Accreditation (A2LA) for our ISO 17025 ISO Accreditation one year assessment and scope expansion (January 25); and along with **MS. TERRI ARSENAULT** and **MS. KITTY PRAPAYOTIN-RIVEROS**, attended the annual FDA MFRPA ISO Accreditation Face-to-Face meeting in Albuquerque NM (January 29-31).

ENTOMOLOGY

DR. KIRBY C. STAFFORD III testified for the State Attorney's Office about entomological forensic evidence (January 10); spoke about tick-borne diseases and tick control at the Ledge Light Health District, New London, for an initial Lyme disease task force meeting and taped an interview for their Health Watch show in Groton (30 attendees) (January 10); was visited by Dr. Lars Eisen, CDC, to discuss tick research (January 25); participated in and presented a talk at the first annual meeting of the Northeast Regional Center of Excellence for Vector-Borne Diseases (January 26); and participated in a meeting of Connecticut IACUC Administrators at UConn Health Center in Farmington (January 31).

MS. KATHERINE DUGAS attended the UConn Extension Vegetable & Small Fruit Growers' Conference in South Windsor (January 8); gave a talk titled "Insect Problems in Connecticut" to the Burlington Garden Club (15 attendees) (January 17); attended the CT Tree Protective Association Winter Meeting in Watertown, and staffed a CAPS and Forest Pest booth (January 18); staffed a Forest Pest Outreach booth at the CT RV and Camping Show held at the CT Convention Center in Hartford (January 19-20); and attended the CT Nursery and Landscape Association Winter Meeting in Watertown, and staffed a CAPS and Forest Pest booth (January 24-25).

MR. MARK H. CREIGHTON presented several talks to twenty students at Avon Old Farms High School on honey bee anatomy and physiology, history of beekeeping and honey bee dissection (January 3-4); met with seven students at Common Ground High School, evaluated the school apiary, and provided some winter provisions to the colonies (January 11); and spoke at the Connecticut Beekeepers annual bee school here at the Station and discussed bee health and the Honey Bee Registration program (118 new beekeepers) (January 20).

DR. CHRIS T. MAIER distributed information on the brown marmorated stink bug and displayed longhorn beetles commonly found in firewood at the Annual Meeting of the Connecticut Tree Protective Association in Southington (January 18); and exhibited new entomological literature at a meeting of the Connecticut Entomological Society at Yale University, New Haven (35 attendees) (January 19).

DR. CLAIRE E. RUTLEDGE attended the Annual Meeting of the Connecticut Tree Protective Association in Southington (800 adult attendees) and was re-elected to the Board of Directors for a third term (January 18); and participated in the SCSU STEM Career Fair in New Haven (100 adults) (January 31).

DR. VICTORIA L. SMITH attended the winter meeting of the CT Tree Protective Association, held at the Aqua-Turf Club in Southington (January 18); and attended the winter meeting of the CT Nursery and Landscape Association, held at the Aqua-Turf in Southington (January 25).

DR. KIMBERLY A. STONER was interviewed by Colin McEnroe of Connecticut Public Radio (WNPR) about pollinator habitat and the potential for competition between honey bees and native bees, which aired on the Colin McEnroe show on January 30 (January 29); and was visited by a Restoration Ecology class from Sacred Heart University, led by Dr. Jennifer Matthei, in which Dr. Stoner spoke about the work of the Station and about bee research (17 attendees; 16 were students) (January 30).

MS. TRACY ZARRILLO gave a brief demonstration about how she creates bee trap nests to the students of Sacred Heart, and answered questions about using artificial nest boxes (16 students, 1 teacher) (January 30).

ENVIRONMENTAL SCIENCES

DR. JOSEPH PIGNATELLO gave a seminar at the CAES Seminar Series, "Roles of Biochars and Other Carbons in Agricultural and Environmental Management" (approx. 60 attendees) (January 17); and presented a poster, at the USDA-NIFA NSF Water and Soils workshop for grantees, Washington, DC (approx. 150 attendees) (January 29-31).

DR. PHILIP ARMSTRONG gave the lecture, "Dengue and Other Arboviral Diseases" for the Principles of Infectious Diseases course held at the Yale School of Public Health (30 attendees) (January 30).

DR. DOUG BRACKNEY gave the talk, "Successive bloodmeals enhance virus dissemination within mosquitoes and increase transmission potential" at the Northeast Regional Center for Excellence in Vector-Borne Diseases Annual Symposium at CAES (approx. 75 attendees) (January 26).

MR. GREGORY BUGBEE, with **MS. SUMMER STEBBINS**, proctored the multistate aquatic license recertification program at the Northeast Aquatic Plant Management Society meeting in New Castle, NH (January 9-11).

DR. GILLIAN EASTWOOD obtained AMCA certification as a trainer for Integrated Mosquito Management, with focus on *Aedes* species, at Rutgers University, NJ (December 13-14); and gave the talk Connecticut - Mosquito Trapping Methods at the Annual Meeting of the Northeast Regional Center of Excellence for Vector-borne diseases at CAES (January 26).

DR. GOUDARZ MOLAEI was interviewed by News 8, WTNH, "The extreme cold might help tick population" broadcasted and posted online at http://wtnh.com/2018/01/09/the-extreme-cold-might-help-tick-population/ (January 9); and welcomed Prof. Olivia Harriott, Department of Biology, Fairfield University, to start a sabbatical leave in his laboratory working on vector-host interactions of the Asian Tiger Mosquito (January 22).

FORESTRY AND HORTICULTURE

DR. JEFFREY S. WARD meet with Danica Doroski, Yale University Ph.D. candidate, to discuss urban forest dynamics (January 9); was interviewed by John Burgeson of the Connecticut Post about the impact of the recent cold snap on invasive species (January 10); provided an update on current CAES tree research at the Connecticut Tree Protective Association annual meeting in Plantsville (400 attendees) (January 18); met with CT NRCS staff in Tolland to discuss influence of soils and topographic features on tree growth (6 attendees) (January 19); spoke on "Cada Árbol Tiene su Lugar" at the Connecticut Nursery and Landscape Association Winter Symposium in Plantsville (34 attendees) (January 25); and gave an invited talk "The historical and future impacts of exotic insects and diseases on Connecticut's forests" for a Yale forestry seminar (17 attendees) (January 31).

DR. ABIGAIL A. MAYNARD attended the UConn Extension Vegetable & Small Fruit Growers' Conference in South Windsor (January 8); visited the Miller Farm in Oxford to discuss growing new varieties of vegetables (January 11); discussed the New Crops Program with John Holbrook at Holbrook Farm in Bethel (January 22); reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation in Middletown (8 attendees) (January 25); and worked with students and teachers in the greenhouse at Hamden Hall Country Day School (4 teachers, 45 students) (January 9, 16, 18, 23, 29).

DR. SCOTT C. WILLIAMS participated in a iCRV radio program "Nature" with Ranger Russ Miller about ticks, their hosts, and tick-borne diseases, Ivoryton (January 15); gave an invited lecture about deer and ticks and other "Misunderstood Wildlife Species" 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); hosted a meeting of the Connecticut Urban Forest Council, Hamden (January 23); gave an invited presentation titled "Less-toxic Integrated Control and Host Reservoir Dilution of Ixodes scapularis in Residential Settings" at and participated in the Northeast Regional Center for Excellence in Vector-Borne Diseases meeting held in the Jones Auditorium, (75 attendees) (January 26); and spoke to Lyman Hall High School students about career paths and research opportunities at the Connecticut Agricultural Experiment Station (10 students, 1 teacher) (January 29).

MR. JOSEPH P. BARSKY participated in the Quarterly Executive Committee Meeting of the New England Society of American Foresters (January 26); and attended the Connecticut Tree Protective Association Annual Winter Meeting in Plantsville (January 18).

PLANT PATHOLOGY AND ECOLOGY

DR. WADE ELMER presented a CAES seminar entitled "Nanoparticles in Plant Disease Control" in Jones Auditorium (44 attendees) (January 3); and participated in the Southern Connecticut State University Stem Fair (50 attendees) (January 31).

DR. YONGHAO LI staffed the CAES booth at the UConn Extension Vegetable & Small Fruit Growers' Conference in South Windsor (January 8); presented "Bosai Tree Disease Management" to the Bonsai Society of Greater New Haven in Hamden, CT (20 adults) (January 9); and staffed the CAES booth at the CTPA Annual Meeting in Plantsville (January 18), staffed the CAES booth at the CNLA Winter Symposium in Plantsville (January 24).

DR. NEIL SCHULTES spoke to Yale Forestry students about the use of PCR and DNA sequence analysis as applied to fungal taxonomy (15 students) (January 26); and spoke to numerous undergraduate science majors about the current research and internship opportunities at The Experiment Station at the STEM Career Fair at Southern Connecticut State University (50 adults) (January 31).

DR. LINDSAY TRIPLETT presented a laboratory tour and equipment demonstration for visiting students from The Sound School (8 adults) (December 1); manned a recruitment table for the Plant Health Fellows summer internship program at the New Haven Promise Career Fair (19 adults expressed interest) (January 10); and served on a federal grant panel (dates and location confidential).

DR. QUAN ZENG participated in the SCSU STEM Career Fair (50 adults) (January 31).

DR. ZHOUQI CUI met with Noelle Strzalkowski, undergraduate student from SCSU, and discussed research on fire blight and soft rot (January 31).

VALLEY LABORATORY

DR. CAROLE CHEAH was interviewed by John Burgeson of the Connecticut Post on the effects of the recent cold outbreak on hemlock woolly adelgid (January 23); and presented a CAES Seminar entitled "Climate Impacts on Hemlock Woolly Adelgid in the Northeast" (50 attendees) (January 31).

DR. RICHARD COWLES presented "SWD Update" at the UConn Extension Vegetable & Small Fruit Growers' Conference in South Windsor (180 attendees) (January 8); spoke on the subject of "Latest research: Neonics vs. pollinators," to the MA greenhouse growers educational conference organized by UMass, in Sturbridge, MA, (100 attendees) (January 11); was honored with the Award of Merit by the CT Tree Protective Association at their annual meeting in Plantsville (January 18); discussed "IPM and the effects of a changing climate," at the annual meeting of the MA Assoc. of Landscape Professionals, Sturbridge, MA, (180 attendees) (January 24).

DR. JAMES LAMONDIA participated in the UConn Extension Vegetable & Small Fruit Growers' Conference in South Windsor (25 attendees) (January 8); spoke about "Identifying, understanding and managing nematode diseases in potatoes" (50 attendees) (January 10) and "Identifying, understanding and managing nematode diseases in vegetables" (75 attendees) (January 11) at the Long Island Agricultural Forum held in Riverhead, NY; spoke about "Integrated pest management in Connecticut hops" at the Connecticut Hop Growers Association Annual Meeting held in Northford (40 attendees) (January 13); was interviewed about hop research by Steve Jensen for the Connecticut Weekly Agricultural Report (January 13); attended the 48th Tobacco Workers Conference in Myrtle Beach, SC to present a plenary session talk on "Connecticut cigar wrapper leaf: the result of practical research and 375 years of tobacco production" (245 attendees from 11 countries) (January 16), moderated a session and discussion on Nematodes and Nematicides (50 attendees) (January 16) and presented 'Management of target spot in broadleaf cigar wrapper tobacco (45 attendees) (January 18); was interviewed about tobacco research and production in Connecticut by Christopher Bickers for the Tobacco Farmer Newsletter (January 16); was interviewed about hop research and hop production in Connecticut by Joanie Stiers for Connecticut Grown magazine (January 22); and participated in the Connecticut Agricultural Information Council meeting regarding Agriculture Day at the Capitol and the Connecticut Outstanding Young Farmer Award (January 23).

DEPARTMENTAL RESEARCH UPDATES JANUARY 2018

Andreadis, T. G, Thomas, M. C, and Shepard, J. J. 2018. *Amblyospora khaliulini* (Microsporidia: Amblyosporidae): Investigations on its life cycle and ecology in *Aedes communis* (Diptera: Culicidae) and *Acanthocyclops vernalis* (Copepoda: Cyclopidae) with redescription of the species. *J. Invertebr. Pathol*. 151: 113-125.

Abstract: A multi-year study was conducted to examine the natural ecology of the microsporidium *Amblyospora khaliulini* and more fully characterize parasite development and histopathology in all stages of its primary mosquito host, *Aedes communis* and intermediate copepod host, *Acanthocyclops vernalis* with redescription of the species. *A. khaliulini* exhibits polymorphic development, produces three morphologically and functionally distinct spores, and is both horizontally and vertically transmitted. Development in *A. vernalis* is restricted to females, occurs within the ovaries and results in death of the host. Development is haplophasic with division by binary and multiple fission producing rosette-shaped sporogonial plasmodia and conical uninucleate spores that are orally infectious to *Ae. communis* larvae. Both sexes are equally susceptible and infections are confined to testes in males and ovaries in females. Initial stages of development include uninucleate schizonts that undergo karyokinesis forming diplokaryotic meronts that divide repeatedly by binary fission. Sporogony occurs in both host sexes, but sporogenesis does not progress normally in adult males and elliptical, thin walled binucleate spores that function in vertical transmission of the microsporidium via infection of the ovaries and eggs are formed in adult females only. Development of vertically acquired infections in larval *Ae. communis* hosts occurs within fat body tissue, leads to the production of meiospores in male hosts only and results in death during the 4th larval stadium. Initial development is characterized by merogonial multiplication of diplokarya by synchronous binary division producing additional diplokarya. The cessation of merogony and the onset of sporogony are characterized by the simultaneous secretion of a sporophorous vesicle and meiotic division of diplokarya resulting in the formation of octonucleate sporonts that undergo cytokinesis and sporogenesis to form eight uninucleate, broadly ovoid meiospores enclosed within a sporophorous vesicle. The natural prevalence of patent vertically acquired fat body infections in field populations of *Ae. communis* ranged from 1.6% to 3.6%. Yearly infection rates in *A. vernalis* copepods ranged from 57.1% to 15.0%. Prevalence rates of horizontally acquired infections in emerging adult *Ae. communis* ranged from 69.0% to 11.9% in males and 50.0% to 16.4% in females.

Candace R. Alexander, **Douglas W. Dingman, Neil P. Schultes**, George S. Mourad 2018.The solute transport profile of two Aza-guanine transporters from the Honey bee pathogen *Paenibacillus larvae FEMS Microbiology Letters*, January 29, 2018; fny018, https://doi.org/10.1093/femsle/fny018

Abstract-Two nucleobase transporters encoded in the genome of the Honey bee bacterial pathogen *Paenibacillus larvae* belong to the azaguanine-like transporters and are referred to as PlAzg1 and PlAzg2. PlAzg1 & 2 display significant amino acid sequence similarity, share predicted secondary structures and functional sequence motifs with two *Escherichia coli* nucleobase cation symporter 2 (NCS2) members; adenine permease (EcAdeP) and guanine-hypoxanthine permease EcGhxP. However, similarity does not define function. Heterologous complementation and functional analysis using nucleobase transporter deficient *Saccharomyces cerevisiae* strains revealed that PlAzg1 transports, adenine, hypoxanthine, xanthine and uracil, while PlAzg2 transports adenine, guanine, hypoxanthine, xanthine, cytosine and uracil. Both PlAzg1 & 2 display high affinity for adenine with K_m of 2.95 ± 0.22 μM and 1.92 ± 0.22 μM, respectively. These broad nucleobase transport profiles are in stark contrast to the narrow transport range observed for EcAdeP (adenine) and EcGhxP (guanine and hypoxanthine). PlAzg1 & 2 are similar to eukaryotic Azg-like transporters in that they share a broad solute transport profile, particularly the fungal *Aspergillus nidulans* AzgA (that transports adenine, guanine and hypoxanthine) and plant AzgA transporters from *Arabidopsis thaliana* and *Zea mays* (that collectively move adenine, guanine, hypoxanthine, xanthine, cytosine and uracil).

Handbook on Florist Crop Diseases 2018. McGovern, R. J. and **Elmer, W. H.** (eds.) Springer Publishing Co. Inc. New York, NY), DOI 10.1007/978-3-319-32374-9_49-1. Two volumes, 43 chapters.

Abstract-Florists' crops production has evolved considerably through new technological advances in irrigation, media and environmental control, along with the appearance of new centers of large scale production of plant material. These changes have necessitated the development of newer and innovative ways of suppressing pathogenic fungi, bacteria, viruses, and nematodes. The aim of the Handbook of Florists' Crops Diseases was to assemble a global team of experts to present the latest techniques for disease management. Introductory chapters outline up-to-date strategies regarding breeding, chemical and biological control, cultural and environmental manipulation, diagnosis, nutrition, and sanitation and how these approaches directly influence ornamental plant health. The following chapters address the major diseases of economically important ornamentals with the goal of capturing the latest disease management strategies along with diagnostic photographs.

Datnoff, L. E. and Elmer, W. H. 2018. Mineral Nutrition and Florists' Crop Diseases, In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer. Springer, Inc. DOI 10.1007/978-3-319-32374-9_49-1

Abstract-The health of any ornamental crop is a direct function of the nutritional status of the plant. Disease susceptibility or resistance is often governed by the speed in which the plants can directly react to infection by plant pathogen and/or indirectly by their ability to tolerate predisposing stresses such as drought. Information is presented herein on the role of essential minerals N, P, K, Ca, Mg, S, Cl, Fe, Mn, Cu, Zn, B, Mo, and Ni along with beneficial elements Si and Al for their effects on suppressing diseases in ornamental crops.

Elmer, W. H. and Kamo, K. 2018. Diseases of Gladiolus. In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer, Springer, Inc. DOI 10.1007/978-3-319-32374-9_49-1.

Abstract-Gladiolus (Gladiolus spp.) are in the Iridaceae family and are native to South Africa, and over 200 species have been described. Gladiolus have become a major crop in the florist industry. Growers of gladiolus plant their corms in the spring and harvest the flower spikes during the summer and early fall. Although the crop can be propagated sexually from seeds, most of the industry is based on movement of corms and cormels, which leads to many diseases being disseminated with the crop. Fusarium corm rot, Gladiolus rust, and Curvularia spot are the most limiting fungal diseases, whereas Cucumber mosaic virus and Bean yellow mosaic virus emerge as the more threatening viral diseases affecting gladiolus.

Elmer, W. H. and M. D. Daughtrey. 2018. Diseases of Cyclamen. In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer, Springer, Inc. DOI 10.1007/978-3-319-32374-9_49-1

Abstract-Cyclamen (Cyclamen persicum Mill.) is a major potted flower in the horticultural trade. As a result of more intensive production over the past 20 years, many new disease problems have emerged as breeders have exchanged germplasm and seed. Fusarium wilt and tospovirus diseases have become particularly challenging to manage. The following chapter offers an array of management strategies for more than 15 disease conditions based on current research.

Gent, M.P.N. 2017. Factors affecting relative growth rate of lettuce and spinach in hydroponics in a Greenhouse. HortScience 52(12):1742–1747. doi: 10.21273/HORTSCI12477-17.

Abstract-Relative growth rate (RGR), the relative increase in weight per day, can analyze the effect of environment and nutrition on growth. I examined which of the parameters responding to plant growth scaled according to RGR for

lettuce and spinach grown in heated greenhouses in hydroponics with control of the nutrient solution. The experiments for lettuce in 2006–08 included all times of year, high vs. low temperature, and effect of withdrawal of nitrogen. There were four parameters that were significant in multiple linear regression vs. RGR; irradiance divided by leaf area index if it was greater than one, or normalized daily light integral (NDLI), solution temperature, electrical conductivity (EC), and logarithm solution nitrate when it was between 3 and 55 mg·LL1 N. NDLI had the most significant coefficient, but the other parameters had regression coefficients more than three times SE. For experiments on spinach in 2009–10, all the parameters mentioned previously were significant in multiple linear regression vs. RGR, except EC. The coefficient for NDLI in spinach was about half the value in lettuce. The coefficients for solution temperature and low nitrate were two and three times that in lettuce. In a third set of experiments on lettuce in 1996–98, solution temperature was the only significant parameter among those mentioned previously. The coefficient for solution temperature was similar to that for regression of lettuce in 2006–08.

Gloria-Soria, A., Dunn, W.A., Yu, X., Vigneron, A., Lee, K.Y., Li, M., Weiss, B.L., Zhao, H., Aksoy, S. and Caccone, A., (2018). Uncovering Genomic Regions Associated with Trypanosoma Infections in Wild Populations of the Tsetse Fly Glossina fuscipes. G3: Genes, Genomes, Genetics, pp.g3-300493. https://doi.org/10.1534/g3.117.300493

Abstract- Vector-borne diseases are responsible for more than one million deaths every year but genomic resources for most species responsible for their transmission are limited. This is true for neglected diseases such as sleeping sickness (Human African Trypanosomiasis), a disease caused by Trypanosoma parasites vectored by several species of tseste flies within the genus Glossina. We describe an integrative approach that identifies statistical associations between trypanosome infection status of Glossina fuscipes fuscipes (Gff) flies from Uganda, for which functional studies are complicated because the species cannot be easily maintained in laboratory colonies, and ~73,000 polymorphic sites distributed across the genome. Then, we identify candidate genes involved in Gff trypanosome susceptibility by taking advantage of genomic resources from a closely related species, Glossina morsitans (Gmm). We compiled a comprehensive transcript library from 72 published and unpublished RNAseq experiments of trypanosome infected and uninfected Gmm flies and improved the current Gmm transcriptome assembly. This new assembly was then used to enhance the functional annotations on the Gff genome. As a consequence, we identified 56 candidate genes in the vicinity of the 18 regions associated with Trypanosoma infection status in Gff. Twenty-nine of these genes were differentially expressed among parasite-infected and uninfected Gmm, suggesting that their orthologs in Gff may correlate with disease transmission. These genes were involved in DNA regulation, neurophysiological functions, and immune responses. We highlight the power of integrating population and functional genomics from related spe-

cies to enhance our understanding of the genetic basis of physiological traits, particularly in non-model organisms.

Li, Yonghao, Margaret T. Mmbaga, Boru Zhou, Jacqueline Joshua, Emily Rotich, and Lipi Parikh. 2018. Disease of Hydrangea In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer, Springer, Inc. DOI 10.1007/978-3-319-32374-9_49-1

Abstract-Hydrangea, a native to Asia and America, is a popular ornamental plant due to its interesting large, showy flowers with different colors and inflorescence forms. Many hydrangea species are often used to design landscapes and gardens. In greenhouses, nurseries, and landscapes, hydrangea production and values are affected by fungal, bacterial, and viral diseases. In this chapter, the biology of pathogens, development of diseases, and strategies for their control of common diseases of hydrangea were described.

McGovern, R.L., and Elmer, W. H. 2018. Diseases of Tulips: In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer Springer, Inc DOI 10.1007/978-3-319-32374-9_49-1

Abstract-Tulip is the most important ornamental geophyte worldwide, grown for bulbs, cut flowers, potted plants, and landscape use. Major increases in consumer demand in the first half of the twentieth century were associated with the identification of many new disease problems. Tulip is susceptible to a number of diseases caused by fungi, bacteria, viruses, and nematodes including Botrytis tulipae, Fusarium oxysporum f. sp. tulipae, Pectobacterium carotovorum, Tulip breaking virus, and Ditylenchus dipsaci that can significantly reduce flower and bulb production. Since the plant is propagated vegetatively, this factor can facilitate the spread of disease if pathogen-free propagative material is not used and integrated disease management is not followed.

McGovern, R.L., and Elmer, W. H. 2018. Florist Crops: Global trends and disease impact. In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and W. H. Elmer, Springer, Inc. DOI 10.1007/978-3-319-32374-9_49-1

Abstract-The production of cut-flowers, potted flowering plants, and related propagative material is a dynamic, fast-growing, and highly lucrative global industry. In the past, flower production sites were primarily located in or near the major markets – developed countries in North America and Europe. However, because of lower production costs, including labor inputs, more favorable climatic conditions, and the development of efficient transportation methods, there has been a shift in production to exporting countries closer to the equator such as those in Latin America, sub-Saharan Africa, and Asia. The direct effects of pathogens on florists' crops are the extensive losses that can occur in their production and postharvest handling. Furthermore, the dissemi-

nation of pathogens and their vectors on cut-flowers and potted flowering plants and propagative material may also damage unrelated crops. Management of pathogens of florists' crops is very challenging and costly because these crops have an essentially zero pest damage threshold, and because of the increasing demand by the public and government agencies that all of agriculture, including floriculture, should adopt a sustainable approach which minimizes/eliminates its nontarget effects.

Ruotolo, R.; Maestri, E.; Marmiroli, M.; Pagano, L.; **White, J.C.**; Marmiroli, N. Plant response to metal-containing engineered nanoparticles: an omics-based systems biology perspective. *Environ. Sci. Technol*. DOI: 10.1021/acs.est.7b04121.

Abstract- The increasing use of engineered nanomaterials (ENMs) raises questions over their environmental impact. Improving the level of understanding of the genetic and molecular basis of the response to ENM exposure in biota is necessary to accurately assess true risk to sensitive receptors. The aim of this review is to compare the plant response to several metal-based ENMs widely used, such as quantum dots, metal oxides and silver nanoparticles (NPs), integrating available 'omics' data (transcriptomics, miRNAs and proteomics) in a systems biology approach. Although there is evidence that ENMs can release their metal components into the environment, the mechanistic basis of both ENM toxicity and tolerance is often distinct from that of metal ions and bulk materials. We show that the mechanisms of plant defense against ENM stress includes the modification of root architecture, involvement of specific phytohormone signaling pathways and activation of antioxidant mechanisms. A critical meta-analysis allowed us to identify relevant genes, miRNAs and proteins involved in the response to ENMs, and will further allow a mechanistic understanding of plant/ENM interactions.

Trolinger J. C., McGovern, R. M., **Elmer, W. H**. Rechcigl N.A., and Shoemaker C. M. 2018 . Diseases of Chrysanthemums In: Handbook of Florist Crop Diseases. Eds. R. J. McGovern and **W. H. Elmer** Springer, Inc DOI 10.1007/978-3-319-32374-9_49-1.

Abstract-Chrysanthemums originated in China, but its major phenotypic selection occurred in Japan. The plant is sold as a cut flower, as a potted flowering plant, or as a garden plant. By manipulating day length, the plant can be produced year round. Intensive production during the first half of the twentieth century resulted in devastating diseases, such as those caused by the fungi *Ascochyta, Septoria*, and *Verticillium*, which severely threatened the chrysanthemum industry, but are no longer problems because of the widespread use of fungicides and the clean stock programs employed by the key producers. However, several new major diseases of chrysanthemums have emerged that limit production and affect quality including bacterial infections, root rots, rusts, and viral and viroid infections.

JOURNAL ARTICLES APPROVED JANUARY 2018

Agrimonti, C., **Jason C. White**, S. Tonetti, and N. Marmiroli. Antimicrobial activity of cellulosic pads treated with emulsions derived from essential oils of oregano and thyme against bacteria of minced beef meat. *Journal of Packaging, Technology and Research*

Armstrong, Philip M., H. Ehrlich, **Angela Bransfield**, **Theodore Andreadis**, **John Shepard**, J. L. Warren, V. E. Pitzer, and **Doug E. Brackney**. Successive bloodmeals enhance virus dissemination within mosquitoes and increases transmission potential. *Nature*

Aulakh, Jatinder S. and A. Witcher. Response of some herbaceous ornamentals to two pre-packaged herbicide mixtures. *Proceedings, Weed Science Society 2018*

Giordano, P. R., J. Wang, J. M. Vargas, J. Jacobs, M. I. Chilvers, and **Quan Zeng**. Using a genome-based PCR primer prediction pipeline to develop molecular diagnostics for the turfgrass pathogen *Acidovorax avenae*. *Plant Disease*

Jia, W., **Chuanxin Ma**, M. Yin, H. Cao, J. Wang, C. Wang, H. Sun, **Jason C. White**, and B. Xing. Effects of biochar on 2,2',4,4',5,5'-hexabrominated diphenyl ether (BDE-153) fate in *Amaranthus mangostanus* L.: accumulation, metabolite formation, and physiological response. *Environmental Science & Technology*

LaMondia, James A. Management of target spot in broadleaf cigar wrapper tobacco. Abstract, *Proceedings of the 48th Tobacco Workers' Conference, 2018*

Linske, Megan A., **Scott C. Williams**, **Jeffrey S. Ward**, and **Kirby C. Stafford III**. Indirect effects of *Berberis thunbergii* infestations on *Peromyscus leucopus* exposure to *Borrelia burgdorferi*. *Environmental Entomology*

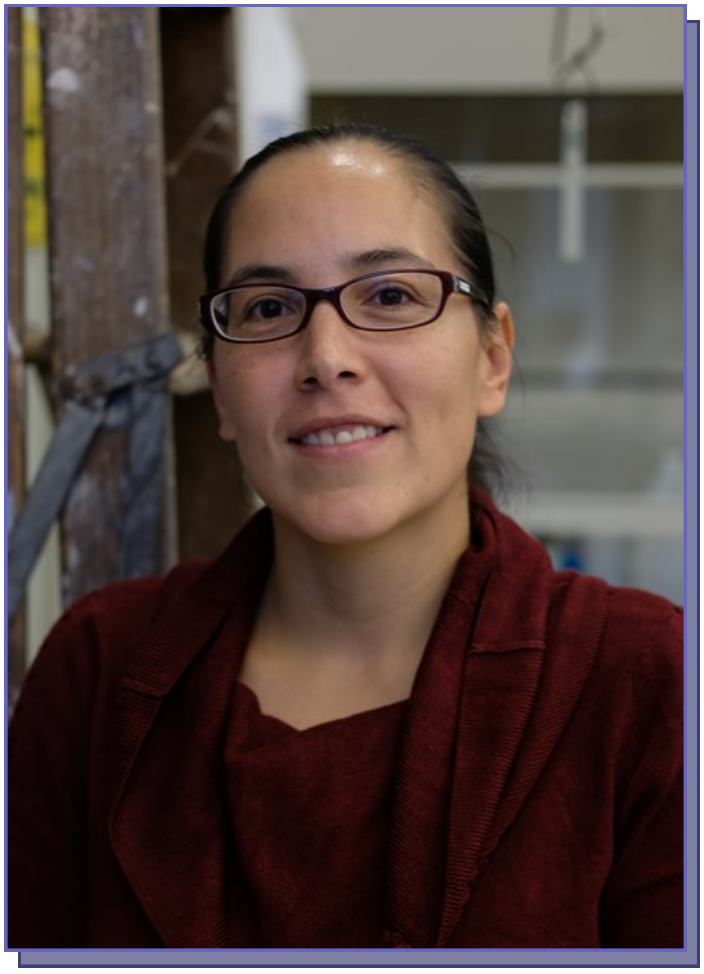
Molaei, Goudarz and **Eliza Little**. A nine-legged tick: report of a morphological anomaly in the blacklegged tick, *Ixodes scapularis*, from the Northeastern United States. *Ticks and Tick-borne Diseases*

Williams, Scott C., **Eliza A. H. Little**, **Kirby C. Stafford III**, **Goudarz Molaei**, and **Megan A. Linske**. Integrated control of juvenile *Ixodes scapularis* parasitizing white-footed mice in a residential setting in southwestern Connecticut. *Ticks and Tick-borne Diseases*

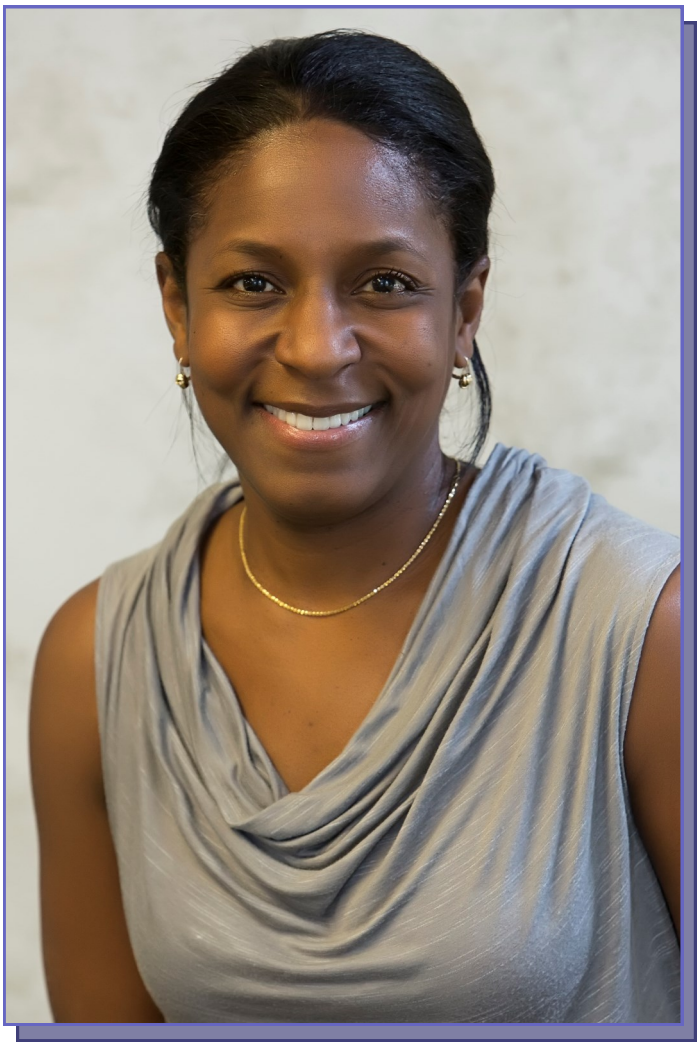
GRISWOLD RESEARCH CENTER

Mr. Robert Durgy attended as a member of the steering committee and ran the audio-visuals at the Connecticut Vegetable and Small Fruit Grower's Conference in Windsor on (245 attendees) (January 8); and was appointed by the All-America Selections Board of Directors as judge for the AAS Edibles Variety Trials.

NEW STAFF, STUDENTS, AND VOLUNTEERS JANUARY 2018

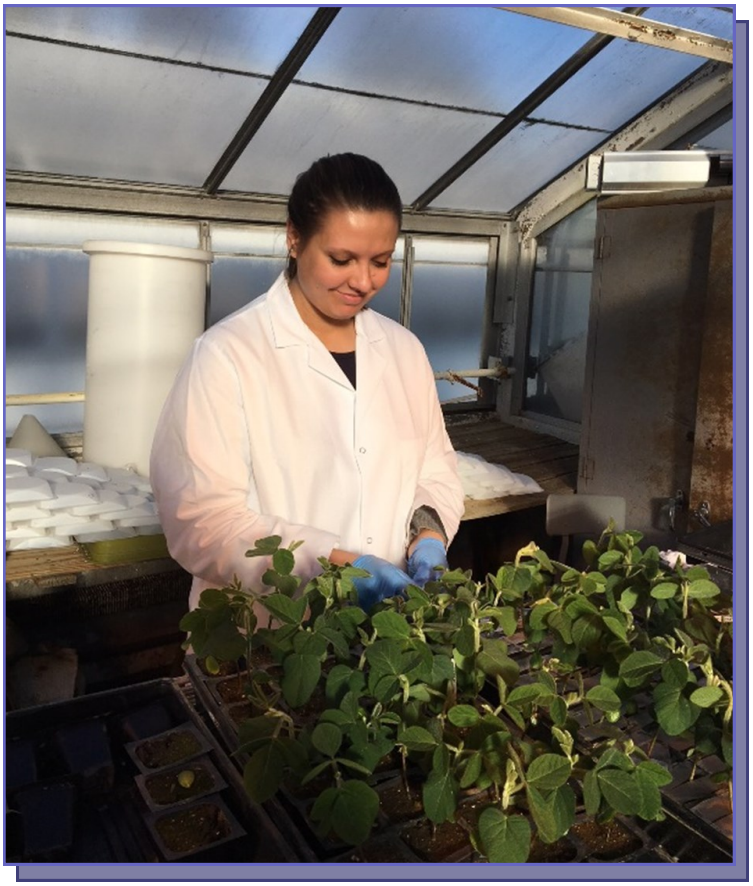


Dr. Andrea Gloria-Soria joined the Station on January 5th as an Assistant Agricultural Scientist I. Her background is in population genetics and genomics, molecular biology, vector biology, evolutionary genetics, and arthropod genetics. She will be conducting research on how the genetic diversity of disease vectors influence their ability to transmit arboviruses, as part of the Northeast Region Center of Excellence in Vector-Borne Diseases, among other projects. She obtained her PhD from the Department of Biology and Biochemistry, University of Houston in 2009. She was a Gaylord Donnelley Environmental Postdoctoral Fellow at Yale from 2009-2011 where she transitioned to Associate Research Scientist in 2013. Her office is in the Johnson-Horsfall Building and she works in the BSL3 laboratory.

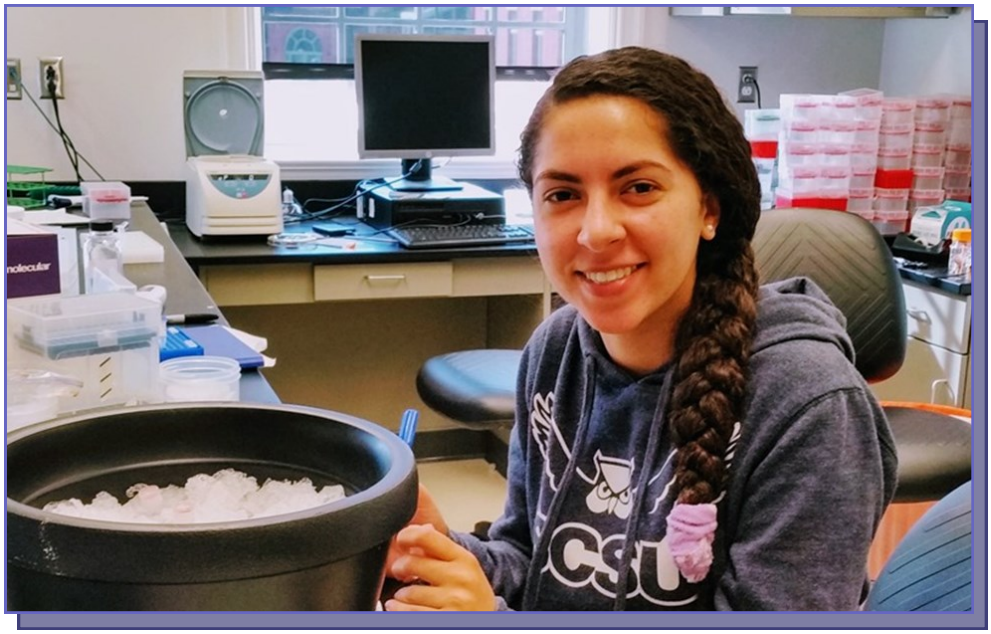


Olivia Harriott, Ph.D.

Dr. Olivia Harriott is conducting sabbatical research in the laboratory of Dr. Goudarz Molaei at the Department of Environmental Sciences and the Center for Vector Biology & Zoonotic Diseases in a project funded by the Centers for Disease Control and Prevention through the Northeast Regional Center for Excellence in Vector Borne Diseases. She is using molecular methods to study the vector-host interactions of the Asian tiger mosquito, *Aedes albopictus*, a potential vector for Zika and Chikungunya viruses. She is currently an Associate Professor in the Department of Biology at Fairfield University. There, she served as department chair from 2012 to 2013 and from 2014 to 2016. Dr. Harriott holds a bachelor's degree in biological sciences (1988) and a doctorate in microbiology (1994) from the University of Connecticut, Storrs. Her graduate work focused on the ultrastructure and genetics of the nitrogen-fixing plant symbiont, *Frankia*. Prior to joining the faculty at Fairfield University, Dr. Harriott completed postdoctoral training as a research associate and USDA fellow at the Agricultural Biotechnology Center at Rutgers University, where she studied the mechanism of anaerobic O-demethylation by acetogenic bacteria. At Fairfield University, Dr. Harriott teaches and trains undergraduates in microbiology and genetics. Her research interests are in host-microbe interactions and environmental microbiology. Her office is in 306 Slate.



Ms. Caroline Kobierowski joined **Dr. Elmer's** group as a student intern in January 2018. She is from Wallingford, CT and is currently a senior studying Biology at Albertus Magnus College in New Haven, CT. She is assisting in the Nanoparticle/Disease suppression research.



Ms. Onshouda Shaban is student intern in the laboratory of **Dr. Lindsay Triplett**. She is a senior biology student at Southern Connecticut State University. She will be working with **Dr. Teja Shidore** on bacterial antibiotic survival mechanisms.

GRANTS RECEIVED JANUARY 2018

Dr. James LaMondia and colleagues from the University of Idaho were awarded a $500,000 NIFA Methyl Bromide Transition Grant for 'Pyramiding biofumigants and trap crops for eradication of *Globodera pallida*'. CT will receive $116,811 over three years.

Dr. James LaMondia was awarded a research grant from the Horticultural Research Institute for 'Boxwood Blight Management in the Landscape' for $24,000 for 2018.

Mr. Robert Durgy was awarded a Specialty Crop Block Grant from the CT Department of Agriculture entitled "Produce Overwintering Program" to investigate techniques and varieties best suited for overwintering vegetables, $31,620.

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The Connecticut Agricultural Experiment Station

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Station News was prepared and edited by Dr. Theodore G. Andreadis, Ms. Vickie Bomba-Lewandoski, Ms. Sandra Carney, and Ms. Brandi Marks.

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