

## FEATURED NEWS

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### Lessons from Around the World: A Guide to Box Tree Moth

**Management** by Dan Gilrein, Extension Entomologist, Cornell Cooperative Extension of Suffolk County, New York

The very destructive pest, box tree moth (*Cydalima perspectalis*), was found near Toronto, Canada in 2018 and in the US for the first time in summer 2021. Known US detections are currently limited to Niagara County in western New York State. A low number was intercepted in boxwood nursery stock last year. Surveillance is continuing in NY towards containment and eradication.

Although box tree moths can also complete their life cycle on *Murraya paniculata*, so far, boxwoods, including all common cultivated species, are the only observed hosts in Europe and Canada. It is becoming necessary to make the public aware of some management options should treatment become necessary in the U.S. Certain aspects of the box tree moth biology can inform management.

In southern Canada, around mid-May the overwintered small caterpillars emerge from their protective silk 'hibernacula' of webbed leaves to start feeding, becoming more exposed and susceptible to treatment. Low populations are hard to detect and dense foliage on boxwood makes early signs of infestation even more difficult to see. Spread boxwood branches apart lightly to look for signs of chewing damage on leaves and stems, webbing (i.e., not from spiders) and the insects themselves. While looking for signs on your boxwood, refer to a blog post from Jen Llewellyn, Nursery & Landscape Specialist, Ontario Ministry of Agriculture, Food & Rural Affairs, for excellent images of what to look for ([Click Link](#)). Pheromone traps, available from some suppliers, can aid in detection and timing management. It is highly recommended to set these out well in advance of first moth flights (mid-June in Canada, earlier south). These trap males for monitoring purposes and do not increase infestation but are unlikely to provide adequate control by themselves. Work in Europe is



Box tree moth caterpillar



Box tree moth adult. Photo credit: Hannah Nadel, USDA

### RECENT DELIVERABLES (February to May 2022)

#### Research

- 5 Research articles
- 6 Seminars

#### Extension & Outreach

- 4 Field demonstrations
- 1 Workshop/symposium
- 3 Webinars/virtual meetings
- 8 Extension presentations
- 36 Samples diagnosed
- 120 Email/phone inquiries answered
- 1461 People reached with articles/news

#### Education

- 4 Postdoctoral associates
- 2 Graduate students

investigating the use of pheromone for mating disruption. Two generations (flights) have been observed in Canada and central Europe and three in southern Europe, so continuous inspections and use of traps as long as activity persists is advised. Ongoing investigation in Canada is expected to provide more details, such as growing degree-day correlations, to help inform scouting, insecticide treatment, and trap placement.

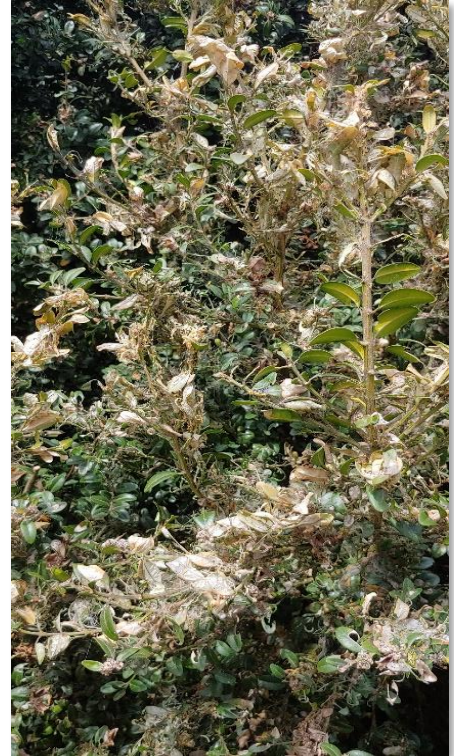


Box tree moth starting to feed. Credit: Jen Llewellyn

OR, and rarely *Datana ministra* (yellow necked caterpillar). Many insecticides can be used to control caterpillars but efficacy data specifically on box tree moth are scant. At the present time, there is no reason to suspect box tree moths are unusually tolerant to insecticides normally effective against caterpillars.

The decision on what product(s) to use will rest on considerations such as eradication vs maintenance, nursery vs landscape, biocontrol compatibility, site conditions, personal preference, pest population and stage, crop stage and size, state or local registrations and restrictions, the nature of the treatment, etc. *Bacillus thuringiensis* (Bt) products, commonly used in Europe and Canada, will be most effective applied when caterpillars are actively feeding; anecdotal reports note that spinosad insecticides, which provide contact activity absent in Bt materials, work quite well and may be even more effective. Chlorantraniliprole (Acelepryn) and pyrethroids (several) also appear to be quite effective. Note that most Bt labels that list specific target species tend to omit box tree moth. So, in NY several supplemental FIFRA 2(ee) labels now allow such use (other states may allow looser label interpretations and not require box tree moth named as a target). USDA's *Box Tree Moth New Pest Response Guidelines* ([Click Link](#)) includes a helpful literature summary of effective insecticides in Table 5.1. There is also a more detailed compilation of *commercial* options for New York State specifically listing product names, active ingredients and other helpful information [Click Link](#). Some of these have corresponding products under different brand names for home garden/non-commercial landscape use, but many do not. Prospective users in other states should verify products and uses approved for your area. If treatment is warranted, thoughtful timing for the caterpillar stages and thorough coverage for dense canopies should enhance performance; including an appropriate sticker or other adjuvant agent may enhance retention on glossy foliage.

Incidentally, a few other caterpillars, very different in appearance from the box tree moth, feed on boxwood in the US, including *Galasa nigrinodis* (boxwood leaf-tier), *Ditula angustiorana* (apricot moth) around Salem,



Close-up of box tree moth damage Photo credit: Hubert Szafranski

## FEATURED RESEARCH

### Fight Against the Blight by Growing More Resistant Boxwood Cultivars by Olanike Omolehin

Cultivar selection plays a significant role in sustainable crop production. Recently, the role of cultivar selection is being studied for sustainable plant disease management. In terms of boxwood blight, it is unclear how studies on cultivar performance under severe blight infestation have contributed to management of the disease in the United States since 2011. Although various publications evaluating boxwood cultivars for their susceptibility to blight have been made public between 2011 and 2016, there has been no investigation on

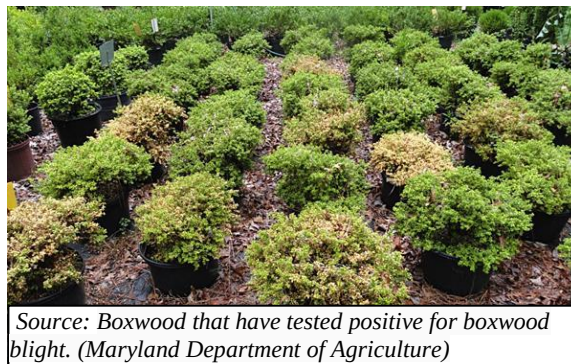


Boxwood Blight Management Approaches

and these make cultivar selection needed ahead of cultivar development. Developing new cultivars that show resistance to the different diseases and pests of boxwood is a herculean task. Abandoning boxwood for other evergreens is also not an option for growers across the U.S.; instead, they will need to think outside the box to preserve their crop's salability. In a survey of 16 nurseries across blight infested states where boxwood was produced in 2011 and is still produced, a gradual shift from blight susceptible boxwood cultivars to pre-existing or newly developed blight-resistant boxwood cultivars was observed. The shift became very pronounced in recent 2021 sales data. A 93% increase in the quantity of more resistant cultivars was observed, with higher sales recorded for Winter Gem, Little Missy, Independence and Freedom cultivars.

possible shifts in boxwood cultivars grown across nurseries. Multiple blight management approaches have been in place since blight became a devastating epidemic, but particularly due to regulatory and economic issues, most of these approaches are not sustainable.

Breeding disease-resistant cultivars is the most sustainable, inexpensive and stable approach to managing crop diseases. However, Boxwood is a woody ornamental that has its own breeding challenges as a perennial prone to various diseases

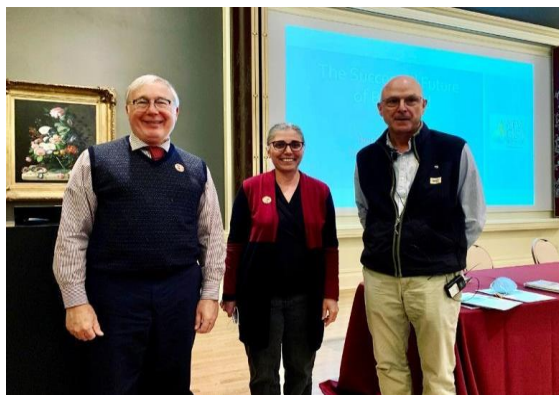


Source: Boxwood that have tested positive for boxwood blight. (Maryland Department of Agriculture)

## EXTENSION HIGHLIGHT

### BBIG Scientist and Advisory Panel Members Join Force at Dixon Gallery and Gardens

Dixon Gallery and Gardens hosted a day-long event on 18 February 2022 in Memphis, TN with approximately 150 attendees, including landscapers, homeowners, garden members, and University of Tennessee/Tennessee State University Extension agents. Speakers included the BBIG Advisory Board members Lynn Batdorf and Bennett Saunders and Co-Project director Dr. Fulya Baysal-Gurel, Tennessee State University, local experts Dr. Chris Cooper and Booker T. Leigh, UT Extension, along with Leslie Hollandsworth, Tennessee Department of Agriculture (TDA) plant inspector and Katy Kilbourne, TDA plant pathologist. Those professionals discussed the history of boxwood, landscape use, and cultural information including pest control. The current challenges of boxwood blight and successful strategies for living with this disease were the most important topic of the day. There was a roundtable discussion with Boxwood experts and professionals at the end of the event and the recording is publicly available at [Click Link](#).



### Boxwood Takes Center Stage at APS Southern Division Meeting

The Southern Division of the American Phytopathological Society (APS-SD) held its 99<sup>th</sup> annual meeting at the Read House in Chattanooga, TN from March 7 – 10, 2022. This meeting was held as a hybrid meeting to allow presenters and attendees (approximately 120) to join sessions in person or virtually. **Dr. Fulya Baysal-**



**Gurel**, Tennessee State University, as APS-SD president organized a special symposium titled “Ornamental Production Challenges and Perspectives: A Case Study of Boxwood Blight” on 9 March 2022. Researchers and Extension specialists with the Boxwood Blight Insight Group (BBIG) shared their mission with the attendees to win the battle against boxwood blight through innovation, economic analysis, and education. Presenters and their presentation titles were **Dr. Chuanxue Hong**, Virginia Tech, “Fighting a good fight against emerging invasive pathogen”; **Dr. Jo Anne Crouch**, USDA ARS, Mycology and Nematology Genetic Diversity and Biology Laboratory, “Invasion and expansion of boxwood blight pathogens in the U.S. and globally”; **Dr.**

**Charlie Hall**, Texas A&M University, “Economic impacts of boxwood blight on the U.S. boxwood market”; **Dr. Douglas G. Luster**, USDA ARS, Foreign Disease-Weed Science Research Unit, “Development of diagnostic assays for the boxwood blight pathogens *C. pseudonaviculata* and *C. henricotiae*”; **Dr. Fred Gouker**, USDA ARS, U.S. National Arboretum Floral and Nursery Plant Research Unit, “Boxwood breeding: selecting for blight resistance”; and **Margery Daughtrey**, Cornell University, Long Island Horticultural Research and Extension Center, “Extending knowledge of boxwood blight and its management to the ornamentals industry”. The attendees were faculty, graduate and undergraduate students, researchers, and industry partners who live in the geographical region of the Southern Division which includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

### Recent International Boxwood Webinar Recap by Margery Daughtrey

On March 10<sup>th</sup>, BBIG and guests were treated to a webinar given by Dr. Matthew Cromey, Senior Plant Pathologist of the Royal Horticultural Society (RHS), Wisley, UK. Dr. Cromey spoke on **Progress in Boxwood Blight Management in the UK and New Zealand: 1990s to 2021**. The audience included boxwood lovers from Belgium, Canada, Germany, New Zealand, Switzerland and the United Kingdom as well as the United States. Over 350 people registered for this webinar, indicating continued interest in the global experience of boxwood blight. In New Zealand, where box blight has been known since 1998, the climate is best suited to the disease on the west coast of the north island. Boxwood has now lost its status as an eminently useful and undemanding hedging plant because of boxwood blight. It is still being grown however—garden centers carry materials with names like “Boxwood Blight Buster” and “Boxwood Blight Fighter”.

In the UK, where box blight was first detected in 1994, the disease has received a higher level of attention. The RHS has over 600,000 members who may send in plants for diagnosis as a benefit of membership, so their records allow an opportunity to observe fluctuations in disease incidence from year to year. In the UK they have noted that larger, taller *Buxus* fare much better than those in formal parterres where the plants are very low to the ground. In some National Trust sites, they have seen taller plants weather periodic blight on top without succumbing to the disease. Often when a tightly-sheared, formal look is desirable the *Buxus* are now replaced by *Taxus*, although problems with *Phytophthora* root rot may then bedevil the yews. Plants observed in the wild in the Surrey hills show little if any boxwood blight, probably largely because the structure of the trees is so different from the plant form in formal gardens. Usually, late summer and autumn are when box blight will be most active in the UK. In years of higher-than-average rainfall, they will also see an early, spring peak of infections. The RHS is analyzing their records to learn about year-to-year variation in the disease in relation to weather and doing research comparing the suitability of new boxwood cultivars to perform as hedging. Their goal is to shift gardeners to using the right plants in the right place, which includes keeping boxwood out of the warmer, wetter areas of their country and using alternative plants in parterres. RHS also encourages Integrated Disease Management, which includes strategies such as growing boxwood in a more open environment. Dr. Cromey gave his audience new insight into how gardening practices have changed in the UK, precipitated by the appearance of boxwood blight. [Click here to access video](#)

## Upcoming International Boxwood Seminar



### Biology and Management of Boxwood Volutella Blight

June 23, 1:00 p.m. Eastern

Prof. Tom Hsiang, University of Guelph, Guelph, Ontario, Canada.

**FREE REGISTRATION**

## Diagnostic Hint by Margery Daughtrey

Sporulation of a *Pseudonectria* species on *Buxus* is a familiar sight to a diagnostician, the indication of Volutella blight. The undersurface of necrotic leaves may be entirely coated with the pinkish-orange spore masses. But now that boxwood blight caused by *Calonectria pseudonaviculata* is in the picture, give these colorful areas a second look, using a microscope. Sometimes there is also white sporulation of *C. pseudonaviculata* right next to the more colorful spores of *Pseudonectria*. In the example shown here, the *C. pseudonaviculata* may have paved the way for the more obvious but less aggressive *Pseudonectria* species. When immature, both *Pseudonectria* and *Fusarium* sporulation may look whitish, so go by the morphology, not by the color.



## PROJECT MEETING BRIEF

The fourth Epidemiology Group Meeting was held on Monday May 9, 2022, with a keynote presentation by Plant Pathologist, Dr. Andrew Loyd of Bartlett Tree Experts titled “Attempting to understand boxwood blight epidemiology in landscape plantings through diagnostic sample confirmations” and was followed by discussion about ongoing and proposed research studies to utilize and validate available data to gain clearer insight into the blight disease epidemiology. For meeting recordings please reach out to [chuan@vt.edu](mailto:chuan@vt.edu). A Google Group ([epidemiology-g@vt.edu](mailto:epidemiology-g@vt.edu)) is in place for future communication among the epidemiology team members. The 5<sup>th</sup> Epidemiology Group Meeting is scheduled to be held on Monday, October 17, 2022

Three or four Project Leaders and the Project Manager met monthly – March 9, April 12 and May 11, 2022, discussing project progress, planning project-wide activities, and preparing this issue of the BBIG Newsletter.

All Project Directors and their associates met on May 18, 2022 to discuss research and extension progress. Dr. Omolehin and Dr. Liyanapathiranage presented seminars focusing on boxwood management using cultivar selection and chemical fungicides, respectively.

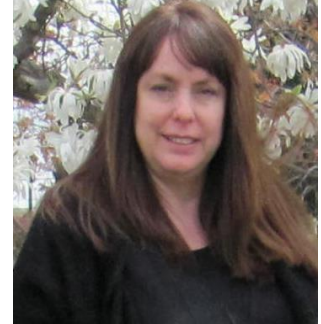
## BBIG Project Leader, Margery Daughtrey, Speaks on Boxwood Blight at Central Plant Board Meeting

The Central Plant Board met on April 11-14 in Des Moines, Iowa, and included a special panel on Boxwood for an hour on Wednesday afternoon. Russ Bullock of USDA, who was on-site, led off with a discussion of regulatory concerns regarding box tree moth, stressing the importance of the crop to producers in OH, OR, NC and other states. He mentioned that boxwood was one of our very first American ornamentals. He described trapping operations and quarantines for the box tree moth. Next Margery Daughtrey zoom-presented a history of the problem and research efforts on boxwood blight disease, and then Abigail Weisner, graduate student at the University of Guelph, described her research on box tree moth. Abigail showed phenology of common plants in relation to the life cycle of the box tree moth and gave some optimistic comments on potential

biocontrol of the new pest. Margery described the forming of BBIG and showed the states where the disease has been observed; symptom development in nurseries, landscapes and on holiday wreaths; hosts; pathogen dissemination; and the threat of *Calonectria henricotiae*, currently only in a few countries in Europe. She quickly covered chemical control measures, the variation in susceptibility in existing boxwood types and the push to develop boxwood with very low disease susceptibility. She invited everyone to attend the BBIG/HRI international Boxwood Seminars, and to join BBIG—and to go outside to enjoy the boxwood flowers, which were blooming at the time.

## NEW ROLES AND PROMOTION

**Dr. Jo Anne Crouch** recently assumed the position of Research Leader at the Foreign Disease and Weed Science Unit, Ft. Detrick, MD. Dr. Crouch is an outstanding USDA-ARS scientist with numerous achievements and national awards in the field of plant pathology, and the recipient of multiple funded grants. Her research focuses on understanding evolutionary relationships, genetic diversity, host range, and characteristics of destructive pathogens of ornamental plants and turfgrass, combining classical and molecular techniques. She has led research teams working on turfgrass anthracnose, downy mildew of impatiens and graminicolous downy mildews, with many significant achievements in research on the boxwood blight pathogens. Dr. Crouch until recently worked at the USDA ARS Mycology and Nematology Genetic Diversity and Biology Lab in Beltsville, MD, is adjunct Professor at the Department of Entomology and Plant Pathology at NC State University and currently serves as a Co-Director on the BBIG SCRI-NIFA Project. The BBIG congratulates Dr. Crouch on her new position leading the Ft. Detrick laboratory.



**Karen Snover-Clift**, Director, Plant Disease Diagnostic Clinic, Cornell University, Ithaca, NY and Co-Director on the BBIG SCRI-NIFA Project, was recently recognized for her years of outstanding service at the National Plant Diagnostic Network (NPDN). She was among the four NPDN members recognized for the 2022 USDA-NIFA outstanding Service and Lifetime Achievement awards. Karen is known for her vibrant role in training Master Gardeners, Extension Educators, and green industry members. Within BBIG, she is playing a critical role as liaison between the boxwood community and NPDN to develop tools to properly identify the frequency of boxwood blight reports among diagnostic samples. Similarly, she continues to work on improving the NPDN diagnostic capacity to detect important biological threats such as the blight. The entire BBIG is proud to congratulate Karen on a well-deserved award!

## Final Farewell to a Boxwood Legend: In Memory of Paul M. Saunders

On March 11, 2022, Paul M. Saunders, a devoted nurseryman, author, historian, and family man, passed away at his home in Piney River, VA.

In 1947, his eighth-grade science teacher taught Paul how to propagate boxwood. Paul was fascinated at the process and through the enthusiasm of his mother and county agent, Paul started a backyard nursery. In the 1960s, he began to ship his boxwood to garden centers and K-Marts throughout Virginia and Maryland. Early on, he recognized problems with the predominant variety ‘English’ boxwood and began a search for better cultivars. In the 80s and 90s, Paul helped to establish 60 boxwood testing sites in an evaluation project whose goal was to introduce new varieties into the





*Paul in his boxwood nursery circa 1950*

industry. Paul's dream of better boxwood cultivars has been further realized in recent years with the advent of NewGen® boxwood.

Paul's passion in all endeavors was contagious to his family and workers. With the help of four sons, five grandchildren, and many devoted workers, Saunders Brothers, Inc. now grows and ships plants throughout the mid-Atlantic region and has supplied boxwood to

the White House, Longwood Gardens, and other historic sites.

On the 17th of March, hundreds gathered at the Calvary Baptist Church and the Harewood Cemetery in Nelson County, VA to celebrate the life Paul lived. BBIG joins the Saunders family to celebrate Paul as a legend and pacesetter of Boxwood production and research.



*Paul in center with his 4 sons at the Rose Garden in August 2020.  
Photo courtesy White House*

## RECENT PUBLICATIONS

Baysal-Gurel, F., Simmons, T., and Jennings, C. 2022. Evaluation of fungicides for the control of boxwood blight, 2021. Plant Disease Management Report No. 16: OT010. Online publication. [Click here to access publication. Registration is required](#)

Baysal-Gurel, F., Simmons, T., and Jennings, C. 2022. Evaluation of fungicides for the control of boxwood blight, 2021. Plant Disease Management Report No. 16: OT021. [Click here to access publication. Registration is required](#)

Behe, Bridget, Patricia Huddleston, and Charles Hall. 2022. Gardening motivations of U.S plant purchasers during COVID-19 pandemic. Journal of Environmental Horticulture (2022) 40 (1): 10-17. [Click here to access publication](#)

Gouker, F., Guo, Y., and Pooler, M. HRM Analysis Enables Efficient Detection and Differentiation of Two Boxwood Blight Pathogens by qPCR Assays. PhytoFrontiers. [Click here to access publication](#)

Hong, C. X., Daughtrey, M., Howle, M., Schirmer, S., Kosta, K., Kong, P., Likins, M., and Suslow, K. Rapid Decline of *Calonectria pseudonaviculata* Soil Population in Selected Gardens across the United States. Plant Disease [Click here to access publication](#)

Kong, P., Li, Xi. P., Gouker, F., and Hong, C. X. cDNA Transcriptome of *Arabidopsis* Reveals Various Defense Priming Induced by a Broad-Spectrum Biocontrol Agent *Burkholderia* sp. SSG. International Journal of Molecular Sciences. [Click here to access publication](#)

## PROJECT DIRECTORS

Chuan Hong (Project Director), Virginia Tech, Virginia Beach, VA  
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Jerry Weiland, USDA, ARS, Horticultural Crop Research Lab, Corvallis, OR  
Fulya Baysal-Gurel, Tennessee State University, McMinnville, TN  
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Ping Kong, Virginia Tech, Virginia Beach, VA  
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Karen Snover-Clift, Cornell University, Ithaca, NY  
Xiao Yang (former Project Manager, from April to December 2021), USDA ARS Ft Detrick, MD  
Olanike Omolehin (Current Project Manager), Virginia Tech, Virginia Beach, VA

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Michael Gaines, President, CW Arborists, Ltd., Sagaponack, NY  
John Keller, Planning & Research Vice President, Monrovia – Grow Beautifully in CA, CT, GA, OR  
Bennett Saunders, General Manager, Saunders Genetics, LLC., Piney River, VA  
Richard Schnall, Vice President, Rosedale Nurseries, Inc., Hawthorne, NY  
Casey Sclar, Executive Director, American Public Gardens Association, Kennett Square, PA  
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Jennifer Gray (Liaison to AmericanHort), Administrator, Horticultural Research Institute, Washington, DC

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