

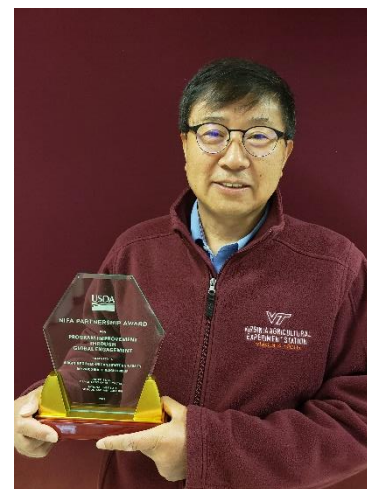
## FEATURED NEWS

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### Boxwood Blight Insight Group Wins USDA Award by Margery Daughtrey, Cornell University

In March, Virginia Tech nominated our BBIG group for a Partnership award offered by the National Institute of Food and Agriculture (NIFA) within USDA. Funding for boxwood blight studies being conducted by BBIG (Chuan Hong of VA Tech and 19 additional team members) was obtained through NIFA's Specialty Crop Research Initiative (SCRI) and thus the group hoped to receive NIFA's recognition of the global reach of their accomplishments. When



announcements were made this fall, it was exciting to learn that BBIG had indeed won the category of *Program Improvement Through Global Engagement*. The BBIG group was honored at a virtual awards ceremony on October 6th, where it was recognized as strengthening US agriculture through "effective international engagement in research, education and/or Extension". International engagement examples showcased in the award nomination included the International Boxwood Seminar (IBS) Series produced in conjunction with the AmericanHort/Horticultural Research Institute's thRIve webinars. This IBS Series has been attended by over 1000 people from 21 countries on 5 continents and has featured speakers from Belgium, Canada, Germany, Switzerland, and the United Kingdom as well as the US. The next seminar will be held on December 20<sup>th</sup>, at 1 pm Eastern, and will feature Iryna Matsiakh from Sweden speaking on boxwood blight as a disease of *Buxus* in the forests of Georgia. BBIG team members have worked closely with researchers in Belgium and Germany on biocontrol, chemical control, cultivar susceptibility and epidemiology of boxwood blight. The International Boxwood Blight Epidemiology Working Group was established in 2021. These collaborations have resulted in several papers. This NIFA award was featured in several press releases with the latest by Horticultural Research Institute on November 2, 2022: <https://www.hrresearch.org/boxwood-blight-insight-group-wins-prestigious-nifa-award>.

### Revised Oregon Boxwood Blight Cleanliness Program by Kara Mills, Nursery & Christmas Tree Program Lead, Oregon Department of Agriculture

Oregon is the largest producer of boxwood in the United States, accounting for 19% of all US sales in 2019. Boxwood blight (BWB) was

### DELIVERABLES

(September to November 2022)

#### Research

7 Presentations

#### Extension & Outreach

1 Workshop

11 Extension presentations

38 Samples diagnosed

76 Email/phone inquiries answered

2951 People reached with articles/news

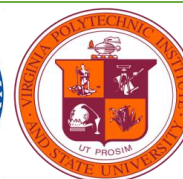
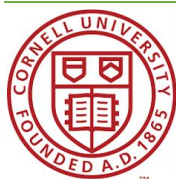
#### Education

5 Postdoctoral associates

2 Graduate students

#### Publicity

4 Press releases





Dr. Weiland (center) showing where and how to look for boxwood blight symptoms during disease scouting

first confirmed in several Oregon nurseries in 2011 and has since been observed in additional nurseries and landscapes across the Willamette Valley. In response to this expansion, the Oregon Department of Agriculture (ODA) Nursery & Christmas Tree Program established a Boxwood Blight Cleanliness Program in 2012. This program was based on the National Plant Board's template, "Boxwood Blight Compliance Agreement for Production Nurseries" and included a checklist of best management practices for annual audits.

In 2021, 43 Oregon nurseries participated in the BWB Cleanliness Program which facilitated shipping boxwood to Pennsylvania, Tennessee, and Canada. Unfortunately, in 2022, nurseries in the Willamette Valley experienced the longest, wettest spring since the 1940s which created ideal conditions for BWB symptoms to develop and for the disease to expand in this region. To ensure the sanctity of Oregon's BWB Cleanliness Program, participation requirements were amended to become more robust and

better harmonize with other BWB cleanliness programs around the US.

The ODA Nursery & Christmas Tree Program contacted several states (CT, MI, PA, TN, VA, and WI) to review their BWB compliance documents and learn about their protocols for responding to BWB outbreaks. The ODA also examined best management practices advised by various State Agriculture Departments; University Extension programs; members of our Boxwood Blight Insight Group; and several local experts. After assessing recommendations and discussing how the BWB Cleanliness Program had been operating in Oregon, revisions were made to expand the audit and intensify scouting for BWB in Oregon nurseries. The updated program and documents were modelled on Systems Approach to Nursery Certification (SANC) process.

To ensure the ODA inspectors' proficiency with the refreshed program, the Nursery & Christmas Tree Program held a field-training day at a local nursery with Oregon BWB experts Jerry Weiland (USDA ARS) and Luisa Santamaria (OSU, Research & Extension). Jerry presented techniques to conduct intense disease scouting in all types of boxwood production areas and how to differentiate BWB from other foliar disease symptoms. Luisa further educated the team on how to identify production practices that increase the risk of BWB and implement sanitation techniques to mitigate those risks. The ODA team also participated in and evaluated a practice audit with the new program documents before finalized versions were shared with nurseries.

The intensified best management practices include longer quarantines, new training expectations for nursery staff, expansive annual BWB scouting, and specific sanitation options for each type of production. Over 120 hours of ODA staff time was used to scout 33% to 100% of tens of thousands of boxwood plants across ten interested nurseries. Currently, eight nurseries are participating in this revised rigorous BWB Cleanliness Program. We will continue to support other Oregon nurseries in learning about best management practices to avoid BWB incursion and spread, and we hope to increase the number of program participants in the near future.



Dr. Weiland on the left demonstrating boxwood blight scouting with Dr. Santamaria looking on (top photo); participants practicing intense scouting (bottom photo)

## FEATURED RESEARCH

### Using biological and epidemiological knowledge to improve boxwood blight management by James LaMondia, Connecticut Agricultural Experiment Station

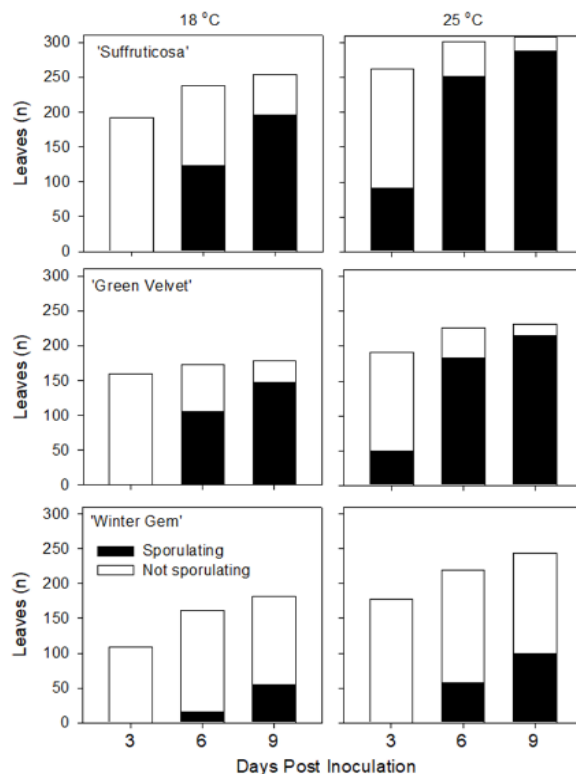
Over the course of this project we have learned a number of things that now allow us to more efficiently target management tactics against boxwood blight. Examples include new fungicides that are additional tools for control and recognizing that certain fungicides have curative or anti-sporulant activity which allows targeted control for specific reasons.

Knowledge of pathogen dispersal has implications for reducing spread by cultural controls such as irrigation type and frequency, plant spacing, mulching, and how pruning is managed.

Knowledge about extended spore survival under dry conditions also has implications for spread and infection, particularly with pruning. We can counter this with improved sanitation and targeted anti-sporulant and protectant fungicide applications. We have also recognized that ethanol is very effective against conidia and should be the preferred sanitizer against microsclerotia.

Plant resistance is expressed as infection efficiency of primary inoculum, latent period, lesion size, and sporulation. Breeding for resistance should evaluate all of these aspects.

Finally, all of these topics can eventually be incorporated into the epidemiological risk models to most efficiently manage disease.



The blight pathogen's ability to produce conidia – inoculum production depended upon boxwood cultivar and also temperature

## EXTENSION HIGHLIGHTS

### Oregon Boxwood Health Workshop by Jerry Weiland, USDA ARS Horticultural Crops Research Unit: Corvallis, OR

On 10/20/2022, plant health professionals from Oregon State University, the Oregon Department of Agriculture, and the USDA-Agricultural Research Service (ARS) held the first Oregon Boxwood Stakeholder Workshop since February 2020! Forty growers and nursery crop consultants were in attendance in addition to seven speakers. Luisa Santamaria (OSU) began the workshop with information about boxwood blight training opportunities that are available from her program for growers who need help identifying and controlling this disease. Jerry Weiland (USDA-ARS) and Mana Ohkura (OSU) were next. They presented research showing how boxwood blight can be much more severe in Oregon at cool temperatures (59°F) than at warmer temperatures (77°F) and how temperature influences disease severity on the boxwood blight resistant



Dr. Weiland (on stage) with other presenters (standing) during the discussion session



Dr. Weiland commenting on an ongoing boxwood blight study

cultivar, Winter Gem. Winter Gem develops mild symptoms and appears more disease resistant at 77°F, but becomes more susceptible and develops severe blight at 59°F. Jerry and Mana also presented results demonstrating how plant size, irrigation frequency, and plant spacing can interact to affect the spread of boxwood blight from plant to plant: boxwood blight spreads faster when the canopies of adjacent plants have merged together and when their leaves stay wet for extended periods of time. Next, Len Coop (OSU) and Brittany Barker (OSU) explained how to use the updated boxwood blight disease forecasting app (<https://uspest.org/risk/models>) and how climate modeling helps us to see where boxwood blight is likely to be a significant problem worldwide. Jay Pscheidt (OSU) presented information about fungicide selection, the difference between contact and systemic fungicides, and how differences in sprayer technology and application rate can affect fungicide coverage. Lastly, Andriy Hos (ODA) gave an update about recent changes that have been made to improve the Boxwood Blight Cleanliness Program. The

workshop ended with a tour to an onsite boxwood blight research project. All in all, this workshop was a success and Oregon boxwood growers left with numerous disease management and prevention recommendations.

### **Recap of the Recent International Boxwood Seminar - How do weather and climate impact boxwood blight? A modeling approach to aiding in boxwood disease management** by Margery Daughtrey, Cornell University

BBIG research collaborator Dr. Len Coop of the Oregon IPM Center in the Department of Horticulture at Oregon State University gave the 7<sup>th</sup> presentation in the International Boxwood Seminar series of HRI and BBIG on September 7, 2022. Len covered how infection rate is affected by weather and climate and described how temperature and leaf wetness information is integrated into his disease-predictive app ([uspest.org/risk/boxwood\\_app](https://uspest.org/risk/boxwood_app)). He also shared Brittany Barker's maps of establishment risk for boxwood blight in the US and the rest of the world. Len explained how the latest 3.0 version of his app now takes into consideration more likelihood of infection at lower temperatures than was assumed earlier: there is a linear relationship between temperature and infection between 43° and 77°F for *Buxus sempervirens*. As a result, there is now more risk predicted at cooler temperatures than in earlier versions; it is also recognized that the optimum temperature for boxwood blight disease may be different for different cultivars or species of *Buxus*. The boxwood app, available for free at his website, calculates the leaf wetness necessary for infection by integrating temperature, dewpoint, windspeed and rainfall. The variable in the grower's control is irrigation, which may bridge between natural leaf wetness events to allow infection. This webinar was recorded and is available for viewing in the Knowledge Center at <https://www.boxwoodhealth.org/knowledge-center>.

## **PROJECT MEETING BRIEF**

**The Advisory Panel** met on September 2, 2022, discussing the latest project progress and advising on future activities and directions.

Three monthly **Project Leadership Team Meetings** were held on September 14, October 13 and November 14. At the September meeting, joined by Jerry Weiland, Luisa Santamaria, and Jay Pscheidt, we discussed Oregon, true boxwood country, as a site option for the upcoming annual meeting – where, when, and logistics. At the October meeting we discussed a variety of topics from upcoming quarterly meetings and annual meeting to outreach products including monthly digest, quarterly newsletter, International Boxwood Seminar series and BBIG showcase at [Cultivate'23](#), and [Plant Health 2023](#). At the November meeting, we discussed and ironed some details about the upcoming quarterly and annual meeting planning while continuing to foster new extension/outreach initiatives.

**Team leaders** met with **key collaborators at AmericanHort/Horticultural Research Institute** on October 5, 2022, discussing proposed new structures for the [Research Updates](#) and [Knowledge Center](#) tabs of the [BBIG Outreach website](#) to accommodate increasing content while making them more user friendly.

**The 5<sup>th</sup> International Boxwood Blight Epidemiology Meeting** was held virtually via Zoom on October 17, 2022 with Drs. Len Coop and Brittany Barker, Oregon State University, as invited speakers. Their presentation was entitled: Models for boxwood blight infection and establishment risk. Ten people from Germany and U.S. attended the meeting, discussing the latest development in the blight modeling and charting strategies forward, especially in areas of outreach for beta testing and further calibration.

**Project Directors and Associates** met on November 16, 2022, featured by two invited presentations – Revised Oregon Boxwood Blight Cleanliness Program by Dr. Kara Mills, and Using Biological and Epidemiological Knowledge to Improve Boxwood Blight Management by Dr. James LaMondia of Connecticut Agricultural Experiment Station, followed by discussing major research and extension activities and accomplishments and charting future directions.

## ANNOUNCEMENTS



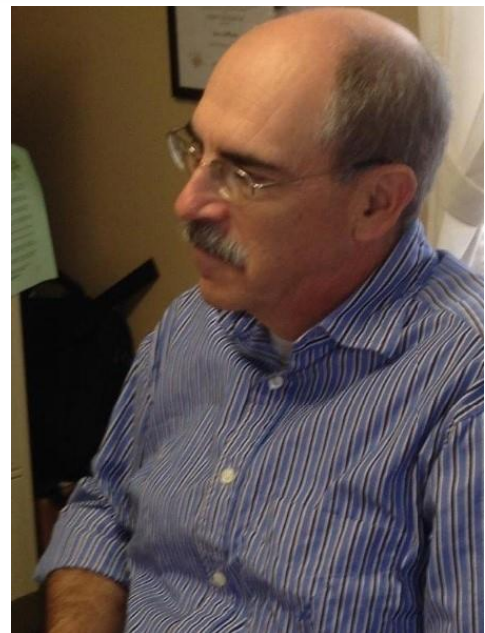
**Dr. Ihsan Khaliq** is a recent addition to our team and will be closely working with the other members of the BBIG team to better understand the ecology and epidemiology of boxwood blight.

Ihsan completed his PhD and a 2.8-year postdoc both in Australia before joining the BBIG team on September 1, 2022. His PhD research was focused on using traditional and high-throughput sequencing techniques to determine *Phytophthora* species diversity in natural ecosystems; and the recent range expansion of *Phytophthora* species, particularly *Phytophthora cinnamomi*, into sub-alpine and alpine ecosystems previously considered *Phytophthora* free. His postdoc was focused on modelling Ascochyta blight disease risk to support a Decision Support System in Australia. The aim of his postdoc project was to develop models for predicting spatial disease risk based on findings from detailed research on *Ascochyta rabiei* (syn. *Phoma rabiei*) epidemiology, and spatio-temporal dynamics in varying environments.

### **Jim LaMondia Retires — and Continues to Work on Boxwood**

Jim LaMondia completed Master's and Doctoral degrees in plant pathology and nematology at Cornell University in 1982 and 1986. Following a short postdoc, he was hired to work in New Haven at the Connecticut Agricultural Experiment Station (CAES) in 1986, and moved one year later to work from the Valley Laboratory of the CAES in Windsor. His expertise is the biology and control of plant diseases caused by fungi, nematodes and complex diseases involving multiple soilborne pathogens, such as black root rot of strawberry. Areas of emphasis include non-chemical controls such as plant resistance in tobacco, strawberries, and boxwood, and the development of cropping systems with non-host or nematode-antagonistic plants. Examples include biofumigation with Brassicas, breeding for resistance to fungal, virus and nematode pathogens, and IPM programs for nematodes based on sampling and damage functions.

Although Jim retired at the end of May, 2022, he continues as an emeritus scientist at CAES to study such topics such as management of boxwood blight; the management of pathogens and disease in small fruit and vegetable crops; and most recently, management of beech leaf disease, which is caused by a foliar nematode.



## RECENT PRESENTATIONS

### At Professional Conferences

- Ghimire, B., Pendyala, B., Patras, A., and Baysal-Gurel, F. 2022. Ultraviolet inactivation of conidia of boxwood blight pathogen, *Calonectria pseudonaviculata*. Ornamental Workshop on Pests and Diseases, Raleigh, NC. 18-20 October, 2022 (Poster presentation).
- Kodati, S., Cowles, R. S., and LaMondia, J. A. 2022. Survival of conidia of the boxwood blight pathogen *Calonectria pseudonaviculata* under different relative humidity conditions. APS Annual Meeting in Pittsburgh, PA, August 6 to 10, 2022.
- LaMondia, J. A. 2022. Integrating research results into a boxwood blight management program. APS Annual Meeting in Pittsburgh, PA, August 6 to 10, 2022.
- Luster, D., Carter, M., McMahon, M., and Yang, X. 2022. Development of a capture-ELISA immunoassay for the boxwood blight pathogens *Calonectria henricotiae* and *C. pseudonaviculata*. Plant Health 2022 – APS Annual Meeting in Pittsburgh, PA, August 6 to 10, 2022.
- Shishkoff, N. 2022. The epidemic since 2020: new insights into management of boxwood blight. Plant Health 2022 – APS Annual Meeting in Pittsburgh, PA, August 6 to 10, 2022.
- Shishkoff, N., and Daughtrey, M. 2022. Something wicked this way comes: boxwood blights. Ornamental Workshop on Pests and Diseases. JC Raulston Arboretum, Raleigh, NC. October 19, 2022.
- Shishkoff, N., and Smallwood, E. 2022. Effect of temperature on lesion area of detached leaves of different boxwood cultivars infected with boxwood blight. Plant Health 2022 – APS Annual Meeting in Pittsburgh, PA, August 6 to 10, 2022.

### At Extension and Outreach Programs

- Baysal-Gurel, F. 2022. Boxwood blight case study. Tennessee Urban Forestry Council State Conference. Burns, TN. November 9-10, 2022.
- Baysal-Gurel, F. 2022. Vascular streak dieback of redbud and other important woody ornamental disease updates. TNLA Field day. McMinnville, TN. August 25, 2022.
- Daughtrey, M. 2022. Research and observations on woody plant diseases. Cornell Long Island Horticultural Research and Extension Center Plant Science Day. Riverhead, NY. September 15, 2022.
- Daughtrey, M. 2022. Are we propagating plant diseases? Eastern Branch of the International Plant Propagators Society Meeting. Hauppauge, NY. September 28, 2022.
- Daughtrey, M. 2022. Something wicked this way comes. GardenComm. Webinar, October 12, 2022.
- Daughtrey, M. 2022. IPM for diseases in the landscape. Farmingdale State College SUNY. November 8, 2022.
- Pscheidt, J. 2022. Pathogens, life cycles and management principles of boxwood blight and other important plant diseases. Master Gardener Hour Training, Roseburg, Douglas Co., OR. October 18, 2022.
- Pscheidt, J. 2022. Fungicide selection and coverage. Oregon Boxwood Health Workshop. North Willamette Research and Extension Center, Aurora, OR. October 20, 2022.
- Santamaria, L. 2022. Scouting tips and educational resources for boxwood diseases and pests. Oregon Boxwood Health Workshop. North Willamette Research and Extension Center, Aurora, OR. October 20, 2022.
- Santamaria, L., Baysal-Gurel, F., and Fare, D. 2022. Scouting pest and diseases. TNLA Field Day. McMinnville, TN. August 25, 2022.
- Weiland, J. E., and Ohkura, M. 2022. USDA-ARS Boxwood Blight Research. Oregon Boxwood Health Workshop. North Willamette Research and Extension Center, Aurora, OR. October 20, 2022.

## BBIG in the NEWS

- [BBIG was among the 2022 USDA National Institute of Food and Agriculture \(NIFA\) Partnership Award Recipients](#) (USDA, October 17, 2022).
- [Virginia Tech-led group that researched boxwood blight wins USDA award](#) (USDA, October 18, 2022).
- [Virginia Tech-led group that researched means to curb boxwood blight wins USDA award](#) (Virginia Tech, October 24, 2022).
- [Boxwood Blight Insight Group wins prestigious NIFA award](#) (Horticultural Research Institute, November 2, 2022)

## PROJECT DIRECTORS AND MANAGERS

Chuan Hong (Project Leader), Virginia Tech, Virginia Beach, VA  
Margery Daughtrey (Extension Leader), Cornell University, Riverhead, NY  
Douglas Luster (Research Leader), USDA, ARS, Foreign Disease & Weed Science Research, Ft. Detrick, MD  
Charles Hall, Texas A&M University, College Station, TX  
Jerry Weiland, USDA, ARS, Horticultural Crop Research Lab, Corvallis, OR  
Fulya Baysal-Gurel, Tennessee State University, McMinnville, TN  
Fred Gouker, USDA, ARS, Floral & Nursery Plants Research, Beltsville, MD  
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James LaMondia, Connecticut Agricultural Experiment Station, Windsor, CT  
Jay Pscheidt, Oregon State University, Corvallis, OR  
Luisa Santamaria, Oregon State University, Aurora, OR  
Nina Shishkoff, USDA, ARS, Foreign Disease & Weed Science Research, Ft. Detrick, MD  
Karen Snover-Clift, Cornell University, Ithaca, NY  
Xiao Yang (former Project Manager, April to December 2021), USDA ARS Ft Detrick, MD  
Olanike Omolehin (Project Manager, December 2021 to September 2022), Virginia Tech, Virginia Beach, VA

## ADVISORY PANEL & LIAISON TO AMERICANHORT

Jill Calabro (Chair), Sr Product Development Manager, Valent USA Corporation, Walnut Creek, CA  
Lynn Batdorf, Boxwood Cultivar Registration Authority, International Society for Horticultural Science  
Frank Collier, Owner, Pleasant Cove Nursery, Rock Island, TN  
Michael Gaines, President, CW Arborists, Ltd., Sagaponack, NY  
Laura Gladwin, Plant Health Manager, Everde Growers, Forest Grove, OR  
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, H.O. Smith Endowed Director, The Arboretum at Penn State, State College, PA  
Mark Sellew, Owner, Prides Corner Farms, Lebanon, CT  
Martha Sleeper, Plant Health Manager, Everde Growers, Forest Grove, OR (Retired June 2022)  
Jennifer Gray (Liaison to AmericanHort), Administrator, Horticultural Research Institute, Washington, DC

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