



Newsletter



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FEATURED NEWS

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DELIVERABLES

(Dec 2022 to Feb 2023)

Research

5 Refereed journal articles

Extension & Outreach

2 Field demonstrations

9 Extension presentations

49 Samples diagnosed

46 Email/phone inquiries
answered

7228 People reached with
articles/news

Education

4 Postdoctoral associates

2 Graduate students

1 Mentorship

grown and bareroot trees and shrubs throughout its 1,110 acres, including a 300-acre container facility and 100-house greenhouse range. To date Bailey's has not had an incidence of boxwood blight, owed to using strict best management practices (BMPs) at every stage of propagation and production, including using a closed-loop system by not allowing outside boxwood material to enter its facility, and participation in the Oregon Department of Agriculture's Nursery Cleanliness Program for Boxwood Blight, a voluntary program of inspections and best management

BBIG Team Visiting Three Large Boxwood Producers in Oregon
by Fred Gouker, USDA-ARS Floral and Nursery Plants Research, U.S. National Arboretum, Beltsville, MD



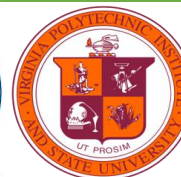
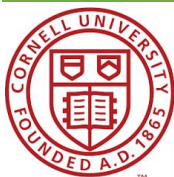
(Group Photo - Courtesy of J Pscheidt)

The second annual BBIG meeting of Project Directors, Collaborators, Advisory Panel Members, and industry stakeholders was held February 15-16, 2023 in Aurora, Oregon. A highlight of the meeting was a full day's worth of nursery visits organized by our Project Directors Jay Pscheidt, Luisa Santamaria, and Jerry Weiland. Among the major stops were Bailey Nurseries (Yamhill, OR), Kraemer's Nursery (Mt. Angel, OR), and Woodburn Nursery & Azaleas (Woodburn, OR).

The tour started at Bailey Nurseries (a fifth-generation family-owned company) included meeting with three staff members, one of whom was Jeff Stoven, Bailey's west coast propagation manager who gave us a history of the facility that established itself in Yamhill, OR in the late 1970's. The location now produces container



(Boxwood production - Courtesy of L Batdorf)



procedures designed to help a nursery provide clean boxwood nursery stock. Bailey's only takes boxwood cuttings from in-house facilities, pre-scouts before taking cuttings, sanitizes the cuttings and sterilizes all trays and containers used throughout production, spaces out 1-, 3-, and 5-gallon containers and only ships one cultivar at a time to prevent potential spread of blight should it occur. To-date Bailey's top selling boxwood cultivars are *Buxus* × 'Green Velvet', Chicagoland Green® *B. × 'Glencoe'*, and *B. sinica* var. *insularis* 'Wintergreen'.

The second stop was Kraemer's Nursery where we saw similar propagation and production practices, including strict BMPs and scouting. The 20-acre Cravo retractable-roof greenhouse contained an impressive



(Repotting boxwood liners - Courtesy of C Hong)



(Boxwood BMPs - Courtesy of L Batdorf)

Woodburn's unique strengths is its ability to custom fabricate equipment to deal with production efficiency including plant spacing and pruning.

number of boxwood plants being grown which is in addition to Kraemer's three other field and container growing sites. The scale of plants being grown was the largest of the three nurseries, and they primarily sell to large retail stores. Of the many woody plants sold, boxwood accounts for ~14% of Kraemer's total sales (~\$1.4 million) growing only four cultivars *Buxus* × 'Green Mountain', *Buxus* × 'Green Velvet', *Buxus microphylla* 'Little Missy', and *Buxus microphylla* var. *japonica* 'Winter Gem'. It was also learned that Kraemer's is growing the recently released Better Boxwood® blight-resistant hybrid cultivars.

The last stop was Woodburn Nursery & Azaleas, a 500-acre nursery with 100 greenhouses dedicated to growing woody perennial and annual ornamentals. For Woodburn, boxwood accounts for 7-8% of their total sales with their most popular cultivars 'Green Velvet' and 'Little Missy'. Similar to the other nurseries we visited, strict sanitation practices were followed when handling boxwood with an emphasis on proper spacing when plants are in production in 3-gallon pots in order to promote airflow and reduce the chance of blight growing and spreading. Since plant spacing is considered the biggest time and labor cost, Woodburn is building a custom GPS-guided spacing machine. One of the



(A locally-engineered pruning machine (left) capable of capturing trimmings and self-disinfection (above) – Courtesy of C Hong)

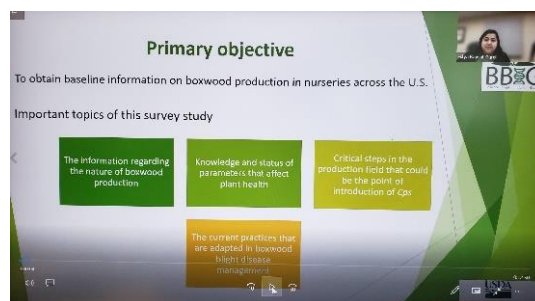
Visiting these large nurseries, including a drive-through of Monrovia Nursery, highlighted the size of Oregon's top agricultural commodity and ongoing efforts to produce blight-free boxwood crops, including strict BMPs, regular scouting, inventory change from highly susceptible cultivars (e.g., *B. sempervirens* 'Suffruticosa') to more resistant cultivars. These large nurseries all had their own shipping trucks which avoid the potential cross contamination associated with shared shipping loads. Travel between these nurseries also introduced us to some of Oregon's unique features including many smaller nurseries, a ferry ride across the Willamette River, lunch at the Oregon Garden, and a few chocolate hazelnuts (one of Oregon's top 10 agricultural commodities).

FEATURED RESEARCH

Highlights of the Latest Research and Innovations from the 2nd BBIG Annual Meeting by Douglas Luster, USDA ARS Foreign Disease – Weed Science Research, Ft Detrick, MD

On February 16, 2023, BBIG scientists attended the BBIG Annual Meeting in a hybrid Zoom/on-site format at the North Willamette Research and Extension Center (NWREC) in Aurora OR, to present their latest findings from the previous year and plans for the upcoming year to the BBIG Advisory Panel, boxwood growers and industry representatives. PI's Jerry Weiland, Charlie Hall, Doug Luster, Chuan Hong, Margery Daughtry, Fred Gouker, Jim LaMondia, Jo Anne Crouch and Nina Shishkoff all presented updates on their research projects and planned activities for upcoming year. The highlight for many participants were presentations by postdoctoral research scientists and graduate students on their research projects in BBIG PI's labs. Highlights included:

- Gabriel Sacher (Pscheidt Lab – Oregon State Univ) presented a portion of his graduate research project investigating the potential of drench and sprench applications to improve boxwood plant coverage and protection from the blight by selected systemic fungicides.
- Mana Ohkura (Weiland Lab – ARS/Oregon State University) has refined DNA extraction procedures for larger plant sample sizes and adapted the Guo & Pooler (2020) SYBR green PCR assay to a TaqMan molecular detection assay to reduce background interference in sample extracts. Dr. Ohkura also reported intriguing findings on Buxus volatiles affecting spore germination that she will be following up.
- Bhawana Ghimire (Baysal-Gurel Lab – Tennessee State Univ) presented the results and feedback from the nursery critical control points survey, which resulted in a 62% response rate. Respondents identified their current worst pathogen problems associated with 1) Phytophthora, 2) Volutella, and 3) Boxwood Blight, but identified Boxwood Blight as their top future concern. Another interesting finding was that while just 70% were fully implementing sanitary practices, 80% believed they were. This gap in good nursery practices vs perception illustrates the need to improve communication to growers on sanitation practices.
- Srikanth Kodati (LaMondia Lab – Conn Agric Exp Station) reported on studies with essential oils, measuring the inhibition of mycelial growth on cultures in vitro. Future studies are planned to test the effect of copper nanoparticle solutions in greenhouse trials with funding from Horticultural Research Institute (HRI).
- Xiaoping Li (Hong Lab – Virginia Tech) characterized the bacterial and fungal microbial communities in the boxwood phyllosphere in response to fungicides and anti-desiccants. Microbiome studies on garden soils identified bacterial species with potential for use in promoting plant growth and suppressing pathogens. A study in progress examines differences in the boxwood microbiome in Oregon vs Virginia.
- Ihsan Khaliq (Hong Lab – Virginia Tech) reexamined the data from field trials conducted over multiple seasons in North Carolina and Virginia, as well as those in Germany to identify key weather factors that affect boxwood blight progression, inoculum survival & subsequent carry over to the next season.

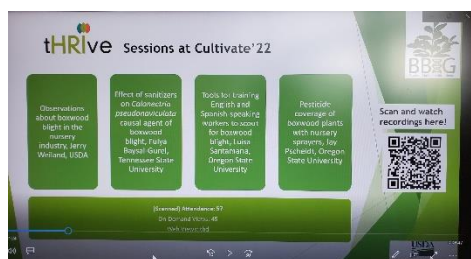


All of the research presentations stimulated questioning by Advisory Panel members, stakeholders and BBIG researchers, making the sessions a valuable learning experience and identifying new avenues for research.

EXTENSION HIGHLIGHTS

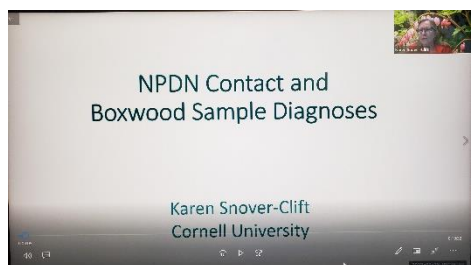
Extension/Outreach Highlighted in the 2nd BBIG Annual Meeting by Margery Daughtrey, Cornell University, Riverhead, NY

Extension/outreach contacts, as reported at the Annual Meeting, have been remarkable in 2022: tools have been developed and programs have been delivered. Nina described her careful documentation of the appearance of symptoms for 22 boxwood cultivars exposed to both blight pathogens – *Calonectria pseudonaviculata* (*Cps*) and *Calonectria henricotiae* (*Che*), showing that in general the symptoms caused by the two species of fungi are the same on any given cultivar. These illustrations will be used for training tools. With the help of HRI, the International Boxwood Seminar series had a second powerful year, showcasing 4 webinars with presenters from the United Kingdom, Canada, Oregon, and Sweden. These seminars were seen by a total of 1376 attendees, plus an additional 223 views of [their recordings](#) at boxwoodhealth.org.



Jennifer described how Cultivate'22 had provided an audience of 57, with another 45 [On-demand](#) views for the presentation team of Jerry, Fulya, Luisa, and Jay. Plans for 2023 are still in the works, with a possible session on Tuesday or Saturday at Cultivate'23 that would include the hot topic of box tree moth. She showed the group how the newsletters and the seminars have provided spikes in website traffic. Chuan's goal is to capture all of BBIG's accomplishments and to expand into new communication arenas

(such as the Twitter account that now announces events and published papers – with 53 Tweets so far). He described how the BBIG Monthly feeds into the quarterly newsletter, and how four tiers of BBIG include the core team with its industry advisors, collaborators and advocates making up a network of 400 people. Luisa described her “scouting for the scoundrel (*Cps*)” educational efforts (some of these done with Fulya in TN) to educate workers in Spanish and English, making sure they know why early recognition is important. Jay described extension efforts focused on: a) what is it? – contributed by the OSU diagnostic clinic, and b) what can we do about it? – for which he and his grad student have focused on improving coverage and using systemic rather than contact fungicides.



Karen described the National Plant Diagnostic Network (NPDN) of 72 labs that collect data on boxwood disease diagnosis. Margery reached out to the central division meeting of the National Plant Board in spring 2022, serving on a panel to educate horticultural inspectors on Boxwood Blight, along with a regulator and a box tree moth researcher. Fred described his new position on the Board of American Boxwood Society (ABS) and how partnering with ABS President Andrea Filippone had led to boxwood blight getting coverage in the New York Times last spring.



Fulya described several fruitful outreach activities through the American Phytopathological Society (APS): a special session at the 99th Southern Division meeting was devoted to boxwood blight—the first time a symposium had ever been dedicated to an ornamental disease topic! She also moderated the Plant Health 2022 Symposium on Boxwood Blight at the APS annual meeting in Pittsburgh, which was well attended by our colleagues. There were at least 9 APS publications from BBIG in 2022!

PROJECT MEETING BRIEF

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

Three monthly **Project Leadership Team Meetings** were held on December 14, 2022, January 11 and February 3, 2023. At the December meeting, joined by Luisa Santamaria, we discussed the planning for the 2nd

BBIG Annual Meeting, specifically on hotel and dinner restaurant options and a range of other topics. At the January meeting, joined by Jill Calabro, we discussed updated agenda for the 2nd BBIG Annual Meeting, new topic list for the Knowledge Center. At the February meeting, we further discussed and modified the 2nd BBIG Annual Meeting agenda according to emerging needs. We also discussed a range of other important topics, including monthly digest, quarterly newsletter, and BBIG showcase at [Cultivate'23](#) in Columbus, OH from July 15 to 18, [Plant Health 2023](#) in Denver, CO from August 12 to 16, and [ICPP](#) in Lyon, France from August 20 to 25.

ANNOUNCEMENTS

Congratulations to **Bhawana Ghimire**, PhD student at Baysal-Gurel Lab – Tennessee State University on her winning the travel award to and also the third place in the poster presentation competition at the 2023 Annual Meeting of the APS Southern Division in Durham, NC from February 13 to 16, 2023.

Congratulations to **Srikanth Kodati**, Postdoctoral Associate in LaMondia Lab, Connecticut Agricultural Experiment Station on landing his dream job as Assistant Extension Educator – IPM and Pesticide Safety with Connecticut Cooperative Extension in Vernon Rockville, CT.

RECENT PUBLICATIONS

Refereed Journal Articles

- Brand, T., Beltz, H., Adhikari, U., Daughtrey, M., Luster, D. G., Kong, P., and Hong, C. X. 2022. Evaluation of fungicides for management of boxwood blight caused by *Calonectria* spp. under field conditions in Northern Germany. *Journal of Plant Diseases and Protection* ([open access](#)).
- Kong, P., Daughtrey, M. L., and Hong, C. X. 2023. Differential adaptation has resulted in aggressiveness variation of *Calonectria pseudonaviculata* on hosts *Buxus*, *Pachysandra* and *Sarcococca*. *Journal of Fungi* 9(2), 181 ([open access](#)).
- Ohkura, M., Scagel, C. F., and Weiland, J. E. 2022. Rapid and scalable DNA extraction and real-time PCR assay from boxwood tissue for the detection of *Calonectria pseudonaviculata*, causal agent of boxwood blight. *Plant Disease*. Abstract at <https://doi.org/10.1094/PDIS-06-22-1453-SR>.
- Omolehin, O., Keller, J., Gouker, F., Daughtrey, M., Luster, D. G., Pscheidt, J., and Hong, C. X. 2022. Combating an invasive boxwood pathogen – *Calonectria pseudonaviculata* – in the United States by shifting production to less susceptible cultivars. *Plant Disease*. Abstract at <https://doi.org/10.1094/PDIS-09-22-2124-RE>.
- Yoder, K. S., Dunn, R. A., Saunders, J. B., Mays, T. E., Yanny, M. D., Hong, C. X., and Scoggins, H. L. 2022. Field performance of *Buxus* cultivars and selections against boxwood leafminer and boxwood blight. *Journal of Environmental Horticulture* 40(4): 129-142 ([open access](#)).

Newsletter and Trade Journal Articles

- Batdort, L. R., and Daughtrey, M. L. 2023. Boxwood blight nomenclature. *The Boxwood Bulletin*. *The Journal of the American Boxwood Society* 62:40-42.
- Baysal-Gurel, F. 2022. Box blight Control Trial. *Chase Digest* December 2022 Issue Volume 10(12).

RECENT PRESENTATIONS

At Professional Conference

- Ghimire, B., Liyanage, K., Hall, C., and Baysal-Gurel, F. 2023. Investigating the growers' perceptions on boxwood blight disease management in the U.S. nursery industry. 2023 Annual Meeting of the APS Southern Division. Durham, NC. February 13 to 16.

At Extension and Outreach Programs

- Baysal-Gurel, F. 2023. Boxwood blight disease management - woody ornamental disease update. UT-2023 Landscape Short Course/Green Team Landscape Meeting. Franklin, TN. January 12.

- Baysal-Gurel, F. 2023. Sanitation for boxwood blight management. The Kentucky Green Industry Winter Conferences. January 25.
- Baysal-Gurel, F. 2023. Boxwood blight disease management. Advanced Turf Solutions Meeting. Lebanon, TN. January 31.
- Daughtrey, M. 2023. When it didn't rain, it was droughty. Professional Certified Applicators of Long Island. Melville, NY. January 19.
- Daughtrey, M. 2023. Diseases to defend your plants against. Back 2 Basics. AmericanHort. Virtual. February 7.
- Daughtrey, M. 2023. Scouting skills for diseases on broadleaved woody plants. Sharpen Your Scouting Skills Workshop. Branching Out, Cornell Cooperative Extension, Ithaca, NY. Virtual, February 9.
- Daughtrey, M. 2023. Understanding plant diseases. Master Gardeners of Fairfax County, Virginia. Virtual. February 15.
- Daughtrey, M. 2023. Diseases of ornamental plants. Certified Nursery and Landscape Professionals Training. Virtual. February 21.
- Pscheidt, J. W. 2023. Fungicide Selection and Coverage. Pesticide Recertification. Southern Oregon Research and Extension Center. Central Point, OR, January 24.

PROJECT DIRECTORS

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
Ping Kong, Virginia Tech, Virginia Beach, VA
Jo Anne Crouch, USDA, ARS, Foreign Disease & Weed Science Research, Ft. Detrick, MD
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

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
Jennifer Gray (Liaison to AmericanHort), Administrator, Horticultural Research Institute, Washington, DC

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