

Contents

Featured News	1
Featured Research.....	2
Extension Highlight	2
Project Meeting Brief	3
New Roles & Promotion	4
Recent Publication.....	4
Project Directors	5
Advisory Panel	5

FEATURED NEWS

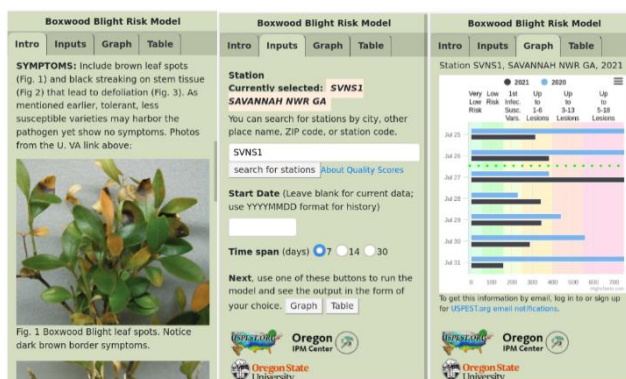
A Mobile-friendly Tool for Predicting Severity of Boxwood Blight

by Leonard Coop, Associate Professor, Oregon IPM Center, Oregon State University

Boxwood blight is a disease of boxwood and related ornamental plants caused by an invasive fungus that first arrived in the US around 2011. Blight symptoms range from minor brown leaf spots

and black streaks on stems, to defoliation and even death of the plant. The sticky fungal spores are spread by contact and not through air movement. Since the mid-1990s, boxwood blight had established in parts of Europe, and so was extensively studied there first.

Beginning around 2013, researchers at Oregon State University, working with collaborators across the US and Europe, released the first boxwood blight infection risk prediction tool. This tool is based upon weather conditions, and makes use of thousands of public weather stations. It predicts that the infection process can take from a few hours to a few days, at temperatures above 46 °F and below 83 °F, but only during periods of abundant moisture, either from rainfall or very high humidity. Generally, infections occur more rapidly at the higher end of the favorable temperature range (optimum around 75 °F). This prediction tool has been released in several formats, and the latest is available as a convenient mobile device-adapted online app. This new version of the tool has recently been updated with the ability to send email notifications of current risk levels, for selected weather stations and for selected schedules, such as Mondays and Wednesdays during high-risk months. With this decision support tool, one can check for current and forecast risk conditions and make better-informed decisions about the need to use tactics to reduce the chance of infection. Practices including registered and approved fungicide applications, curtailing irrigation, pruning to increase air-flow within the boxwood foliage, applying mulches, and increasing sun exposure may all be of some help in lowering this risk of infection. In summary, this new app can help make decisions to fight boxwood blight both more informed and more convenient.



Blight infection risk prediction tool with interactive tabs at https://uspest.org/risk/boxwood_app

RECENT DELIVERABLES

(September to November 2021)

Research

- 4 Research articles
- 3 Seminars

Extension & Outreach

- 4 Field demonstrations
- 1 Workshop/symposia
- 3 Webinars/virtual meetings
- 6 Extension presentations
- 3 Extension publications
- 49 Samples diagnosed
- 213 Email/phone inquiries answered
- 2692 People reached with articles/news

Education

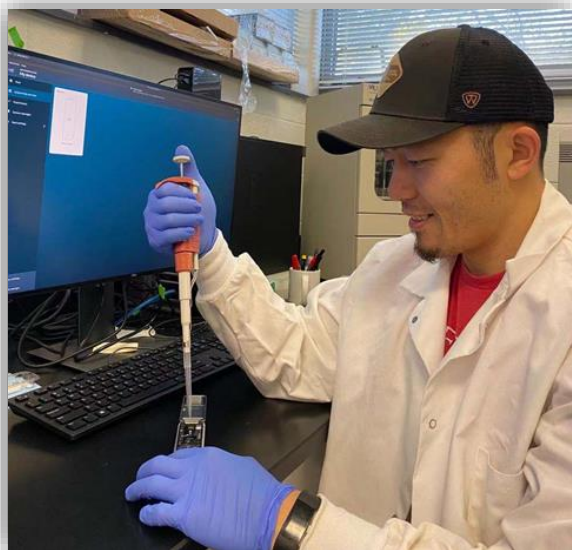
- 5 Postdoctoral associates
- 2 Graduate students

Publicity

- 3 Interviews/reports

FEATURED RESEARCH

Microbiome Scientists Spotlight Fungicide Impact on Boxwood Phyllosphere by Xiaoping Li and Ping Kong, Hamptons Roads Agricultural Research and Extension Center, Virginia Tech



Boxwood foliage is surrounded by microbes that may act as pathogens or plant growth and health promoters, which are collectively called the microbiome. When plants are subjected to chemical applications for the control of boxwood blight, it is not clear whether the foliage microbiome is affected. As part of an ongoing field trial to understand the efficacy of anti-desiccants and fungicides for boxwood blight management, shoot samples were collected to study the *Buxus sempervirens* ‘Vardar Valley’ microbiome during Spring and Fall seasons. Three types of fungicides representing systemic, contact and combined actions and containing propiconazole or chlorothalonil were included in this study. Boxwood shoots were sampled prior to, plus 1 day, 1 and 2 weeks after fungicide treatments for DNA extraction. Nanopore sequencing was conducted targeting the bacteria and fungi present on leaf surfaces

(epiphytes) and inside (endophytes). Initial data analysis showed that fungicides had significant influence on both diversity and structure of fungal epiphytes, but did little to bacteria and endophytes. The dominant fungi were *Cladosporium* species on leaf surfaces but *Shiraia* and *Alternariaster* species inside of boxwood leaf tissue. Likewise, the most abundant bacteria were *Staphylococcus* species in the epiphytic community but *Clostridium* and *Brevundimonas* in the endophytic community. Specifically, the epiphytic *Alternaria* group was found abundant in the fungicide treatments but not in the control samples. These results could be explained by the modes of action specific to fungi and the boxwood’s waxy leaf structure preventing fungicide from permeating into the leaf tissue. These results are of critical importance to developing a systems approach to boxwood health and production. One immediate and exciting implication is that fungicide application may not affect the efficacy of bacterial biocontrol products and agents if used simultaneously in the field. Confirming these results is warranted with the new sample analysis. This study was a joint effort with the North Carolina Department of Agriculture and Consumer Services and North Carolina Cooperative Extension.

EXTENSION HIGHLIGHT

BBIG at the 1st International Boxwood Workshop



The 1st International Boxwood Workshop was held between October 25–27, 2021, in virtual platform with the support and facilitation provided by the Turkish governmental and non-governmental organizations. Among the five invited presentations and 21 oral presentations, Dr. Fulya Baysal-Gurel, gave a presentation titled *Update on boxwood blight in the United States and Boxwood Blight Insight Group (BBIG) - An International Consortium*. Other topics at the workshop included biodiversity and ecology of boxwood forests; silviculture and the genetic diversity of boxwood; threats, conservation, and ecological restoration of boxwood; control strategies of boxwood pests and diseases; boxwood in the landscape as ornamental plants; economical and ethnobotanical features of boxwood.



Diagnostic Hint by Margery Daughtrey

Because we have no selective medium to help us, culturing *Calonectria pseudonaviculata* (*Cps*) from plant tissue can be very challenging. Other fungi commonly outcompete the *Cps*. One trick: do not rely solely on your eyes! Although there may be none of the chestnut brown mycelium visible amidst the masses of orange *Pseudonectria* or white *Fusarium*, often there is sporulation of *Cps* just on the top of the original tissue piece plated. The *Cps* sporulation can sometimes be visualized with great clarity using a dissecting scope to see the characteristic “crystalline” appearance of the conidiophores and their conidia in dense masses on the tissue, along with the spear-shaped sterile hyphae projecting beyond the conidia. A diagnostician who has not had too much coffee can reach in from above with a transfer loop or other tool and collect sporulation to move it safely to another Petri plate.



Conidia of Cps sporulating on a bit of boxwood tissue (Photo courtesy Chuan Hong)

Upcoming International Boxwood Seminar Series



Invasion, impact, and management of box tree moth in Europe

December 2, 11:00 a.m. Eastern

Marc Kenis, Head Risk Analysis and Invasion Ecology @CABI

FREE REGISTRATION



Progress in Boxwood Blight Management in the United Kingdom and New Zealand: 1990s to 2021

March 10, 2022, 3:00 p.m. Eastern

Matthew Cromeey, Senior Plant Pathologist @Royal Horticultural Society, UK

FREE REGISTRATION

PROJECT MEETING BRIEF

BBIG Annual Meeting Session 1 took place on October 5. Project Directors and their associates met with Advisory Panelists to review BBIG's accomplishments over Year 1. Dr. Chuan Hong gave an overview of BBIG's major activities and accomplishments during the past year. Margery Daughtrey led the review of important metrics of BBIG's website and the International Webinar Series. Dr. James LaMondia presented new findings of blight epidemiology and integrated management. Dr. Olanike Omolehin reviewed her anti-desiccant trials done in Lowgap, NC and proposed testing other treatment intervals in the next step of her experiment. Jill Calabro led the Advisory Panel feedback. Session 2 of the BBIG Annual Meeting will be held with the focus on planning BBIG's activities for the coming year.

The Second Epidemiology Group Meeting was held on October 25, 2021, with two presentations followed by Q&A. Drs. Leonard Coop and Brittany Barker from Oregon State University presented a seminar *Predicting boxwood blight infection and establishment risk using CLIMEX, correlative, and DDRP modeling platforms*, while Drs. Wolfgang Schweigkofler and Nilwala Abeysekara updated their research titled *Long-term monitoring of Boxwood blight symptom development in an open-air nursery in coastal California - update*. A total of 17 members from U.S. and Europe attended the meeting and Dr. Urmila Adhikari served as the meeting coordinator.

For meeting recordings please reach out to aurmila@vt.edu. A Google Group (epidemiology-g@vt.edu) was set up for future communication among the Group members. The next meeting is scheduled for February 7, 2022.

Three Project Leaders and the Project Manager met monthly – September 21, October 19, and November 10, discussing project progress, planning project-wide activities, and preparing this issue of the BBIG Newsletter.

Project Directors and their associates met on November 17, 2021, discussing the research and extension progress. Dr. Xiaoping Li presented a seminar on how fungicide use may affect the boxwood microbiome.

NEW ROLES AND PROMOTION



Dr. Olanike (Nike) Omolehin recently took on a new role as the BBIG's incoming Project Manager, while continuing to work as a postdoctoral research associate at Virginia Tech's Hampton Roads Agricultural Research and Extension Center in Virginia Beach, VA. A Nigerian by birth, she obtained both BS and MS degrees in Agronomy (Crop Science) from the University of Ibadan, Nigeria. Olanike graduated from Louisiana State University with a Ph.D. in Plant Pathology. She has research experience on *striga* (witchweed) and ear rot in corn.

In her new role, Dr. Omolehin will coordinate communications and project reports among project directors, associates, collaborators, and advisory panel members, organize future project meetings, and help the

extension team to translate research outcomes into outreach materials. She can be reached via email at olanike@vt.edu.

Dr. Xiao Yang, the outgoing BBIG Project Manager, will join Clemson University as the Diagnostician/Manager of Plant and Pest Diagnostic Clinic in December 2021. Congratulations on his new position, we wish him well with his new adventure!



RECENT PUBLICATIONS

Avenot, H.F., Brewster, C.C., Baudoin, A.B., Hong, C.X. 2021. Conidial production and viability of *Calonectria pseudonaviculata* on infected boxwood leaves and twigs as affected by temperature, wetness and dryness periods. Plant Pathology. <http://doi.org/10.1111/ppa.13500>

Hall, C.R., Hong, C.X., Gouker, F.E., Daughtrey, M.L. 2021. Analyzing the structural shifts in U.S. boxwood production due to boxwood blight. Journal of Environmental Horticulture. <https://doi.org/10.24266/0738-2898-39.3.91>

Kong, P. Sharifi, M., Bordas, A., Hong, C.X. 2021. Differential tolerance to *Calonectria pseudonaviculata* of English boxwood plants associated with the complexity of culturable fungal and bacterial endophyte communities. Plants. <https://doi.org/10.3390/plants10112244>

LaMondia, J.A., Allan-Perkins, E., Kodati, S. 2021. Factors affecting boxwood blight spread under landscape conditions. Journal of Environmental Horticulture. <https://doi.org/10.24266/0738-2898-39.3.100>

PROJECT DIRECTORS

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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, Mycology & Nematology Genetic Diversity and Biology Lab, Beltsville, 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
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
Mark Sellew, Owner, Prides Corner Farms, Lebanon, CT
Martha Sleeper, Plant Health Manager, Hines Growers, Forest Grove, OR
Jennifer Gray (Liaison to AmericanHort), Administrator, Horticultural Research Institute, Washington, DC

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