



**Maryland
Department of Agriculture**

Office of Plant Industries and Pest Management

Larry Hogan, Governor

Boyd K. Rutherford, Lt. Governor

Joseph Bartenfelder, Secretary

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*Plant Protection and
Weed Management*

The Wayne A. Cawley, Jr. Building

50 Harry S. Truman Parkway

Annapolis, Maryland 21401

www.mda.maryland.gov

Agriculture | Maryland's Leading Industry

410.841.5920 Baltimore/Washington

410.841.5835 Fax

800.492.5590 Toll Free

Boxwood blight: An emerging concern for nurseries and landscapers in Maryland

Topics:

- | | |
|---------------------|---|
| 8:00 to 8:30 | Introduction and importance of boxwood blight |
| 8:30- 9:00 | How to identify the disease |
| 9:00 to 9:15 | Break |
| 9:15 – 10:00 | Disease management strategies |
| 10:00 -10:30 | PA Quarantine and compliance agreement |
| 10:30- 10:45 | Break |
| 10:45 -12:00 | Where do I stand on the compliance agreement:
QA |

If you have any questions, call us at 410-841-5920 or email (ppwm.mda@maryland.gov), Plant Protection and Weed Management, 50 Harry S Truman Pkwy, Annapolis, MD.

Introduction and importance of boxwood blight



Ramesh Pokharel, Ph.D.
Plant Disease Specialist,
Maryland Department of
Agriculture



- **Very important landscape plants**
- **Evergreen**
- **Can be trained into different shapes**
- **Cold hardy**
- **No deer damage**



Boxwood blight defoliates and weakens the plants

Other pathogens

– *Volutella*

– *Fusarium*

– *Macrophoma*

– Nematode (*Pratylenchus*)



Abiotic causes

- **Winter injury**



- **Watering**



- **Chemicals**



What is Boxwood blight ?



- **Foliar fungal disease of *Buxus* spp.**
- **Caused by *Calonectria pseudonaviculata* (syn. *Cylindrocladium pseudonaviculatum*, *C. buxicola*).**
- **Short-term dispersal takes place by wind and water**
- **Long-term dispersal is with plants moved by humans, and by animals**

What is.....

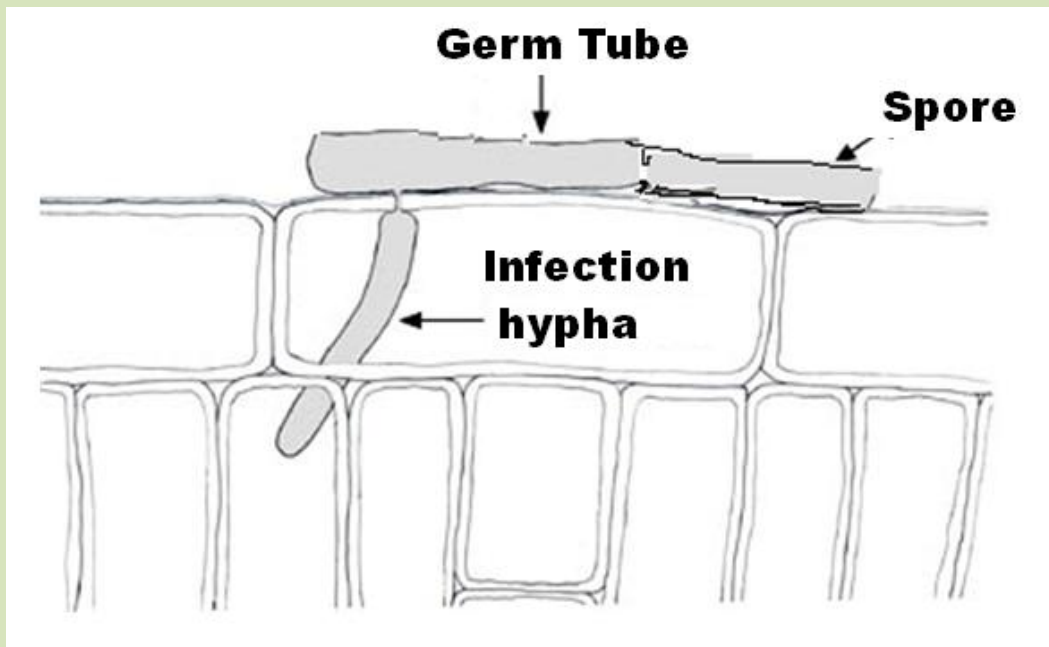
- **Does not do well below 50 and above 86° F and mycelium is killed at 95° F.**
- **The fungus grows best from 75° to 85° F.**
- **High humidity or moisture is essential for disease development**
- **In favorable conditions, life cycle is completed in 7 days**



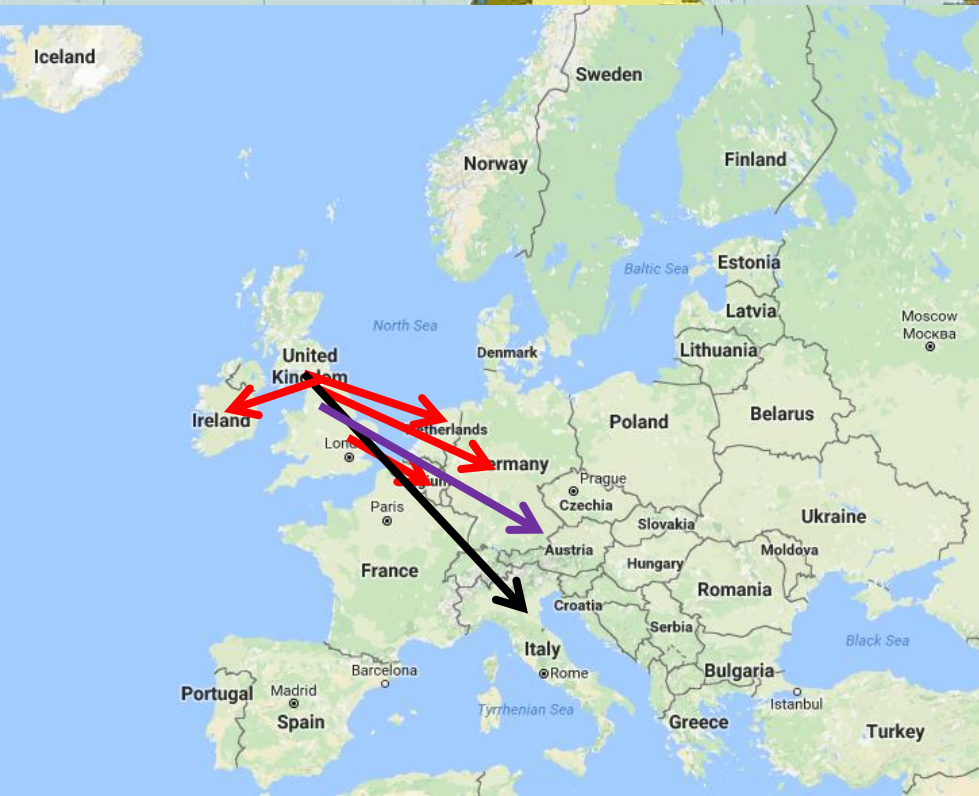
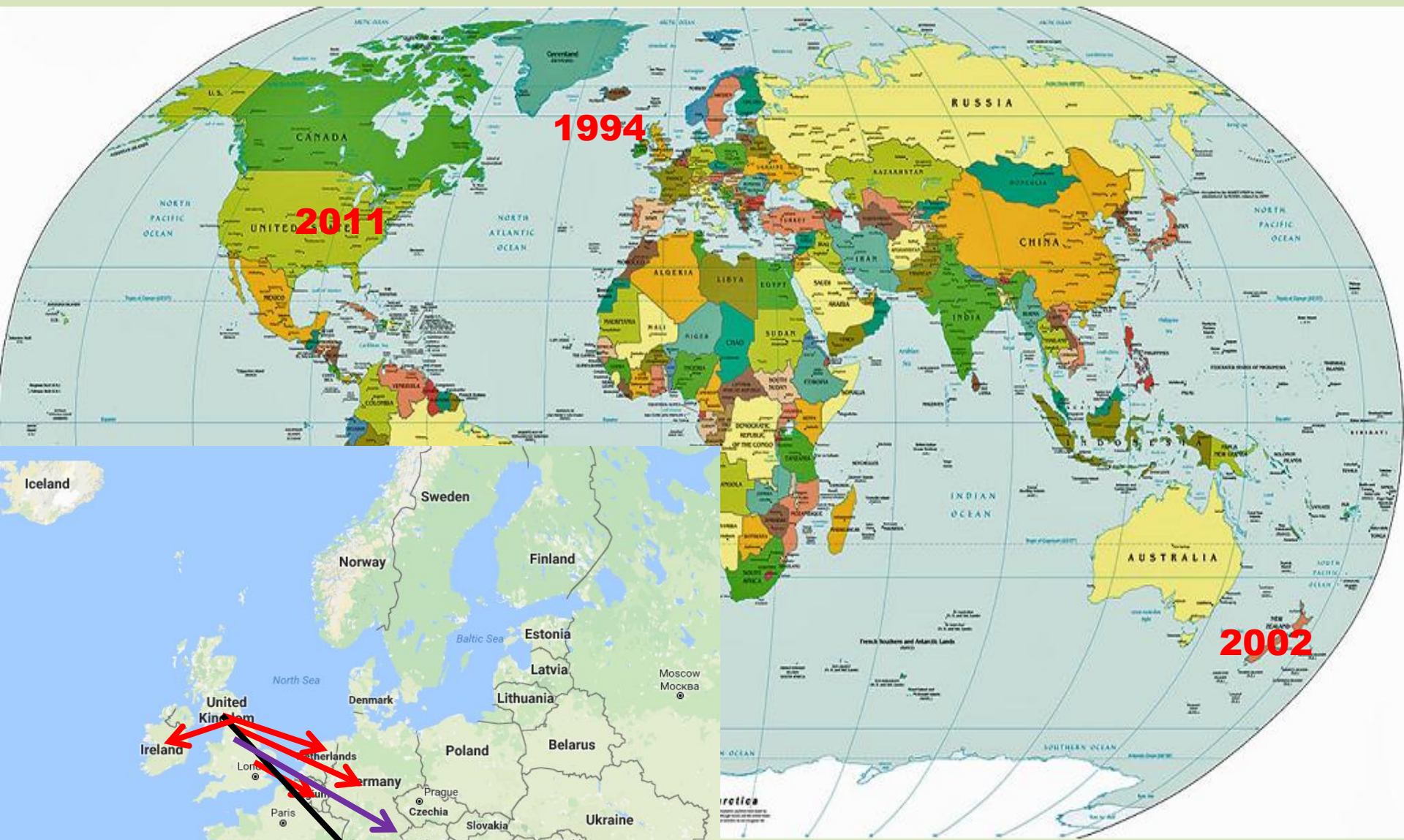
What is.....

- **Produces sticky spores**
- **In unfavorable conditions, this pathogen may produce microsclerotia and/or chlamydospores**
- **The microsclerotia/mycelium survives in leaf debris up to 5 years**

Infection process



- **Starts germination within 3 hours of landing on leaf**
- **Penetrates directly or through stomata without appressorium**
- **Does not need wound**

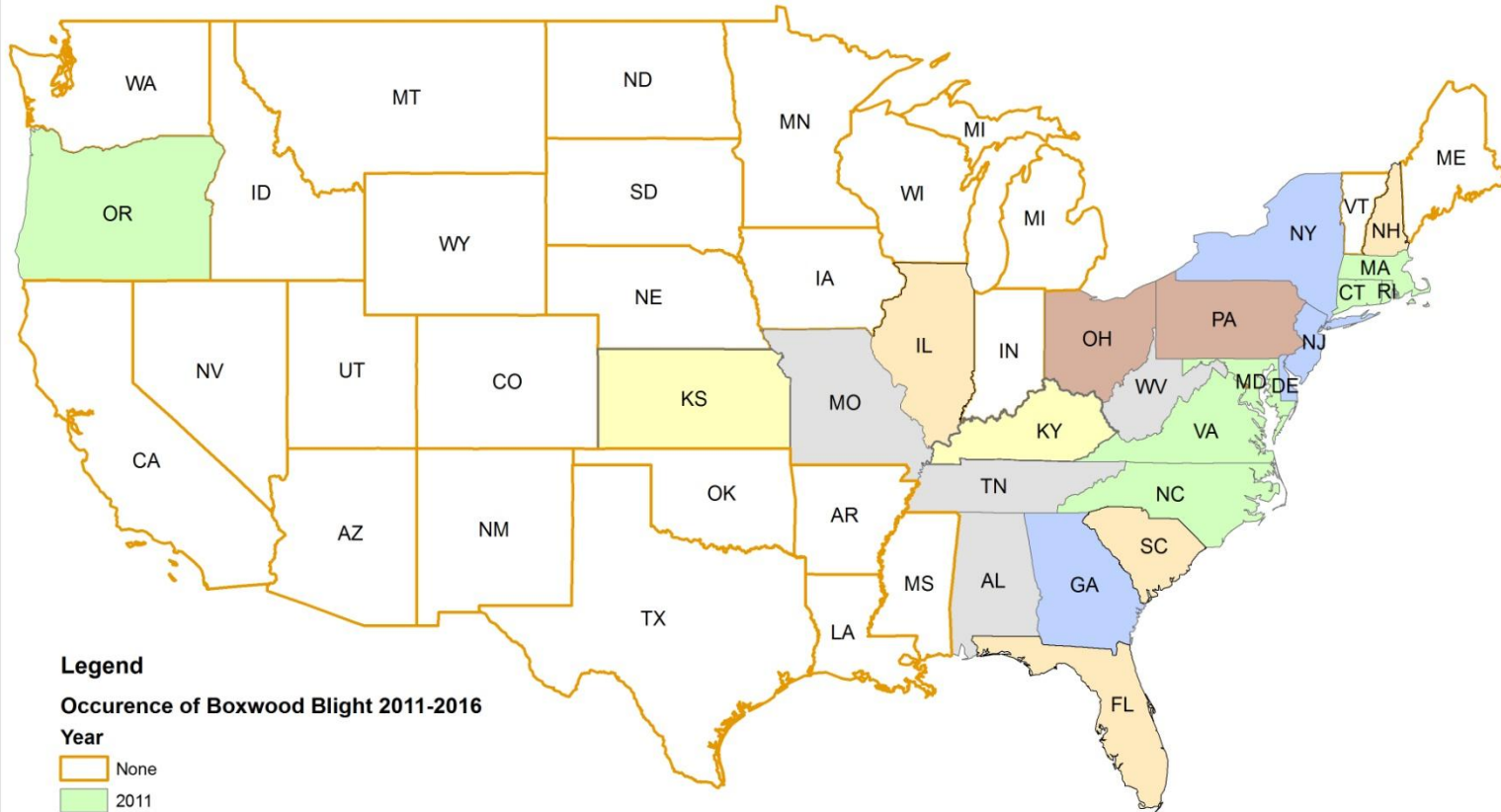


- 2007 (4 countries)
- 2008 (1)
- 2009 (1)

Occurrence of Boxwood Blight in USA



THE OCCURENCE OF BOXWOOD BLIGHT IN USA (2011-2016)



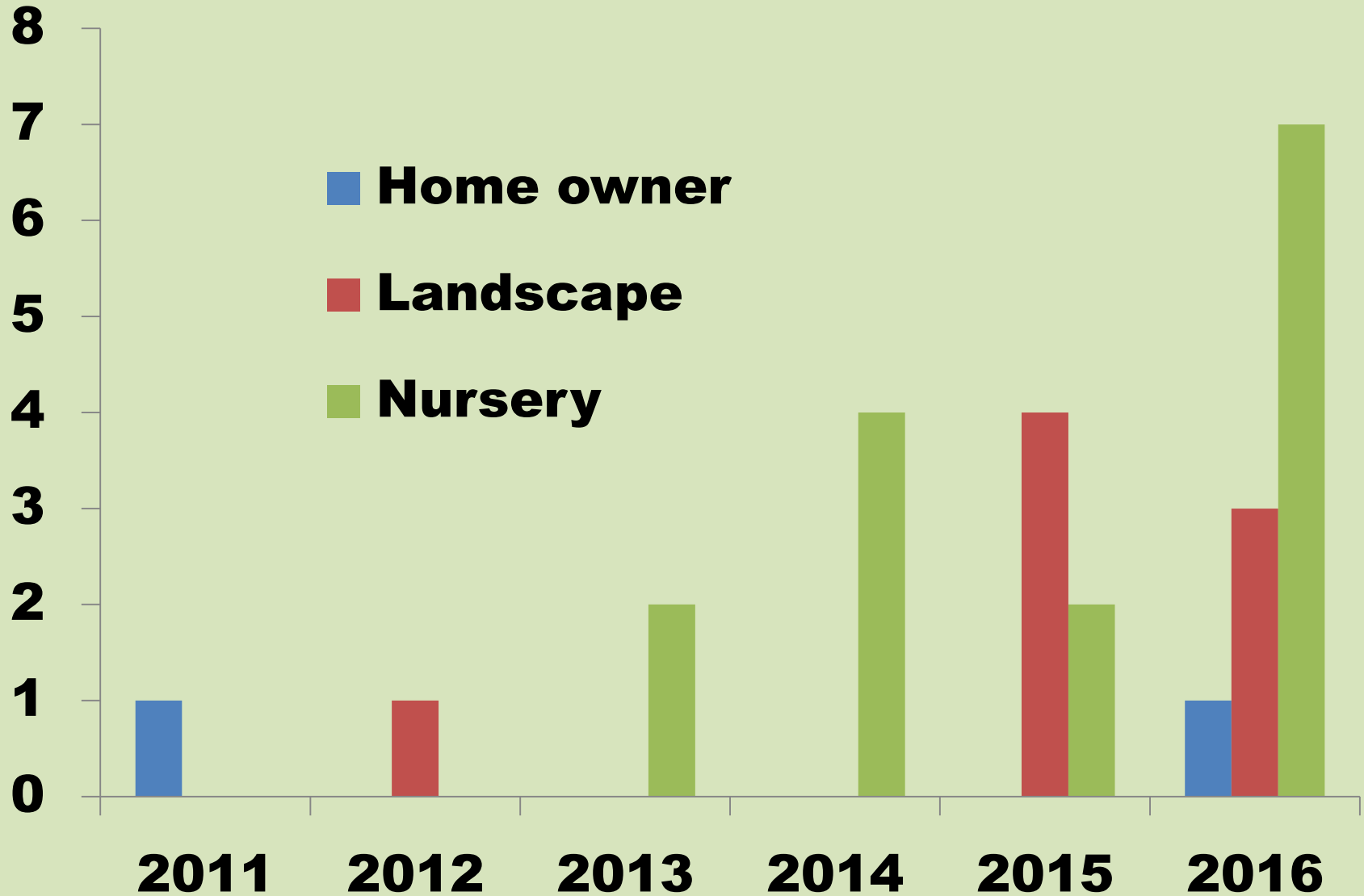
Legend

Occurrence of Boxwood Blight 2011-2016

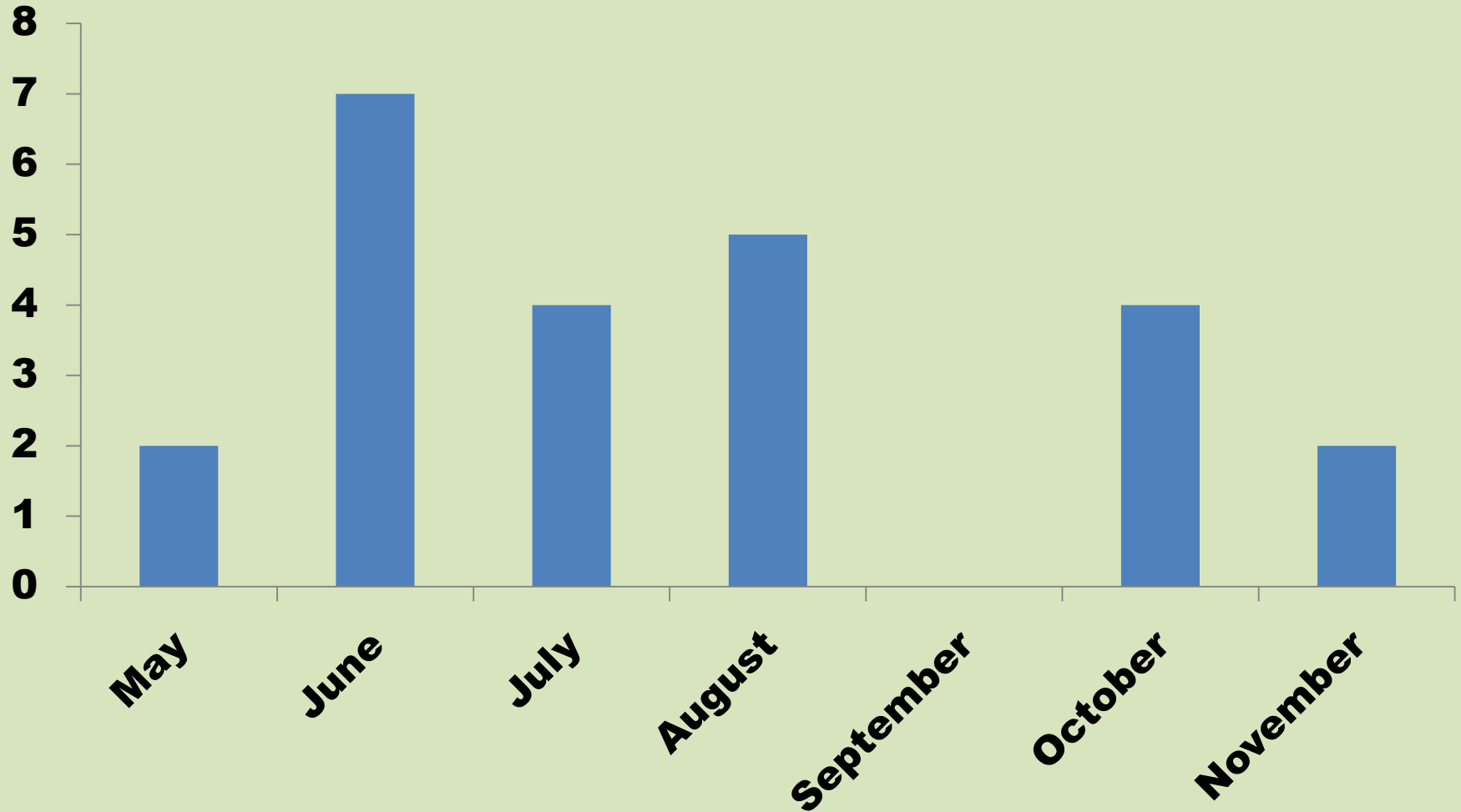
Year

- None
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016

Boxwood blight positive sites in Maryland



Seasonal occurrence of samples testing positive for BWB (2011-16)





Why we consider this disease important

- **Exotic and difficult to control**
- **Causes rapid defoliation and death**
- **Microsclerotia/mycelium can survive for several years**
- **Fungicides can kill mycelium, halt spore formation and symptom development **but do not eradicate****



Economic importance

It causes

- **leaf spots and blight**
- **rapid defoliation**
- **cankers on stems**
- **severe dieback**
- **eventual death of the plant**
- **Destroys the beauty of expensive boxwood plants**
- **May cause economical loss**

Case study of a nursery



- **July 10, 2013- Boxwood blight symptoms observed**
- **July 14, 2013- Confirmed boxwood blight infection**
- **August 2013- Destruction order issued with following options:**

Option 1: Destroy all *Buxus* spp.

Option 2: Destroy only the cultivar and the pot size

Option 3: Destroy only infected plants

A Stop Sale order and no pesticide use for 3 months, for options 2 or 3



Case study continued....

- **May 15, 2014- Suspected BWB samples collected**
- **May 28, 2014- Samples confirmed positive for BWB**
- **July 2014 - Destruction order issued with following options:**

1: destroy all *Buxus* in infected and surrounding houses

2: Destroy all *Buxus* spp, disinfect facility, and do not grow *Buxus* spp for at least 5 years

Nursery destroyed 157,247 plants

What about destruction cost ?



How to identify the disease

Field

- **Symptoms**

Laboratory

- **Fruiting structures such as sporophore and spores**

- **Molecular**

Field symptoms

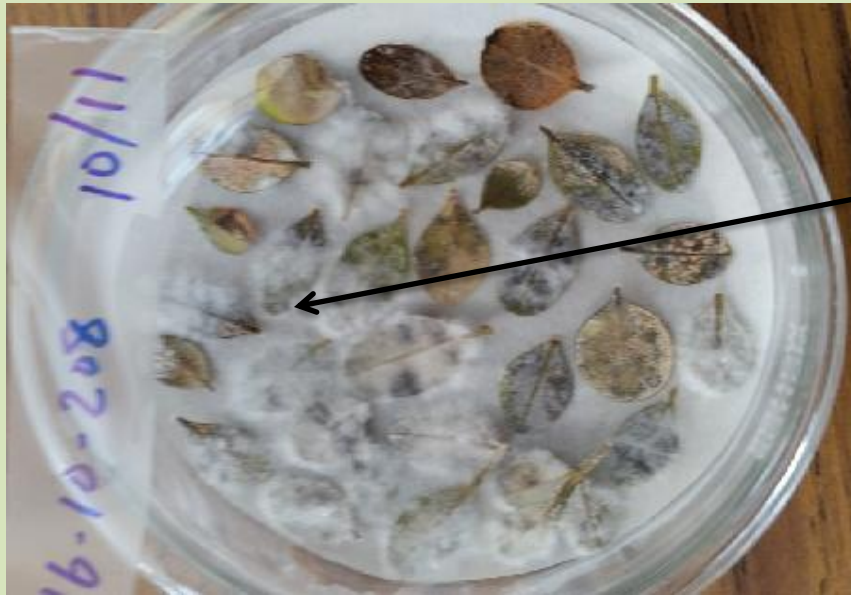


Fallen leaves

Typical BWB symptoms



Incubate 5-7 days in moisture chamber



C. Buxicola
***Fusarium* sp.**

Volutella

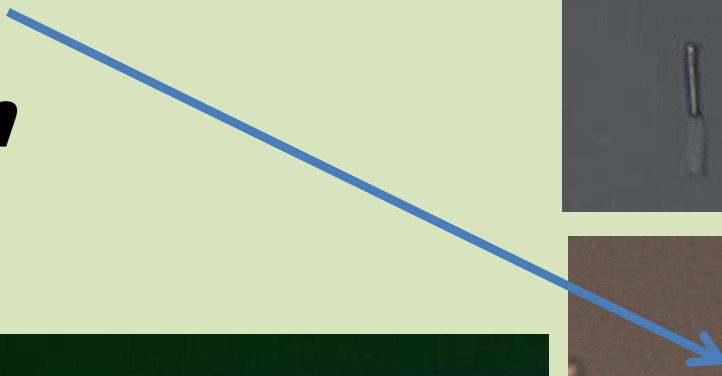
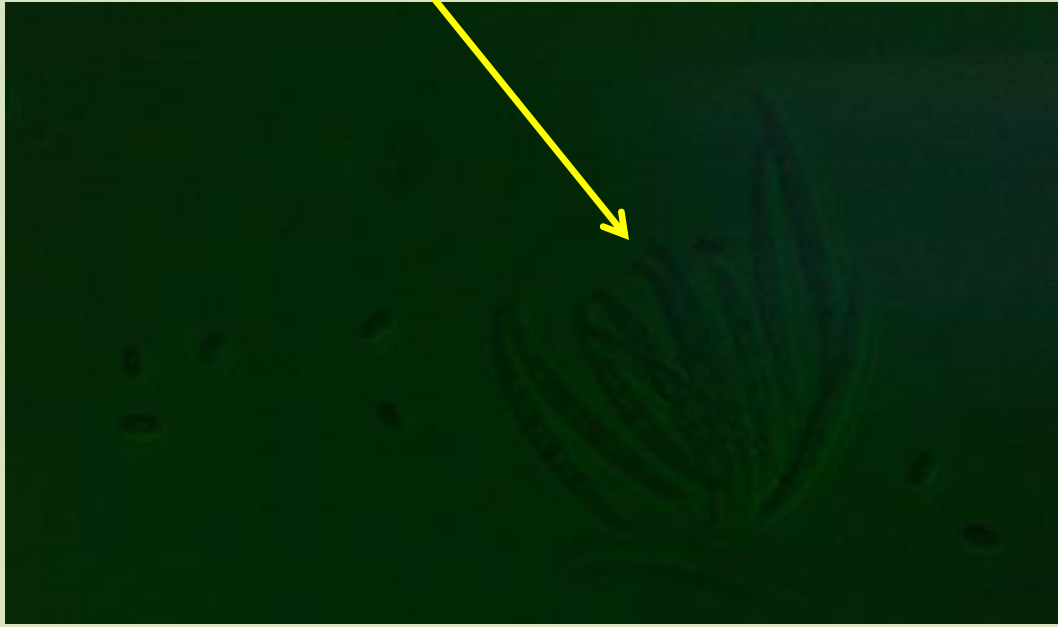
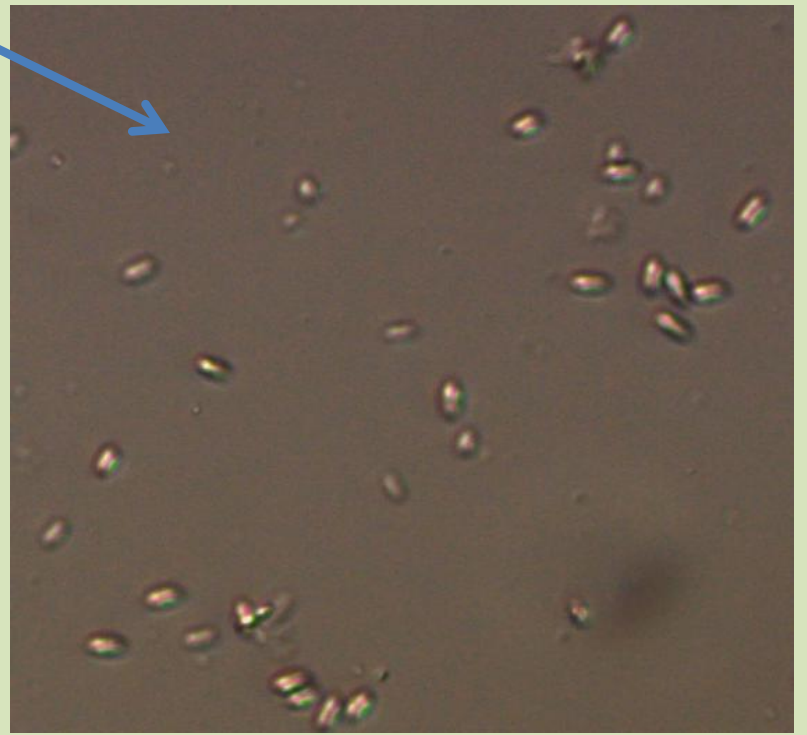
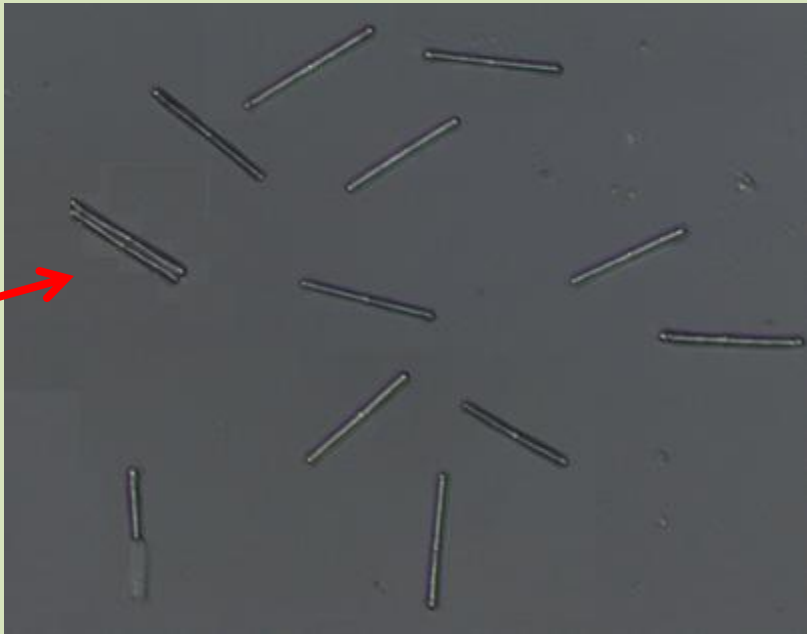


Laboratory Diagnosis

Cylindrocladium

Volutella

Fusarium





'Suffruticosa'

Positive



**Dark black spot
on the stem**

Negative

'Suffruticosa'



Positive



Positive

What about this symptom?

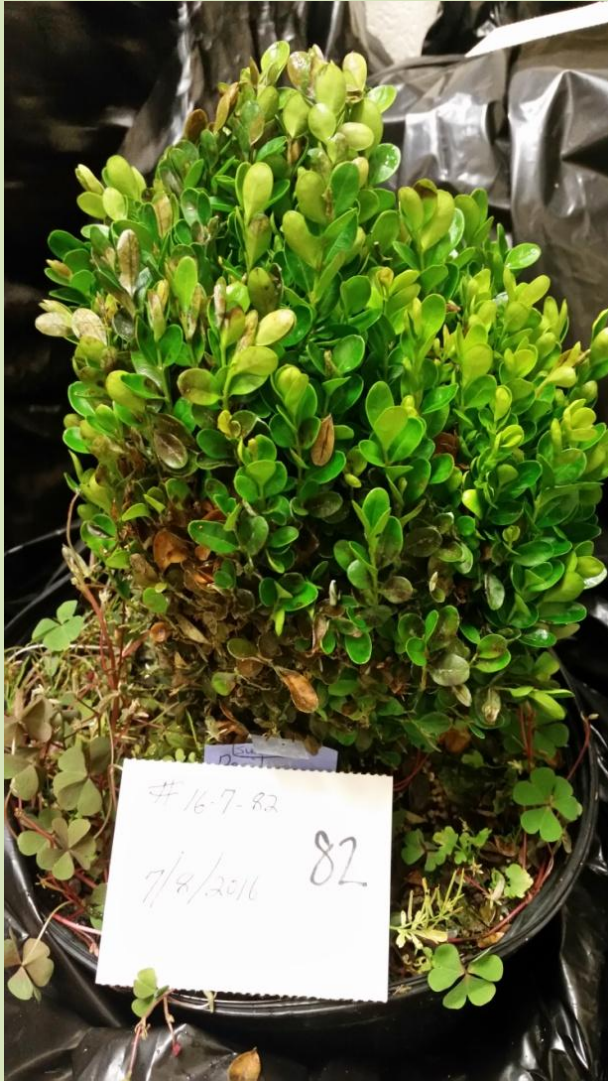


Positive

In the field



Both negative



Both positive

“Green Beauty”



“Vardar Valley”



**May serve as
“Trojan Horse”
Or
“Typhoid Mary”**

Both positive



Disease management strategies



- 1. Avoidance***
- 2. Exclusion***
- 3. Eradication***
- 4. Protection***
- 5. Therapy***
- 6. Resistance***

Management strategies



Exotic Pathogens

- **Avoidance**
- **Exclusion**
- **Eradication**
- **Host resistance**

Help us keep the disease out of Maryland



- **Adopt BMPs**
- **Obtain certified or clean plant material**
- **Destruction and**
- **strict quarantine**



After obtaining plants

- **Keep boxwood lots separate in the nursery**





Keep accurate updated records

Inspect plants for any abnormality

Any abnormal plant should be separated and treated as if infected

Do not buy or sell any suspicious plants



Host resistance

- **No cultivar is completely resistant**
- **Cultivars may vary in damage level**
- **Avoid susceptible cultivars such as 'Suffruticosa'**

Most susceptible	B. sempervirens ‘Suffruticosa’ B. sinica var. insularis ‘Justin Brouwers’
Susceptible	B. microphylla var. japonica ‘Morris Dwarf’ B. microphylla var. japonica ‘Morris Midget’ B. sempervirens ‘Jensen’ B. sempervirens ‘Marginata’ , Buxus X ‘Glencoe’ (Chicagoland Green) B. sempervirens ‘American’ B. sempervirens ‘Elegantissima
Moderately susceptible	Buxus X ‘Green Mound’, Buxus X ‘Conroe’ (Gordo) B. microphylla ‘Green Pillow’ B. microphylla ‘Grace Hendrick Phillips’ B. microphylla ‘Jim Stauffer’, Buxus X ‘Green Mountain’
Tolerant	B. microphylla ‘Winter Gem’ , B. sempervirens ‘Dee Runk’, B. sempervirens ‘Fastigiata’, Buxus ‘Green Gem’, B. microphylla ‘John Baldwin’
Resistant	B. microphylla ‘Golden Dream’ B. harlandii, B. sinica var. insularis ‘Nana’ B. microphylla var. japonica ‘Green Beauty’

Other host plants of BWB



Pachysandra

Source The Connecticut Agricultural Experiment Station



Sarcococca

My boxwood was confirmed positive for BWB



What Next ?

Manage plant disposal



Collect infected plant materials, dispose properly



Curative

Collect and burn or bury 2-3" deep in a safe area



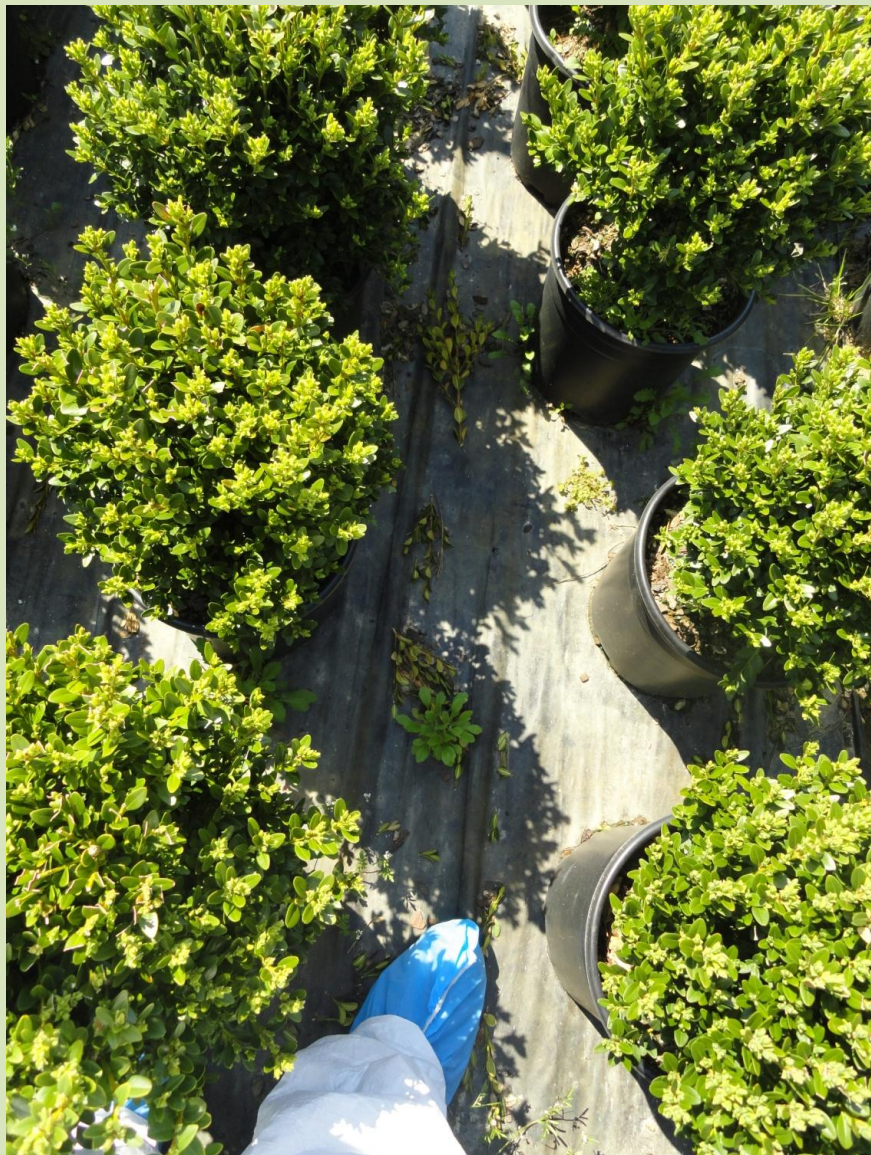
Take care during transportation of infected plant materials



Avoid close planting/storing



Ideal spacing



Less than Ideal



Avoid overhead irrigation



- **Time of day**
- **Wind conditions**
- **Duration**

Runoff water Floor surface



Clean and disinfect areas, tools, equipment, and vehicles



Remove fallen leaves



Minimize



Human, vehicle, animal movement among plants, especially diseased ones





Disease control

- **Difficult to eradicate the pathogen**
- **Disease management is possible, but needs integrated effort**
- **Mostly applies to an established pathogen**

Chemical control

Trade name	Chemical	Amount/100 gallon water	Application intervals
Daconil Weatherstik	Chlorothalonil	1.375 pints	7-14 days
Spectro 90WDG	Chlorothalonil + Thiophanate methy	1.5 lb E	Every 7-14 days not more than 50.6 lb per acre per season
Concert II	Chlorothalonil + Propiconazole	35.0 fl oz	Every 14 days
Torque	Tebuconazole	10.0 fl oz	Every 14 days; max. 3 applications
Tourney 50WDG	Valent	4.0 oz	Every 14-28 days; not to exceed 4.0 lb per acre per season
Medallion WDG	Fludioxonil	4.0 oz	Every 7-14 days



Why no fungicides for BWB ?

- **They can't eradicate the pathogen**
- **They suppress symptoms**
- **How many homeowners would apply?**
- **Is this affordable ?**
- **Risks to human health, environment, and resistance development ?**

Then



**I am so sad
I can't grow
boxwood for
five years**



- **Avoid other BWB host plants:
Pachysandra and *Sarcococca***

Thanks



[Further information on Boxwood Blight:
http://mda.maryland.gov/plants-
pests/Pages/nursery_inspection_plant_quarantine.aspx](http://mda.maryland.gov/plants-pests/Pages/nursery_inspection_plant_quarantine.aspx)

A screenshot of a web browser displaying the Maryland Department of Agriculture website. The browser tabs include "DictionaryBoss", "MyWay", and "Nursery Inspection and Pla...". The address bar shows "mda.maryland.gov/plants-pests/Pages/nursery_inspection_plant_quarantine.aspx". The website header features the MDA logo, a search bar, and navigation links for "HOME", "MARYLAND PRODUCTS", "PLANTS/PESTS", "ANIMAL HEALTH", "CONSERVATION", "ONLINE SERVICES", and "MDA JOBS". The main content area is titled "Nursery Inspection and Plant Quarantine" and includes a description of the industry, a list of important documents, and information about Boxwood Blight. A sidebar on the left contains links for "Plants/Pests" and "Plant Protection & Weed Management".

Plants/Pests

- > Plants/Pests Home
- > Apiary Inspection
- > Regulatory Information Center
- > Emerging Invasive Plant Pests
- > Forest Pest Management
- > Mosquito Control
- > Pesticide Regulation
- > Plant Protection and Weed Management
- > State Chemist
- > Turf and Seed
- > Zika Awareness

Plant Protection & Weed Management

- > Plant Protection & Weed Management Home
- > Licensed Nurseries & Plant Dealers
- > Nursery Inspection & Plant Quarantine
- > Apiary Inspection

Nursery Inspection and Plant Quarantine

The nursery industry is a strong and growing part of Maryland's agricultural economy. Based on a crop cash value of more than \$400,000,000, it is the number two agricultural commodity in the state and the number one cash crop. It is a goal of this section to facilitate the production and sale of Maryland nursery stock by inspecting all plant material intended for sale or distribution to ensure that it is disease and pest free.

By law, and by reciprocal agreements with other states, plant material at each producing nursery is required to be inspected annually for freedom from dangerously injurious plant pests prior to its movement out of Maryland. These inspections also facilitate phytosanitary certification of Maryland plants for export from the United States. MDA inspectors issued phytosanitary certificates for the movement of plants and plant products to 18 states and territories and five foreign countries. Most of the certificates were issued to meet requirements of Japanese beetle quarantines. Inspections of plants at plant dealers (garden centers, chain stores and landscape contractors) are conducted to intercept pests not known to occur in Maryland and to provide consumer protection. The general health of Maryland-produced

Important Documents

- Dealer License, Plant Broker License Application
- EAB Federal Quarantine
- MDA Pine Shoot Beetle Quarantine Order
- Pine Shoot Beetle Quarantine Area Map
- Shipping Guidelines for PSB Quarantine in Maryland
- MDA Corn Cyst Nematode Quarantine Order #86-1
- Corn Cyst Nematode Quarantine Area Map

Boxwood Blight Information

- Boxwood Blight Alert
- Boxwood Blight Best Management Practice (BMP)
- Maryland Boxwood Blight Compliance Agreement
- Boxwood Blight Checklist
- Pennsylvania Quarantine Announcement

**Any questions or concerns
Call us at 410-841-5920**

or

**email:
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