BOX BLIGHT - BEST MANAGEMENT PRACTICES

Box Blight is caused by the plant pathogen, *Cylindrocladium buxicola* (synonyms: *Cylindrocladium pseudonaviculatum, Calonectria pseudonaviculata*). Plant hosts include all species and cultivars within the genus *Buxus* and *Pachysandra*[1]. Other genera within the Buxaceae family, for example *Sarcococca,* may be susceptible. The following best management practices are recommended for all growers producing *Buxus* to reduce their risk of importing and spreading this pathogen. As the science around this new disease becomes better known, these BMP's may change.

Disease Pathology and Diagnosis

***C. buxicola* will survive on plant debris in soil**

- Although *C. buxicola* sporulates on leaves and stems of plants, it can survive on plant debris that falls to the ground. Plants with *C. buxicola* will often shed their infected leaves which, if not gathered and disposed of properly, may provide a long-lived source of inoculum for new infections.
- The fungus (mycelium) growing within the leaves and stems can survive temperatures below 5^{o} C for extended periods, as well as above 30^{o} C
- When the source of nutrition is depleted, the fungus has the potential to produce hardy microsclorotia and/or chlamydospores, which can survive for more than 5 years on plant debris in soil.

Disease symptoms

- On Boxwood plants, infected leaves will have circular spots that are purplish-brown in colour and have dark borders, the plants may also exhibit complete defoliation, and/or the stems may have black cankers or lesions. Photographs are available on the internet (see www.boxwoodblight.org).
- Pachysandra symptoms include small necrotic regions (1-10mm in diameter) with diffuse yellow haloes.
- If the disease is suspected then contact your local diagnostic laboratory to submit samples for confirmation. If the disease is confirmed then take the appropriate eradication steps described in the section below entitled, 'Eradication Procedures'.

Traceability and Documentation

Accurate and detailed records should be maintained for traceability. The following records can integrate with the usual records kept at the nursery.

1. Addresses and maps of all production facilities indicating where activities such as receiving, shipping, propagation, potting, etc. take place (A modified Google map can be used).
2. Records of boxwood/pachysandra movement and, in particular, the propagation source or origin, monitoring results, the last growing location prior to shipping, and shipping destination.
3. Receiving and shipping inspections of boxwood/pachysandra plants, documented on the pick, shipping or receiving or invoicing slips, including visual inspection results, symptomatic plants, and inspectors name.

[1] Based in part on: *Boxwood Blight Confirmed on Pachysandra in a Connecticut Landscape*. Dr. Sharon Douglas, The Connecticut Agriculture Experiment Station
http://www.ct.gov/caes/lib/caes/documents/publications/fact_sheets/plant_pathology_and_ecology/natural_infection_of_pachysandra_with_boxwood_blight_in_connecticut_landscapes_07-03-12.pdf

4. Fungicide treatment records.

Incoming Plants

The history of received boxwood/pachysandra plants should include the supplier source, the original propagator details (if different), and comments regarding the Best Management Practices under which the plants have been grown. This information should be included on or with the receiving documentation. Select boxwood/pachysandra suppliers from one of the following:

- Nurseries that have implemented Boxwood Blight Best Management Practices and that will submit an application for participation in the Clean Plants Phase 1 *C. buxicola* Certification Program, or
- Nurseries in the Clean Plants Certification Program with the *C. buxicola* module (when available), or
- Nurseries that are deemed by CNCI to be of low risk (to be determined at a later time)

Returns

- No boxwood/pachysandra plants should be returned to the nursery

Segregation Area for Received Plants (Buxaceae)

A segregated area should be organized for received plants. This area needs to be separated from the production facility by a barrier at least 0.5 meters (50 cm) higher than the highest plant adjacent, and/or by a two (2) metre (canopy to canopy) host-free buffer. This will prevent any latent infections (no visible symptoms yet) on received host plants from spreading to adjacent production plants. Received host plants should be held in this area from four to six (4 to 6) weeks and up to one growing season. The shorter segregation period (4 to 6 weeks) can be used when the weather conditions are most favourable to disease development (warm and rainy).

Best Management Practices[2]

As disease symptoms can still appear after the initial segregation period, the following highly recommended practices for host plant production areas are strongly encouraged:

1. Train appropriate staff about *C. buxicola* including symptoms and risk of spore movement by natural means, staff, equipment, pruning tools, plants, and plant debris.
2. Trained nursery staff should inspect inbound and outbound host plants for disease symptoms.
3. Manage movement of staff, equipment and plants to minimize potential spore movement (e.g. work in lower risk crops first, have dedicated crew).
4. Sanitize equipment and tools regularly.
5. Use new pots and media for host plant production.
6. Remove leaf litter and other plant debris to reduce inoculum levels. This step is critical to boxwood blight management. Debris should not be composted. Debris may be:
    i. bagged and disposed of offsite
    ii. burned to ash, or
    iii. buried to a depth of 1 metre (3 feet) onsite
7. Maintain adequate spacing between plants (spacing depends on the species) to promote air circulation, thus reduce prolonged wetness.

[2] Based in part on: *Boxwood Blight: A New Disease for Connecticut and the US*. Dr. Sharon Douglas, The Connecticut Agriculture Experiment Station
http://www.ct.gov/caes/lib/caes/documents/publications/fact_sheets/plant_pathology_and_ecology/boxwood_blight-_a_new_disease_for_connecticut_and_the_u.s.__12-08-11.pdf

8. Minimize leaf wetness with irrigation practices that result in a period leaf wetness of less than five hours per day. Direct runoff water away from crop.
9. Avoid working in beds during rainy periods or right after irrigation, or work in beds at the end of the day with subsequent sanitation of clothing and tools before the beginning of work the following day.
10. Manage production blocks as potential risks if infected plants are suspected (strongly recommended) .
11. To minimize the chance of cross-infection keep production blocks of host plants apart from each other with a 2-metre buffer (canopy to canopy) of non-host or no plants between.
12. Avoid mingling recently received host plants and host plants assembled for shipping if your facility has a single receiving/shipping area (i.e. separate inbound and outbound host plants.

Integrated Pest Management Recommendations

- Practise regular and thorough inspections by trained staff of all host plants (production and permanent plantings) throughout their crop cycle with records of symptoms and resulting actions.
- Inspection frequency should increase during optimum disease development conditions (warm, rainy weather).
- Maintain spray records and follow up inspection results.
- Implement a process for handling symptomatic material, including sampling and testing, and disposal (after confirmation) by bagging and disposing of off site, or burning/burying on site.

Biosecurity

1. Establish entry and movement restrictions for visitors and workers in host plant production areas.
2. Sanitize footwear and equipment on a standardized basis. For example, sanitize after every block of '*x*' number of plants, or every block, or under certain conditions to minimize potential spore transmittal.
3. Collect all plant debris from external sources, including debris in delivery trucks, and dispose of by bagging and dumping off-site, or burning/burying on-site.

Outgoing Plants

- Maintain records of the date of shipment including the results of a visual inspection for symptoms at shipping.
- Clean out trailers of debris before loading boxwood plants. Handle the collected debris as stated under 'Biosecurity'.

Eradication Procedures

When a positive find of Boxwood Blight is confirmed,

- Assess the severity of infection (inspections, records, etc. to trace forward & back)
- Minimize traffic in/through the infected block
- Determine the scope of eradication required (should the whole block be destroyed?)
- Dispose or destroy the infected material by incineration, burial, or off-site disposal
- Sanitize transport containers and vehicles, and implement strict sanitation guidelines

NOTICE:

These Box Blight BMP's are recommendations for nursery growers, to enable them to minimize the risk of moving *C. buxicola* through the wholesale nursery industry. Implementation of these measures cannot guarantee that nurseries will remain *C. buxicola*-free. This document and its practices are based

on the most current information available; as the science evolves and new control measures are introduced, BMP's will change.

For further information about *C. buxicola* in your area, contact your provincial government agricultural ministry office or your local branch of the Canadian Food Inspection Agency.