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SUGGESTED BEST MANAGEMENT PRACTICES FOR BOXWOOD BLIGHT FOR CONNECTICUT -POSITIVE PRODUCTION NURSERIES-

Version 2.0**

****These are subject to revision based on the availability of new information (revised 27 January 2014).**

A. ELIMINATION OF THE PATHOGEN

1. The following protocol will be initiated for boxwood blocks that have tested positive:
 - i. All infected plants will be buried or incinerated with oversight by state plant inspectors as soon as disease is detected.
 - a) Efforts should be made to prevent plant debris from contaminating the nursery on route to disposal (e.g., cover trailer loads of infected plants with plastic sheets).
 - b) At least 2 feet of soil should be placed over buried plants. Burial sites and staging areas around these sites should be capped with at least an additional 2 inches of clean soil.
 - c) Pots can be buried with infected plants or stacked for decontamination and disinfestation.
 - a. All organic matter and plant debris should be removed and properly disposed.
 - b. Products for sanitizing (use label rates): phenolics (e.g., Lysol concentrate); 1:10 dilution of household bleach (10% Clorox); hydrogen dioxide (e.g., ZeroTol, Oxidate); and hydrogen peroxide, peroxyacetic acid, and octanoic acid (e.g., X-3). Personal protective equipment may be necessary when handling some sanitizers.
 - c. Products for sanitizing boots, shoes, and clothing in the field include over-the-counter sprays (e.g., Lysol disinfectant spray).
 - ii. Apparently healthy (“non-symptomatic”) plants will be held on a rolling 3-month schedule to ensure that only apparently healthy, pathogen-free boxwood are shipped.

- a) The 3-month schedule is based on the date of the most recent positive detection. If/when new positives are detected, the clock starts again for another 3 months.
- iii. Plants within large houses should be divided into manageable-sized groups to minimize the number of plants that need to be destroyed if positives are detected. Small group blocks should be separated by a minimum of 4-6 feet.
 - a) When disease is detected in a group or small block, all plants in the group will be removed for burial or incineration.
 - b) Symptomatic plants should not be moved to another part of the nursery unless they are being moved specifically for disposal. This eliminates contamination of additional sites.
 - c) This will automatically set the holding clock back to 3 months.
- iv. Plants will be inspected on a weekly basis (or more frequently, if new infections are detected).
- v. Plants will not be sprayed with fungicides during the 3-month holding period.
 - a) Because no fungicide sprays should be applied, routine practices such as canopy pruning should be suspended during this period.
 - b) Efforts should also be made to minimize handling of the crop (e.g., for spacing).
- vi. All plant debris should be removed on a regular basis by vacuuming, sweeping, or raking. Debris should be bagged for incineration or burial. At least 2 feet of soil should be placed over buried plants. Burial sites and staging areas around these sites should be capped with at least an additional 2 inches of clean soil.
- vii. Plants can only be shipped after they are examined by CAES inspectors and are given an apparently healthy status.

B. EXCLUSION OF THE PATHOGEN

1. Start with pathogen-free material by propagating from stock plants on-site or purchasing from reputable suppliers or nurseries that are licensed and/or certified according to all applicable phytosanitary laws and regulations.
 - i. Avoid purchasing from suppliers in states other than CT known to have infected boxwood.
 - ii. Request a history of fungicide treatments with each shipment (fungicide name, application rate, and time).
 - iii. Carefully inspect plants or cuttings for symptoms at the time of purchase or when received from supplier. Personnel should be trained to detect boxwood blight. All symptomatic plants should be tested.
2. Newly purchased plants or rooted cuttings should be isolated from existing boxwood plantings or production areas in nurseries for at least four weeks, but preferably for longer.
 - i. Keep plants labeled or barcoded to be able to track the vendor source.
 - ii. Physically separate material by source--avoid co-mingling of plant material from different vendor sources.
 - iii. Holding area should have a surface that can be easily cleaned of plant debris from incoming shipments, delivery trucks, and held plants.

- iv. Suspend the use of fungicides on new plants during the holding period.
 - v. Monitor sanitation practices of delivery trucks and shipping containers.
 - a) Products for sanitizing (use label rates): phenolics (e.g., Lysol concentrate); 1:10 dilution of household bleach (10% Clorox); hydrogen dioxide (e.g., ZeroTol, Oxidate); and hydrogen peroxide, peroxyacetic acid, and octanoic acid (e.g., X-3). Personal protective equipment may be necessary when handling some sanitizers.
 - b) Products for sanitizing boots, shoes, and clothing in the field include over-the-counter sprays (e.g., Lysol disinfectant spray).
 - vi. Any boxwood with suspicious symptoms should be sent to CAES for diagnosis and testing.
3. No returns of boxwood plants should be accepted onto the property.
 - i. The purpose is to avoid possible entry of plants that may have been exposed to boxwood blight.
 4. No dead plant material should be brought onto a commercial property for disposal.
 - i. As a courtesy to their customers, many commercial properties currently allow customers to dispose of dead/removed plant material on their properties. However, this is discouraged, since it creates a potential pathway for boxwood blight to enter the property.

C. WATER MANAGEMENT

1. Avoid overhead watering or working with plants when they are wet.
 - i. Water is important for the spread and development of boxwood blight.
2. Irrigation water from sources other than wells or municipal water sources should be tested annually for water quality and water-borne plant pathogens by a private testing laboratory.
3. Increase spacing between plants (rather than placing them pot-to-pot) to maximize air circulation and minimize conditions favorable for disease development and spread, when possible.
4. Avoid or minimize accumulation of standing water in boxwood blocks.

D. NURSERY LAYOUT

1. Locate new boxwood blocks in areas where boxwood (and boxwood blight) have not previously been grown. These areas should be located as far as possible from the infected blocks.
2. Provide separate water supply for new boxwood blocks.
3. In houses where boxwood blight has been detected, separate plants into manageable “groups” separated by a minimum of 4-6 ft.

E. SANITATION

1. Remove leaf debris by raking or vacuuming. Debris should be bagged for incineration or burial.
 - i. In commercial field plantings, burning plant debris with a propane torch, in accordance with state and local laws and regulations, is an option.
2. Monitor plant debris in run-off water. Divert from other boxwood production areas.

3. Routine operations to produce a commercially acceptable crop (e.g., canopy pruning, plant spacing) should involve extensive sanitation practices. A suggested protocol is outlined as follows:
 - i. Pruning crews should focus on a single house in order to complete the pruning as rapidly as possible.
 - ii. Pruning should not occur if plants are wet or if there is high humidity.
 - iii. The day before pruning is scheduled, plants should be thoroughly sprayed with ZeroTol.
 - iv. Immediately after the last plant is pruned in a house, the crop should be sprayed again with ZeroTol. Routine fungicide programs can resume after pruning, as applicable.
 - v. Tools and equipment should be sanitized when moving between different *Buxus* blocks within a house.
 - vi. A similar program can be followed for other practices that require handling the plants such as spacing pots.
4. After every crop production cycle, remove all crop debris and disinfest propagation mist beds, sorting areas, cutting benches, machines, and tools.
 - i. Products for sanitizing (use label rates): phenolics (e.g., Lysol concentrate); 1:10 dilution of household bleach (10% Clorox); hydrogen dioxide (e.g., ZeroTol, Oxidate); and hydrogen peroxide, peroxyacetic acid, and octanoic acid (e.g., X-3). Personal protective equipment may be necessary when handling some sanitizers.
 - ii. Products for sanitizing boots, shoes, and clothing in the field include over-the-counter sprays (e.g., Lysol disinfectant spray).
5. Work in blocks with infected or exposed and potentially infected plants last—after completing work with healthy plants.
 - i. Wearing of protective gear can be helpful.
6. If a block known to have boxwood blight has been visited, wash and sanitize shoes, tools, equipment, and vehicles that may have become contaminated before traveling to other areas on the nursery.
 - i. Use of protective gear can be helpful.
7. Use new or clean and properly disinfested pots or flats for boxwood production. Use new, not reused potting mixes. Sanitize all shipping containers, benches, and equipment.
8. Train all nursery personnel to avoid movement through areas with infected or exposed and potentially infected plants and to regularly sanitize clothing and equipment as part of standard operating procedures.

F. INSPECTION

1. Inspect all boxwood blocks weekly throughout the growing season by trained personnel.
 - i. As soon as boxwood blight symptoms are detected, immediately pull and remove whole plants and place them in plastic bags to avoid carrying infected material through the house or nursery.
 - ii. Infected plant material should NOT be composted.

- iii. If you observe suspicious symptoms on boxwood, it is important to have the disease accurately identified by a specialist (state inspector or CAES plant pathologist).
2. Routinely monitor, inspect, and isolate by vendor all incoming boxwood material.
3. Routinely inspect boxwood in the landscape on the growing grounds or surrounding area for boxwood blight.

G. RECORD KEEPING/TRACEABILITY

1. Keep accurate, detailed records of:
 - i. Incoming and outgoing plants.
 - a) Maintain a complete history for plants while they are in the nursery;
 - ii. Shipping records (plants shipped, location);
 - iii. Propagation of plant material;
 - iv. Mortality due to any cause;
 - v. All chemical/fertilizer applications;
 - vi. Weather records, if available.

H. TRAINING

1. Educate and train nursery personnel to recognize boxwood blight.
 - i. Early detection is critical.
2. Train personnel in nursery BMPs, including sanitation.

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