

Significance to the Horticulture Industry

Boxwood Propagation

Rooting Response of Boxwood Cultivars to Hot Water Treatment and Thermal Sensitivity of *Calonectria henricotiae* and *C. pseudonaviculata* in Diseased Boxwood (*Buxus* spp.). Nina Shishkoff, Megan E. Miller, Marc. A. Cubeta. *Journal of Environmental Horticulture* 39(1):1–10

The production of healthy boxwood cuttings is important for reducing the introduction and spread of boxwood blight disease to nurseries and the landscape. In this study, we investigated the potential use of hot water as a cost-effective and non-chemical way to reduce the occurrence and spread of boxwood blight disease to growers, homeowners and the nursery trade in the United States. Our approach involved determining the time and water temperature needed to kill the boxwood blight fungus without causing damage and injury to boxwood cuttings. We determined that cuttings of four commonly grown boxwood cultivars were able to withstand treatment in 47.5 C (117 F) water for 1 hour without damaging leaves and the ability of cuttings to form roots to a standard level accepted by growers. After 25-30 minutes of treatment in heated water at this temperature, we found that fungal growth and spore production were greatly reduced on boxwood branches and leaves. We conclude that with careful attention to the boxwood cultivar being treated, it may be possible to include hot water immersion in an integrated pest management system for propagating cuttings to produce healthy boxwood plants.

Entomology

Relative Susceptibility, Preference, and Suitability of *Carpinus* Taxa for the Japanese Beetle (Coleoptera: Scarabaeidae). Fredric Miller and Susan Wiegrefe. *Journal of Environmental Horticulture* 39(1):11–21

Nineteen *Carpinus* taxa were evaluated in a series of no-choice and multiple-choice laboratory feeding bioassays for susceptibility, preference, and suitability for the adult Japanese beetle (*Popillia japonica*). In this study, only *C. causica*, *C. tschonoskii*, and the hybrid *C. caroliniana* x *C. coreana*, were significantly less susceptible to feeding by adult Japanese beetles, the remaining *Carpinus* taxa being moderately to highly suitable for adult Japanese beetles. Feeding susceptibility does not appear to reflect feeding preference or reproductive suitability. Physical leaf traits such as leaf thickness and toughness do not present a clear picture of host suitability (i.e. fecundity). Additionally, hybridization may have both a positive and/or negative influence on host susceptibility, preference, and suitability. There appears to be a “*C. tschonoskii* factor” affecting susceptibility and preference with the hybrids of *C. betulus* x *tschonoskii* and *C. caroliniana* x *tschonoskii* being less susceptible and less preferred. Based on the findings in this study, there does not appear to be a large pool of *Carpinus* taxa suitable for future tree breeding programs in areas where chronic Japanese beetle outbreaks are common. However, *C. betulus*, *C. caroliniana*, *C. cordata*, *C. japonica*, and *C. tschonoskii*, and their related hybrids, may have future breeding potential for use in areas where chronic Japanese beetle populations are low or rare due to their broad hardiness range, ability to tolerate varied soil conditions, minimal maintenance, and their use in landscape and urban forest replanting efforts.

Irrigation

High pH, Low Alkalinity Pond Water Used for Overhead Irrigation Does Not Affect Plant Growth of Select Flowering

Shrubs. A.V. LeBude, J.S. Owen, Jr., and C. Holmes. *Journal of Environmental Horticulture* 39(1):22–32

Pond surface water can exceed the best management practices (BMP) range for pH of 5.8 to 7.0 outlined for growing container ornamental crops in season. Elevated pH (>7.0) in ponds used for source water to irrigate is common among producers across the southeastern U.S. Remediation of pond water to properly improve quality within BMP guidelines consists of screens or finer filtration devices (e.g., sand or disc filters), monitoring pH and total alkalinity to determine the correct injection rate, then injecting an acid (e.g., sulfuric) followed by proper residence time to thoroughly mix chemicals with water. Afterwards, within the irrigation system, monitoring equipment is used either in-line, which can automatically inform and adjust the upstream injection rate, or monitored manually at the point of trajectory (sprinkler head) using portable devices or litmus tests to ensure pH remains within recommended BMP ranges. This study suggests that irrigating container plants overhead with high pH, low alkalinity (<100 ppm total alkalinity) source water from ponds may not affect growth enough to warrant investment in an injection system simply to lower pH to meet BMPs. The range for pH stated in BMPs is still important for producers treating water with sanitizing chemicals to reduce microorganisms. If sanitizing chemicals are used, many systems benefit from reducing pH prior to chemical injection and therefore might feasibly justify an acid injection system.

Propagation Trays

From Propagation to Field: Influence of Tray Design on Tree Seedling Quality and Performance. Darby McGrath, Jason Henry, Ryan Munroe and Charlene Williams. *Journal of Environmental Horticulture* 39(1):33–40

The nature of root-constricting container growing has necessitated innovations in order to avoid producing permanently misdirected tree roots. One approach has been to use the growing substrate-air interface to naturally inhibit root growth. To that end, many iterations of propagation trays using various kinds of air-pruning features have been studied and used for decades. Air-pruning features have included different sized and shaped drainage holes, egress holes or slits on the sides of cell walls, and open, bounded substrate-using trays, which allow for air-pruning around the majority of the root ball with minimal plastic contact. Many container-propagated tree seedlings in the horticulture industry end up being upsized, either in the field or into larger containers. Still, seedlings may also be sold as plugs for naturalization plantings. Root systems with well-distributed structural roots, lateral root development and a lesser incidence of coarse root defects from an early age may perform better once transplanted or placed into a larger container. Additionally, reports that misdirected structural roots can reduce tree stability and, in some cases, reduce long-term vigor, highlight concerns about root system quality from the liner stage of production.

Wire Baskets

Impacts of Wire Basket Retention and Removal on Whole Tree Stability and Long-term Growth. Richard J. Hauer, Andrew K. Kooser, Jason W. Miesbauer, Jeff Edgar, and David Kleinhuizen. *Environmental Horticulture* 39(1):41–46

Wire baskets have played a critical role in the mechanization of field-grown nursery tree production. Despite their prevalence, there

is still a lack of industry consensus regarding what should happen to this packing material (and other materials like burlap) at planting. In this study, we found no differences in tree survival or growth five to six years after transplanting when trees were planted with wire baskets intact, partially removed or fully removed and treated burlap

folded or unfolded. Moreover, wire basket removal or retention did not influence rooting strength when trees were pulled to assess whole-tree anchorage. This paper adds to the small, but growing body of literature that directly addresses best practices for planting balled-and-burlapped trees.

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