Significance to the Horticulture Industry

Boxwood Blight

Evaluation of a Novel Endophytic *Pseudomonas Lacits* Strain for Control of Boxwood Blight. Ping Kong. *Journal of Environmental Horticulture 37(2):* 39-43.

Boxwood blight is a destructive and fast-growing disease affecting *Buxus*. It is a serious concern for the boxwood nursery, landscape and plant trading industries. Economic losses to from the disease are enormous due to the lack of resistant cultivars, ineffectiveness of control practices and reliance on costly and potentially environmentally-damaging chemical controls. The discovery of *Pseudomonas lacits* strain SW, a foliage endophyte strongly antagonistic to the boxwood blight pathogen, opens up new avenues for controlling boxwood blight sustainably and effectively. Pretreating plants with SW at high concentrations with lead times of 10 days or less reduced disease incidence by more than 70%. Thus, SW has great potential to be developed into a biofungicide which can fulfill the urgent need for boxwood blight control.

Hazelnut Plant Propagation

Optimizing Temperature and Humidity for Rooting Hybrid Hazelnuts from Hardwood Stem Cuttings. Lois Braun and Donald Wyse. *Journal of Environmental Horticulture 37(2):* 44-49.

Hybrid hazelnuts (*C. americana x avellana*) are one of several new perennial and winter annual crops being developed as part of the University of Minnesota's Forever Green Initiative, to provide continuous living cover on a landscape that would otherwise be bare through the non-growing season. The annual row crops that currently dominate the Upper Midwest keep the landscape green for only four to five months of the year, leaving it brown the majority of the time. Unvegetated soil is vulnerable to soil erosion, leaching of nutrients and loss of organic matter, which lead to contamination of surface and ground waters, and loss of productivity and ecological resilience. Forever Green crops provide farmers and other landowners with economically profitable alternatives to summer annuals. Hazelnuts also provide a healthful and flavorful human food. The primary obstacle to adoption of hybrid hazelnuts thus far has been lack of improved germplasm. Hazelnut breeders at the University of Minnesota are working to develop improved varieties, but these need to be propagated for deployment to growers. Micropropagation is likely the only method capable of producing large numbers, but thus far, success with micropropagation has been variable. Mound layering is an option, but only produces small numbers of clones. Propagation from stem cuttings is an alternative that can augment mound layering to produce modest numbers of new plants needed for research trials or for small-scale commercial plantings. This paper is the second in a series describing trials to optimize propagation of hybrid hazelnuts from hardwood stem cuttings.

Taproot Pruning and Restriction

Tree Seedling Root Architecture Alteration by Tap Root Pruning. Shanon Hankin, Marvin Lo, Frank Balestri, Gary Watson. *Journal of Environmental Horticulture 37(2):* 50-54.

Nursery field production of trees with strong taproots has traditionally included taproot pruning to make them easier to transplant. In this study, taproot pruning resulted in a large and significant increase in the number of new, but still vertically oriented, roots from the cut end of the primary root (regenerated taproots) in two species. Catalpa seedlings, which produced many strong laterals on unpruned taproots, showed greater reduction in number and size of lateral roots after taproot pruning than Kentucky coffee tree (with fewer and smaller natural lateral roots). The two species responded differently to restriction of the single, unpruned taproot by container depth. For catalpa, with more laterals naturally, the number of laterals was not significantly changed when the taproot was restricted by container depth. For Kentucky coffee tree, with fewer natural laterals, restricting the taproot at 15 cm significantly increased the number of lateral roots compared to the deeper containers, suggesting that restricting the taproot could increase the number of laterals in species that naturally produce fewer. Restricting multiple taproots on root-pruned plants did not affect lateral root development for either species, but this may have been due to the low number of lateral roots on the regenerated taproots. Taproot pruning can result in the initiation of multiple, new rapidly growing vertical roots from the cut end and fewer lateral roots. Restricting taproot development and minimizing root regeneration from the end, similar to what occurs with air pruning, can result in more lateral roots. Trees with more lateral roots dominating could be more transplantable and better suited to dense, poorly drained urban soils (where they are often planted). This research focused on one-year-old seedlings of two species; more extensive research is needed to support these results, to investigate taproot pruning responses in other species, and to monitor trees throughout later stages of production. Documenting better performance of trees with more lateral roots in the landscape could help justify additional costs of producing them.

Weed Control

Efficacy of Preemergence Herbicides over Time. James E. Altland. *Journal of Environmental Horticulture 37(2):* 55-62.

There are numerous preemergence herbicide products available for container-grown nursery crops. It has been established that some herbicide active ingredients are more effective at controlling certain weeds than others. This information is used by growers in develop weed management programs. Another factor affecting herbicide performance is how long the product will remain effective on the substrate surface. There is comparatively less information on herbicide longevity. The objective of this research was to provide more information on how long several commonly used herbicides remain effective after application. Herbicides containing oxyfluorfen or flumioxazin provided effective preemergence flexuous bittercress and creeping woodsorrel control even when weed seeds were introduced to the containers up to 8 to 10 weeks after herbicide application. Other herbicide products, including pendimethalin or prodiamine + isoxaben, resulted in reduced control as the time between herbicide and seed application increased. This information provides growers with additional criteria to develop effective weed management programs.

Well-Being Benefits of Plants

An Update of the Literature Supporting the Well-Being Benefits of Plants: Part 2 Physiological Health Benefits. Charles R. Hall and Melinda J. Knuth. *Journal of Environmental Horticulture 37(2):* 63-73.

This paper is the second of a four-part series that provides a review of the substantial body of peer-reviewed research that has been conducted regarding the economic, environmental, and

health and well-being benefits of green industry products and services. While the first article focused on the emotional and mental health benefits that plants provide, this article focuses specifically on the physiological health benefits provided by plants. These benefits include better sleep, increased birth-weights, decreased incidence of diabetes, decreased ocular discomfort, enhanced immunity, improved circadian functioning, improved rehabilitation from illnesses, decreased likelihood of cardiovascular and respiratory disease, decreased mortality, improved digestive functioning, decreased susceptibility to allergies, and improved cognitive development. This research should be strategically incorporated into both industry-wide and firm-specific marketing messages that highlight how quality of life dimensions are affected in order to enhance the perceived value and relevance of green industry products for gardening and landscaping consumers in the future.