Significance to the Horticulture Industry

Greenhouse Gas Emissions

Effects of Fertilizer Placement on Greenhouse Gas Emissions from a Sun and Shade Grown Ornamental Crop. Anna-Marie Murphy, G. Brett Runion, Stephen A. Prior, H. Allen Torbert, Jeff L. Sibley, Glenn B. Fain, and Jeremy M. Pickens. *Journal of Environmental Horticulture* 37(3):74–80

The ornamental plant production industry has the capacity to impact global climate change through a thorough review of its best management practices (BMP), and how each contributes to global warming through the emission of common greenhouse gases CO_2, N_2O and CH_4. Previous research has evaluated substrate alternatives, irrigation delivery method and fertilizer application method in an effort to determine efflux patterns associated with each BMP. The focus of this research is a continuation of those efforts, evaluating fertilizer application method (dibbled, incorporated or top-dresesed) with either a sun- or shade-grown crop. Emissions of CO_2 were highest for 'Royal Standard' hosta (*Hosta* × 'Royal Standard') as compared to full-sun-grown 'Stella D'Oro' daylily (*Hemerocallis* × 'Stella D'Oro'), which is to be expected considering the size differences in the larger shade-grown hosta as compared to daylily. By this same logic, N_2O emissions were confirmed to be lowest for shade-grown hosta, as larger plants would predictably require larger amounts of N, leaving less available for leaching. Results from this research showed that regardless of species, CO_2 and N_2O emissions were least for plant-pot systems fertilized with the dibble method. CO_2 emissions were highest for plant-pot systems fertilized by incorporation. No differences were observed between N_2O efflux measurements for systems fertilized by either the incorporated or top-dressed methods, as both were higher than N_20 emissions where the dibbled fertilizer method was used. Methane efflux throughout the study was negligible, and not significantly affected by treatments or their interactions.

Hazelnut Propagation

Timing of Collection and Preparation of Hardwood Stem Cuttings for Propagating Hybrid Hazelnuts. Lois Braun and Donald Wyse. *Journal of Environmental Horticulture* 37(3):81–84

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. Un-vegetated 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 small-scale commercial plantings. This paper is the third in a series describing trials to optimize propagation of hybrid hazelnuts from hardwood stem cuttings. Hazelnut stems collected in full leaf died, but ones collected soon after leaf abscission, in early November, could be rooted.

Hazelnut Propagation

Field Pretreatment of Crown Suckers for Propagating Hybrid Hazelnuts. Lois Braun and Donald Wyse. *Journal of Environmental Horticulture* 37(3):85–89

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. Un-vegetated 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. This paper is the fourth in a series describing trials to optimize propagation of hybrid hazelnuts from hardwood stem cuttings. 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. Field pretreatment of crown suckers for stem cutting propagation can be a useful way to maximize production of clones when there are limited numbers of stock plants. This method is particularly useful as a way of making use of stems that failed to root in mound layers.

Sprayer Technology

Control of Insects and Diseases with Intelligent Variable-rate Sprayers in Ornamental Nurseries. Liming Chen, Matthew Wallhead, Heping Zhu, and Amy Fulcher. *Journal of Environmental Horticulture* 37(3):90–100

Compared to sprayers equipped with intelligent variable-rate technology, conventional constant-rate sprayers often use more pesticide to achieve insect and disease control in ornamental nurseries. Recently developed intelligent, variable-rate sprayers deliver sufficient pesticide volume to tree canopies with varying size and a range of canopy characteristics while reducing the amount reaching the ground and air, thereby reducing pesticide and operational costs as well as any adverse impact to the environment. However, there have been very few reports about the efficiency of the intelligent sprayers for the control of insect and disease pests. This research indicates that the intelligent sprayers are equally or more effective for control of insect and disease pests in ornamental tree nurseries. Thus, intelligent spray technology provides a highly efficient, low cost, and environment- and worker-friendly pesticide spray technology for the ornamental nursery industry.

Weed Control

Japanese Stiltgrass (*Microstegium vimineum*) Germination Pattern and its Impact on Control Strategies. Geoffrey Payne, Jim Evans, Jeffrey Derr, and Ethan Murdock. *Journal of Environmental Horticulture* 37(3):101–107

Japanese stiltgrass is an invasive species that invades shady, moist sites. Germination peaks in early spring prior to June in eastern Virginia. Preemergence herbicide applications therefore need to be timed between December and March, as treatments utilizing May applications were less effective. Split dose applications of preemergence herbicides that utilize a May treatment are more effective for control of crabgrass species than Japanese stiltgrass, as germination has already commenced for Japanese stiltgrass. Japanese stiltgrass escapes following preemergence applications can grow significantly before frost, requiring other control measures. In comparison, a single glyphosate application in late June or July can be very effective for Japanese stiltgrass control, as emergence has occurred prior to treatment.

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