Significance to the Horticulture Industry

Automated Irrigation

Implementation of Soil Moisture Sensor-based Automated Irrigation in Woody Ornamental Production. William D. Wheeler, Matthew Chappell, Marc van Iersel, and Paul Thomas. *Journal of Environmental Horticulture* 38(1): 1-7.

A soil moisture sensor-based automated irrigation system was trialed in a commercial ornamental nursery over the 2014-2015 growing seasons. In both years, use of the sensor-based system resulted in an approximate 50% reduction in irrigation application (volume) when compared to grower-managed irrigation. No differences in growth and equivalent or slightly reduced crop losses were noted when comparing the sensor-based irrigation system to grower-managed irrigation in production of *Pieris japonica*, *Hydrangea quercifolia*, and *Kalmia latifolia*. In 2014, *Rhododendron catawbiense* had equivalent canopy size and reduced mortality when comparing sensor-based irrigation to grower-managed irrigation. However, in 2015 irrigation control with the sensor-based system resulted in significant (>50%) *Rhododendron* losses. High mortality was thought to have resulted from use of averaged (across crop species) soil moisture readings to establish irrigation set points. Canopy structure of *Rhododendron* obstructed water capture to a greater degree than the other three species due to canopy architecture. This effect, combined with precision irrigation applications, resulted in persistent drought conditions within the *Rhododendron* block. Soil moisture sensor-based automated irrigation can be an effective means of automating irrigation. Support from crop consultants is highly desirable to minimize disruption and maximize adoption during implementation.

Crapemyrtle Bark Scale

Seasonal Population Patterns of a New Scale Pest, *Acanthococcus Lagerstroemiae* Kuwana (Hemiptera: Sternorrhynca: Eriococcidae), of Crapemyrtles in Texas, Louisiana, and Arkansas. Erfan Vafaie, Michael Merchant, Cai Xiaoya, John D. Hopkins, James A. Robbins, Yan Chen, and Mengmeng Gu. *Journal of Environmental Horticulture* 38(1): 8-14.

The crapemyrtle bark scale, *Acanthococcus lagerstroemiae*, is an invasive scale insect pest of crapemyrtles. Crawler populations were monitored using double-sided sticky tape on established crapemyrtle trees in Tyler (TX), Huntsville (TX), Dallas (TX), College Station (TX), Shreveport (LA), and Little Rock (AR) from 2015 - 2017 to determine crawler activity and determine if degree-day models could predict the first peak in crawler activity. Difference in crawler densities on upper and lower branches of trees was also determined by using double-sided sticky tapes. The first peak in crapemyrtle bark scale crawler activity was between March 26th and May 22nd across all locations and years, with multiple subsequent peaks per season frequently found, suggesting multiple generations. Using the average date (May 2nd) to predict the first peak crawler activity resulted in the lowest variance and was subsequently considered a better predictor compared to any degree-day model. There was no apparent difference in crawler activity between upper and lower branches of crapemyrtle trees across an entire season. This study provides the first set of population dynamics data for crapemyrtle bark scale in the U.S. and will help with future bark scale management decisions.

Sulfur Amendment

Sulfur Amendment of Soil Improves Establishment and Growth of Firs in a Field Naturally Infested with Phytophthora. Richard S. Cowles. *Journal of Environmental Horticulture* 38(1): 15-21.

Acidification of soil from pH 6 to 4 by incorporating elemental sulfur reduced mortality and improved color and initial growth of Fraser fir, *Abies fraseri* (Pursh) Poir., and Canaan fir, *Abies balsamea* (L.) Mill. var. phanerolepis Fernald, planted into a field that had previously experienced significant losses consistent with phytophthora root rot. Acidifying the soil improved tree color starting the year of planting and persisting through five years. During their second year after planting, extension of terminal growth was 12.5 vs. 5.6 cm (4.9 vs. 2.2 in) for plots with soil pH of 4 and 6, respectively, averaged across tree species. In subsequent years, the growth rate of trees was unaffected by having acidified the soil. Over the course of five years, the average annual mortality rate for the trees was 1.4, 4.0, 9.7, and 12.2% for Canaan fir (pH 4), Canaan fir (pH 6), Fraser fir (pH 4), and Fraser fir (pH 6), respectively. However, all tree mortality for Canaan fir planted into acidified soil occurred during the first two years. A root dip with potassium phosphite at the time of planting only benefitted Fraser fir. Minimizing losses of trees in this field would require planting species less susceptible or resistant to phytophthora root rot infection and soil acidification.

Tree Root Architecture

Changes in Tree Root Architecture Resulting from Field Nursery Production Practices. Gary Watson and Angela Hewitt. *Journal of Environmental Horticulture* 38(1): 22-28.

Nursery production practices subject tree root systems to mechanical and environmental factors that are not imposed on plants regenerated naturally from seed. Architecture of undisturbed root systems of nine trees species commonly planted in urban landscapes was compared to root architecture of these tree species produced using common field nursery production practices. When young nursery production seedlings are root-pruned prior to replanting, the loss of the lower portion of the main root and lateral roots emerging from it, and initiation of adventitious roots from the cut end, alter the root system architecture. Nursery production plants have 7 to 48 percent fewer natural lateral roots that could develop into flare roots than undisturbed plants. New roots initiated from the cut end of the main root on nursery production plants can substitute for the loss of lateral roots, if accepted practices are followed. Root architecture of trees is established early. With minor exceptions attributed to the loss of small roots less than 1 mm diameter, there were no significant changes in the number of lateral roots over the 4 year period in both nursery production and undisturbed plants. This consistent number of roots also suggests that pruning the main root did not stimulate additional lateral roots above the pruning cut. Root architecture of liner stock produced in nurseries can be equivalent to undisturbed root systems.

Turfgrass Drought Response

Physiological Response to Water Deficit Stress with Restricted Rooting in Tall Fescue and Zoysiagrass. Travis Culpepper, Joseph Young, David T. Montague, Manish Sapkota, Eduardo Escamilla, and Benjamin Wherley. *Journal of Environmental Horticulture* 38(1): 29-36.

Urban soils may restrict turfgrass rooting depth with shallow soil layers in high sand content soils, which may influence water conservation. A greenhouse study sought to quantify water usage and determine the physiological response of turfgrasses at four irrigation levels. 'ATF-14340 tall fescue (*Schedonorus arundinaceus* (Schreb.) Dumort. nom. cons.; syn. *Festuca arundinacea* Schreb.), 'Jamur' Japanese lawngrass (*Zoysia japonica* Steud.), and 'Zeon' Manilagrass [*Zoysia matrella* (L.) Merr.] were established in 10 cm (4 in) diameter by 17.8 cm (7 in) tall containers. Each species was irrigated with 16.5, 21.9, 27.3, or 32.7 mm.wk^{-1} (0.65, 0.86, 1.1, or 1.3 mm·wk^{-1}). Gravimetric water loss was determined by pre- and post-irrigation pot weights. Turf quality, leaf discoloration, percent green cover, and gross photosynthesis were evaluated weekly and root parameters were measured at the conclusion of each trial. Although root mass was similar among species, water deficit stress and leaf discoloration occurred sooner in tall fescue than the two *Zoysia* species, reducing turf quality and green cover. Japanese lawngrass and Manilagrass had greater stomatal conductance, resulting in 109 and 89% higher gross photosynthesis relative to tall fescue. Both zoysiagrasses maintained acceptable turf quality with 27.3 mm water mm·wk^{-1}. However, tall fescue quality was not acceptable at any irrigation level.