

Significance to the Horticulture Industry

American Chestnut Cuttings

Histology of Adventitious Root Formation and Phytohormone Analysis of American Chestnut Cuttings. Xinya Lu, Maxine Cuarto, and Haiying Liang. *Journal of Environmental Horticulture* 41(3):80–86

The American chestnut was among the largest, tallest, and fastest-growing trees in the eastern United States, with great economic and ecological value. The species is notoriously recalcitrant to stem rooting. Overcoming this obstacle by developing an efficient cutting rooting system for this heritage species is critical for the rapid and mass production of elite cultivars. This study identifies the location and cell type that form American chestnut root primordia and reveals the differences in endogenous hormones between American chestnut and easy-to-root poplar cuttings. It is suggested that a low auxin content and high levels of root-inhibiting endogenous hormones, such as ABA, JA, SA, and cytokinins contribute to American chestnut's recalcitrance to rooting. This work provides novel insights into American chestnut's adventitious root induction, laying the foundation for improving the rooting system in American chestnut cuttings. The impact is of great significance to the restoration and diversity conservation of the species.

Cultivated Milkweed Hybrids

Assessing Ecological Impacts of Cultivated Hybrids of Milkweed (*Asclepias*). Justin Peterman, Conor Fair, Hannah Brown, Kris Braman, and Marc W. van Iersel. *Journal of Environmental Horticulture* 41(3):87–96

There are questions as to what extent new cultivated lines of native plants should be assessed for ecological consequences through their use in managed landscapes. Cultivated lines of native plants add complexity for breeding projects, as both ecological and ornamental value could be considered. Here we provide an example of an ecological trial by testing new interspecific hybrids of milkweed for their ecological impacts, prior to market release. We investigated the reproductive biology of the hybrids to understand the likelihood of outcrossing of hybrid genes into natural populations of *A. tuberosa*. Further, we investigated the likelihood that the interspecific hybrids will establish in natural environments and compete with natural populations. We then evaluated the ecosystem services for pollinating species, as selecting for horticulturally preferable traits could inadvertently select away from traits contributing to the coadapted plant-pollinator relationship. We suggest that new cultivars of native species should be shown to support diverse groups of pollinator species, with minimal loss of floral rewards, and with minimal likelihood of introgression, outcrossing, and establishment into natural populations.

Rooting of Cuttings

Foliar application of K-IBA to the Abaxial or Adaxial Leaf Surface With or Without a Surfactant Does Not Impact Root Formation in Buttonbush and Burning Bush *Euonymus* Cuttings. Robert L. Geneve. *Journal of Environmental Horticulture* 41(3):97–100

Applying auxin as a foliar spray has several advantages over traditional basal application methods for rooting cuttings. These include potential worker safety and application efficiency. Foliar auxin sprays may also become important in propagation systems

using automated machine-assisted sticking robotics. However, not all woody species respond to a foliar spray as well as a basal quick dip application for rooting and there are questions concerning initial auxin uptake and transport. The current study evaluated the efficacy of foliar auxin application to the adaxial (upper) or abaxial (lower) leaf surface and the impact of including a surfactant on rooting in cuttings from button bush and burning bush *euonymus*.

Sod Production

Nutrient Evaluation for Sod Production within the Lake Okeechobee Watershed. Mica McMillan, John Cisar, Paucic McGroary, George Snyder, and Michael Fidanza. *Journal of Environmental Horticulture* 41(3):101–108

Florida has the most land area in turfgrass sod production in the USA. Demand for sod continues as Florida's population has increased to be the third highest in the country in 2022. This study documents fertilizer inputs on sod farms in the Lake Okeechobee watershed, and specifically nitrogen (N) and phosphorous (P) exports via sod harvesting. Since the land occupied by those sod farms is within the Lake Okeechobee watershed basin, reducing N and P fertilizer inputs and increasing the removal of those nutrients through sod, could have an ultimate net positive effect of lessening the nutrient load into Lake Okeechobee and subsequent discharges into hydrologically-linked ecosystems such as the Everglades. In addition, the discharge of nutrient-rich water into coastal waters from Lake Okeechobee has been implicated in influencing Red Tide occurrence (i.e., harmful algal blooms). Thus, demonstrated reductions in fertilizer inputs and increased N and P exports away from fragile ecosystems could support the sod production industry's contribution to natural resource conservation and sustainable land management practices.

Variable-rate Spray Technology

Intelligent, Variable-rate Spray Technology Reduces Total Pesticide Output while Controlling Foliar Disease of Shumard Oak. Lauren Fessler, Sun Xiaocun, Wesley C. Wright, Heping Zhu, and Amy Fulcher. *Journal of Environmental Horticulture* 41(3):109–120

Variable-rate spray technology has repeatedly shown the potential to significantly reduce total pesticide output and off-target waste when retrofitted onto sprayers already being used at commercial nurseries. With this technology now commercially available (Smart Apply Inc., Indianapolis, IN), this reduction would not only decrease annual input costs for growers but also decrease environmental and health impacts. However, variable-rate spray technology must also sufficiently control pests in a range of nursery production systems for it to appeal to growers and for large-scale adoption to occur. This research shows that variable-rate spray technology utilized in a dense production system, i.e., a multi-row block of pot-in-pot tree production, can control diseases equally or better than conventional, constant-rate spray applications giving growers confidence to reap the benefits of adopting this technology. Additionally, this study documented substantial off-target spray losses to the nursery floor with both intelligent, variable-rate and conventional applications. Growers with variable-rate spray technology can reduce off-target ground applications and concomitant input cost by adjusting their sprayer detection to a crop height commensurate with the canopy height as opposed to the 0.1 m (0.3 ft) used in this study when making applications to control

canopy pests. Prior to spraying, producers without variable-rate technology can manually close lower nozzles to achieve a similar effect. An additional benefit to reducing off-target ground applications is minimizing the opportunity for non-target organisms, including beneficial fungi, e.g., *Trichoderma spp.*, and beneficial insects from being unnecessarily exposed to pesticides, which may contribute to improved soil, and overall ecosystem, health.

Winterberry Cultivars

Susceptibility Screening of Winterberry Cultivars Against Latent Fruit Rot, and Identification of Metabolites Correlated with Rot-resistant Phenotypes. Isabel B. Emanuel, Jessica L. Cooperstone, and Francesca Peduto Hand. *Journal of Environmental Horticulture* 41(3):121–132

Common winterberry is a deciduous shrub, bearing red, orange, or yellow fruit that persist on the plants through fall and winter. In the U.S., wholesales of winterberry woody cuts have an annual revenue of \$1.5 million (NASS 2019) and allow for an extension of the growing season in many nurseries. Latent fruit rot of winterberry, caused by the fungus *Diaporthe ilicicola*, has been confirmed in

nurseries throughout the Northeastern and Midwestern U.S., with up to 100% crop loss reported. This study aimed to determine whether resistant phenotypes exist within commercially available winterberry cultivars to provide nursery growers with recommendations when establishing new plantings. Eight cultivars were assessed including: ‘Winter Red’, ‘Winter Gold’, ‘Chrysocarpa’, ‘Roberta Case’, ‘Maryland Beauty’, ‘Red Sprite’, ‘Magical Showtime’, and ‘Stoplight’. Cultivars Winter Red and Maryland Beauty were found to develop lower levels of disease under both natural and artificial inoculum conditions, and in both field and container yard production systems; therefore, these cultivars should be preferred over others in nurseries with a history of the disease. Metabolic analysis of the eight winterberry cultivars screened for susceptibility in the field showed that the fruit of less susceptible cultivars display distinctly different metabolic profiles compared to the more susceptible cultivars. Eighty-nine metabolite features were identified as being putatively related with the less susceptible phenotype, due to their increased presence in less susceptible cultivars compared to more susceptible cultivars. Future work will determine the compound identity of these features of interest and determine which are bioactive against *D. ilicicola*.

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