($24\ h \cdot d^{-1}$) from each potting media/species combination; non-plant (bare soil) areas were also monitored. The main effect of species showed that crape myrtle CO_2 efflux was higher than magnolia. The main effect of media indicated that while PB and CCR were similar, both had higher CO_2 efflux than WT. The interaction of treatment variables showed that crape myrtle had higher flux than magnolia in all media. Further, in crape myrtle all three media had significantly different CO_2 efflux values with CCR highest and WT lowest. In magnolia, PB had higher values than the other two media. Soil C analysis indicated that PB had higher C content than the other two media; however, all media dramatically increased soil C content compared to native soil. It is clear that placing container media into the landscape will increase soil C; the length of time this C remains in the soil requires further investigation, but may vary by media type.

Specified Source(s) of Funding: Hopefully my major professor will pay for the trip.

8:15–8:30 am

Foliar Nutrition and Leaf Chlorophyll Index of Container-grown Shade Trees in Response to Controlled-releaser Fertilizer

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Nutrition management is one of the most important components of managing ornamental tree nursery crops. Controlled-release-fertilizers (CRF) provide growers with a means to ensure adequate nutrition is available for tree growth through the growing season while reducing the potential for off-site nutrient movement. The goal of the present study is to determine the response of trees from two ash alternative species; 'State street' maple (*Acer miyabei* 'Morton') and 'Harvest gold' linden (*Tilia cordata* × *mongolica* 'Harvest gold') to controlled-release fertilizer (15–9–12, Osmocote-Plus, Scotts, Inc., Marysville, OH). One and one-half inch (4 cm) caliper nursery liners were planted in 25-gal (95 L) containers in 80:20 (v:v) pine bark and peat moss and grown on for 2 years. Each spring containers were top-dressed with 200, 275, 350, 425, 500, or 575 g of CRF. Response variables measured included caliper and height growth, foliar nutrition and SPAD chlorophyll index. Fertilization rate did not affect ($P>0.05$) total stem caliper growth or height growth of trees from either species. SPAD index values showed a pronounced seasonal pattern, increasing through the spring and then reaching a plateau through the summer. Mid-summer SPAD values varied between species ($P<0.001$) with mean values averaging 5–6 units higher in linden trees than in maple trees. Fertilization increased ($P<0.05$) SPAD values of trees from both species during the midsummer period. SPAD index values were highly correlated ($P<0.001$) with foliar nitrogen concentration of trees from both species. For maple trees, SPAD was correlated ($P<0.01$) with foliar phosphorus, potassium, and sulfur. For linden trees, SPAD was correlated ($P<0.05$) with foliar phosphorus and iron. Foliar magnesium and calcium were negatively correlated ($P<0.05$) with foliar potassium suggesting an antagonism between uptake of potassium and the other cations. The relative lack of growth response of trees from both species suggests that the lowest rate (200 gram per container) of CRF may be adequate to produce acceptable caliper growth in these trees. The increase in foliar nutrients, including nitrogen, phosphorus and potassium, without a concomitant increase in growth suggest luxury consumption of these elements had occurred. Rates of potassium addition should be monitored closely given the apparent antagonism between uptake of potassium and uptake of magnesium and calcium, particularly in linden trees. The broad plateau for SPAD levels observed indicates that comparative samples may be collected at any point during the summer.

Specified Source(s) of Funding: Scotts, Inc., Michigan Ag Expt. Station Project GREEEN, J. Frank Schmidt and Sons Nursery

8:30–8:45 am

Effect of Fertilizer on Growth and Physiological Response of *Zanthoxylum ailanthoides* Sieb. et Zucc. Seedlings

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Zanthoxylum ailanthoides Sieb.et Zucc., a native plant in Hunan, China, has a great potential for an ornamental plant or timber plantation. To better manage its seedling production, nine fertilizer combinations of urea (0, 3, 6 g/pot), calcium superphosphate (CP; 0, 2, 3 g/pot) and potassium chloride (PC; 0, 2, 3 g/pot) were applied to potted seedling plants. Fertilizers significantly influenced the seedling growth (measured by plant height (cm) and caliper size (mm)). All plants received fertilizer(s) were significantly taller and bigger than that (19.6cm and 4.6mm) of the control. The height reached 76.9cm and caliper diameter was 11.9mm under the fertilizer treatment of 3g urea + 3g CP per pot. Regression analysis indicated that nitrogen had much stronger influence than that of phosphorous and potassium. The proper

nitrogen level should be 3g urea per pot. Too higher (6g/pot urea) greatly reduced seedling growth, especially with increased phosphorous levels from 0 to 2 to 3g/pot CP. Regardless of P or K levels, caliper sizes ranged from 11.5 to 12.4mm under application of urea for 3 or 6 g/pot. Total dry weight, root weight, leaf area index had the similar trend as the plant growth. The ratio of root to shoot was higher in the lower concentrations of N, P, and K. It was clear that shortage of nutrient should increase in root/shoot ratio, which led to more roots to take nutrients from soil. Chlorophyll content (CC) and photosynthesis rate (Pn) increased significantly as the N–P–K concentrations went up. Both CC and Pn doubled under the highest combination of three fertilizers. Seedlings could be much higher and stronger if we applied 3 g urea + 2 g CP + 3 g PC per pot during their growing season.

8:45–9:00 am

CCROP—A Web-based Decision Tool Enhances Irrigation and Nutrient Management Decisions for Container Nursery Managers

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CCROP (Container Crop Resource Optimization Program) is a web-based decision support tool that simulates growth, nutrient, and irrigation requirements of woody ornamental container-grown crops. CCROP is used to assist growers/managers and other industry stakeholders select best management practices that maximize use of water and fertilizer resources and minimize environmental impact. Inputs for CCROP include daily weather data uploaded from the Florida Automated Weather Network (FAWN) as well as critical management practices (e.g. plant date, container size and spacing, fertilizer, pruning, etc.). Outputs include plant growth, evapotranspiration, irrigation requirement, nutrient uptake, and leaching of applied nutrients. A real-time tool recommends daily water application based on resupplying that which is lost through evapotranspiration. Examples of simulations used to choose the best practices to implement and associated costs will be presented and discussed.

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9:00–9:15 am

Crop Response to Hybrid Poplar Alternative Soilless Substrate Component for Pacific Northwest Ornamental Container Production

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Douglas fir bark (DFB) is the primary component used in soilless substrate to grow woody ornamental plants in the Pacific Northwest. Bark is a by-product of the timber industry and is used for landscape mulch, a soilless substrate component, or bio-energy. The decline in the housing market and rise in energy generation from renewable resources has resulted in a diminishing bark supply for container nurseries. Thus, the price of bark has been unstable and shown an overall increase over the last two years. Additionally, nurseries have reported reduced bark supply and decreased consistency. This increasing need for alternative substrates has prompted evaluations of economically feasible, regionally available materials that occur within the Willamette valley. Initial research conducted at Oregon State Univ investigated the use of 9–25 mm whole tree hybrid-poplar (WTP) as a substrate alternative. Two experiments utilizing a premixed soilless substrate containing 20% (v/v) screened pumice, 20% fine DFB (9 mm minus), 60% coarse DFB (9–25 mm) was altered by replacing coarse DFB with 0, 20, 40, and 60% (v/v) WTP. Liners of *Acer palmatum*, *Hydrangea macrophylla* 'Endless Summer', *Juniper horizontalis* 'Youngstown' and, *Euonymus fortunei* 'Moonshadow' were potted into 8 L containers. The experiment was conducted using completely randomized design with eight individual plant replications for each taxa within a treatment. The second experiment used liners of *Cotoneaster dammeri* 'Coral Beauty' organized in a completely randomized block design (3 blocks x 4 treatments), where each treatment within each block was independently irrigated to observe the effects of WTP on plant water use. All plants were planted on April 23, 2008. Cotoneaster were harvested on August 4th, 2008, whereas the other taxa were harvested on May 8th, 2009. Growth index (height x width x width), a measurement of plant growth, on euonymus, maples, junipers and hydrangea, showed that a 20% (v/v) addition of WTP produced the largest plants. Cotoneaster root to shoot ratio linearly increased with increasing WTP. This increase was a result of shoot weight. Root weight was unaffected by substrate treatment. Cotoneaster water use