

weeks after planting, Sedum treated at both times had a 100% increase in branching of finished plants compared to either single application time with significant interactions with concentration. Treated as liner only, dikegulac sodium had no effect on branching of finished plants. Treated only after transplant, only 800 mg·L<sup>-1</sup> increased branching. Treated at both times, all dikegulac sodium concentrations tripled the number of lateral branches per plant. Sedum plant height was reduced with 1600 mg·L<sup>-1</sup> at all treatment times with stunting in plants treated twice. Time of treatment did not affect branching in Nepeta but the interaction with concentration was significant. Nepeta treated with a post-transplant application of 800 mg·L<sup>-1</sup> or two applications of 1600 mg·L<sup>-1</sup> had increased branches but the plants treated twice were stunted. Gaillardia treated only post-transplant had reduced branching but dikegulac sodium at 400 mg·L<sup>-1</sup> across treatment times increased the number of branches while 1600 mg·L<sup>-1</sup> decreased branching, caused stunting and delayed flowering. Branching of phlox was not affected by treatment time. Only phlox treated with 1600 mg·L<sup>-1</sup> at both treatment times had increased branches on finished plants. Dikegulac sodium did not affect branching in *Achillea* or *Delosperma*.

### **Growth, Photosynthesis, and Water Relations of Young Pecan Seedlings in Response to Different Nitrogen Fertilization Rates**

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The U.S. pecan industry is experiencing a rapid acreage increase. Many growers believe high rates of nitrogen (N) accelerate tree development and increase yields. A high rate of N application may not be cost-effective and can be harmful to the environment. The aim of this project was to evaluate the effect of N application rate on young pecan seedling performance as measured through photosynthesis and growth following five N application rates (0×, 1/4×, 1/2×, 1×, and 2×, where × corresponded to the recommended rate, as reported by Texas AgriLife Extension). Soil nutrient sampling was performed 5 days after N application and continued throughout each growing season. Diameter of the seedlings was measured at two locations on the tree throughout both years of the experiment. Gas-exchange was measured every 3–4 weeks using an infrared gas analyzer. Results showed that soil N was higher in the 1× and 2× treatments than in the other treatments ( $P = 0.0148$ ). However, N treatment did not affect amount of total leaf N, diameter growth, or net photosynthesis rate. Therefore, it can be concluded that the most effective rate of N application for young pecan seedlings is likely much lower than recommended rates.

### **Evaluation of Selected American and French-American Hybrid Bunch Grape Cultivars in North Alabama**

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An experimental vineyard was established at the Sand Mountain Research and Extension Center, Crossville, AL in 2008 to evaluate the performance of selected Pierce's Disease (PD) tolerant American and French-American hybrid bunch grape cultivars, including 'Black Spanish', 'Blanc du Bois', 'Champanel', 'Conquistador', 'Cynthiana', 'Favorite', 'Lake Emerald', 'Seyval Blanc', 'Seyval Blanc' grafted on C3309, 'Stover', and 'Villard Blanc'. The experimental design is a RCBD with 4 replications and 4 vines per plot. To assess cultivar vine vigor and development, data were collected on vine pruning weight, trunk cross-sectional area, leaf area, and chlorophyll rates. Cultivar phenology was studied by recording the early shoot development, percent open flowers, and veraison progression throughout the growing season. Cultivar productivity and fruit quality were determined based on total yield per vine, mean cluster and berry weight, and soluble solids content. The results of our study suggest 'Champanel' was the most vigorously growing cultivar, based on pruning weight and trunk cross-sectional area data. 'Blanc du Bois', 'Seyval Blanc' and 'Seyval Blanc'/3309 were early ripening cultivars. 'Villard Blanc' had the greatest yield per vine and largest mean cluster weight. 'Champanel' produced the largest berries in 2011. Research will continue and multiple season data is going to provide more complete evaluation on suitability of growing hybrid bunch grape cultivars in Alabama and the Southeast.

### **In Vitro Regeneration and Polyploid Induction of *Acer platanoides* L. 'Crimson Sentry'**

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*Acer platanoides* L. is a valuable introduced species known for its attractive foliage and architecture. Its pest and disease resistance, and tolerance of poor soils also make it a popular choice as a municipal street tree. However, *A. platanoides* has exhibited a high potential invasiveness in disturbed forests, along roadside edges, and within intact forests bordering ornamental plantings. Inducing polyploidy may improve ornamental features of Norway Maple while providing a platform for breeding new sterile cultivars. In this study, protocols were developed for in vitro multiplication and rooting, as well as induction of allopolyploids in the popular fastigate cultivar 'Crimson Sentry.' Multiplication was optimized by culturing explants (20 mm length) on combinations of MS, WPM, and QL basal salts supplemented with 2 μM BAP, mT, 2iP, Kin, or TDZ arranged in a factorial design. The combination MS and 2 μM BAP produced the highest shoot regeneration (3.2 shoots per explants), longest shoots (30

mm) and highest multiplication rate (4-fold). A second study was conducted to optimize cytokinin concentrations. Explants were cultured on MS basal salts supplemented with 0, 2, 4, 8, or 16  $\mu\text{M}$  BAP. Regression analysis showed MS and 6  $\mu\text{M}$  BAP produced the optimal multiplication rate with a 4-fold increase in the number of microcuttings in 5 weeks. Rooting of microcuttings was conducted on half-strength WPM supplemented with 0, 5, 10, 20, 40, or 80  $\mu\text{M}$  IBA. Microcuttings treated with 10  $\mu\text{M}$  IBA produced the optimal rooting percentage (70%), highest number of roots per explants (3.5) and longest roots (15 mm). To induce polyploidy, shoots containing two nodes were subcultured in liquid MS media containing 0 or 2  $\mu\text{M}$  BAP and the dinitroaniline herbicide oryzalin (0, 15, 30, or 45  $\mu\text{M}$  Oz) for a duration of 3, 5, or 7 days. No significant interaction of BAP, oryzalin concentration, and length of exposure was found to influence induction of polyploidy. However, the combination of BAP with oryzalin significantly reduced shoot survival.

### Saline Irrigation of Three Green Roof Species for the Southeast

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Green roof species benefit from supplemental irrigation. Greywater is a renewable, recycled water source that can help reduce the demand for potable water. Use of greywater for irrigation is limited by the potential for salt injury to plants. Research was conducted to evaluate three common green roof species for tolerance of saline irrigation, over the course of 12 weeks. Species used were *Coreopsis auriculata* 'Nana', *Sedum spurium* 'Tricolor', and *Sedum rupestre* 'Angelina'. Liners were planted in a commercially available green roof substrate of heat expanded slate and worm castings. Plants were irrigated Monday, Wednesday, Friday with 300 mL of tap water containing one of the following concentrations of NaCl: 0, 2000, 4000, 6000, 8000, or 10,000  $\text{mg}\cdot\text{L}^{-1}$ . Plants were grown in a greenhouse from Nov. 2011 to Jan. 2012. Root dry weight (RDW) and shoot dry weight (SDW) were observed at each harvest, and survival was determined at experiment termination. RDW decreased in all three species with increasing NaCl concentration at 12 weeks after treatment initiation. SDW decreased with increasing NaCl concentration in *S. rupestre* and *C. auriculata*, while there was no effect of treatment on SDW of *S. spurium* at 12 weeks after treatment initiation. Mortality was only observed in *C. auriculata* at 4000, 6000, 8000, and 10,000  $\text{mg}\cdot\text{L}^{-1}$ . Results suggest that all three species can tolerate NaCl levels commonly observed in greywater.

### Propagation of *Stevia rebaudiana* Stem Cuttings Influenced by Media and Cutting Types

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An herb from Paraguay, *Stevia rebaudiana*, is becoming popular in the natural sweetener market. These plants can be 250 times sweeter than sucrose while staying calorie free. Propagation is usually done by stem cuttings due to the fact that seed propagation has low germination rates. To produce plants that meet demand, more efficient propagation techniques are being tested in order to generate the healthiest plant for harvest. In this study, cuttings were taken from container grown stock plants and planted in 32 cell packs with one cutting per cell. The two node cuttings were placed in one of four types of media: 1 part pine bark : 1 part sand by volume, 1 part peat moss : 1 part perlite by volume, 100% sand, or 1 part sand : 1 part vermiculite by volume. Two cutting types were evaluated, medial and terminal. Cuttings were placed under mist for 15 seconds every 10 minutes for the first 4 weeks, then 5 seconds every 10 minutes the remaining 4 weeks. Data analyzed included: foliar color rating of both old and new foliage, Shoot breaks over 2.54 cm long, and longest root length per cutting. No interactions were found between media and cutting type therefore only main effects will be discussed. Greatest root length occurred in 1 part sand : 1 part vermiculite by volume while 1 part pine bark : 1 part sand had a greater root length yet was similar to other treatments. Medial cuttings had more shoot breaks than terminal cuttings regardless of the substrate used. When looking at old and new foliage medial cuttings showed a greater number of healthy cuttings when given a rating of 1–5 (scale of 1–5 with 1–dead, 3–yellow, 5–dark green).

### Influence of Fruit Thinning and BenefitKiwi® on Fruit Size and Quality of 'AU Golden Dragon', 'AU Golden Sunshine', and 'Hort16A' Kiwifruit

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Fruit thinning and the application of BenefitKiwi® are expensive cultural practices, and the effectiveness of these practices on *Actinidia chinensis* varieties grown in Alabama is not currently known. The influence of these two cultural practices on selected kiwifruit varieties ('AU Golden Dragon', 'AU Golden Sunshine', and 'Hort-16A') over two growing seasons were determined with regard to fruit size, quality, and marketability. The marketable yield of 'AU Golden Dragon' was not affected by BenefitKiwi® applications or fruit thinning. 'AU Golden Sunshine', the most prolific fruiting variety in this study, had greater marketable yield in response to fruit thinning, but marketable yield was not influenced by BenefitKiwi®. Marketable yield of 'Hort-16A' was greater for the BenefitKiwi®-treated plants, but due to variation in crop load, future research is needed to determine the effects of BenefitKiwi® and fruit thinning on 'Hort-16A'. Though minimal thinning and the application of BenefitKiwi® are standard production practices for much of the gold kiwifruit production, the effectiveness of these practices varies for specific varieties of *A. chinensis*.