

On 10 Oct. 2008, the experiment was terminated. Non-flooded plants of *I. virginica* 'Henry's Garnet' and *I. glabra* 'Shamrock' had higher growth indices (GI) [(height + widest width + width perpendicular to widest width)/3] than plants flooded for 3 or 7 days. Shoot dry weight (SDW) of *I. glabra* 'Shamrock' was lower when plants were flooded for 7 days than when flooded for 0 or 3 days. SDW for *I. virginica* 'Henry's Garnet' was higher in non-flooded plants than plants flooded for 3 or 7 days. *I. virginica* 'Henry's Garnet' root dry weight (RDW) was higher in non-flooded plants and plants flooded for 3 days, than in plants flooded for 7 days. RDW for *I. glabra* 'Shamrock' was highest in non-flooded plants, followed by plants flooded for 3 or 7 days. RDW, SDW, and GI for *V. nudum* 'Winterthur' were not different among treatments. *I. virginica* 'Henry's Garnet' Ps rates were higher during flooding than during draining in both flooding treatments, and Ps rates were higher in control plants than in flooded plants. *V. nudum* 'Winterthur' Ps rates were similar in non-flooded and flooded plants indicating its ability to tolerate flooding and maintain rates of Ps. Although growth and Ps of *I. virginica* 'Henry's Garnet' and *I. glabra* 'Shamrock' were generally lower in flooded plants than non-flooded plants, all taxa maintained visual quality and continued to grow which suggests they all would be acceptable choices for use in rain gardens.

### (173) Growth and Photosynthesis of Selected Native Shrubs Planted Above-grade with Organic Matter

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In modified above-grade landscape planting, substrate is mounded around the upper portion of a root ball that remains above soil grade at planting in order to mimic the natural organic litter layer that supports root growth in naturalized landscapes. On 17 March 2008, 3-gal. plants of *Chionanthus virginicus* L., *Rhododendron austrinum* Rehd., and *Hydrangea quercifolia* Bartr. were planted in field plots 1.2 m (4 ft.) on-center, and the planting hole was backfilled to soil grade with existing field soil. Plants were planted at grade (AG) with no organic matter or above grade with one of four organic substrates: peat moss (PM), pine bark (PB), pine tree substrate (PT), or coconut coir (CC). In above grade plantings, plants were planted such that the top 10 cm (4 in.) of the root ball remained above grade, and organic matter was mounded around the above-grade portion of the root ball, extending outward from the stem in a radius of 31 cm (12 in.). *C. virginicus* and *H. quercifolia* were planted under 30% shade, while *R. austrinum* was planted under 47% shade. On 19 September 2008, net photosynthesis (PS) was measured for each plant. Growth indices [(widest width measurement + perpendicular (^) width measurement + height)/3] were recorded at planting (initial growth index, IGI) and on 23 October 2008 (final growth index, FGI). IGI and FGI were used to calculate relative growth index [RGI = (FGI - IGI)/IGI]. Treatments were arranged in a randomized complete block design with five blocks. *C. virginicus* plants were smallest at planting, yet had the highest RGI (1.7) among taxa, followed by *H. quercifolia* (0.8) and *R. austrinum* (0.6). RGI was not different among treatments for *C. virginicus* and *R. austrinum*, however, RGI was lowest in PB for *H. quercifolia*. PS rates were not different among treatments, yet were highest in *R. austrinum* (19  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}$ ), followed by *C. virginicus* (16  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}$ ), with *H. quercifolia* being lowest (6  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}$ ). Differences in growth and PS among taxa are likely related to inherent genetic differences, and similar PS rates among treatments correspond with the lack of growth differences among treatments. Correlation between PS and RGI for *C. virginicus* and *H. quercifolia* 'Alice' but not for *R. austrinum* may explain differences in ease of landscape establishment of these taxa. All substrates appeared to be suitable for use in this planting technique with these taxa.

### (174) Comparative Studies Between Acclimatization and Cultivation of Hook-Moss Grown in a Vinyl House

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Acclimatization and cultivation investigations with *Cratoneuron decipiens* of temperate moss has been performed under vinyl house conditions. For both studies hook-moss was cultivated with different growing media, propagation systems, inoculum densities, light shade, and watering methods. Plant materials for acclimatization were grown through suspension culture with Knopp (1865) macro salts and Nitsch and Nitsch (1956) trace elements. Vegetative propagation is the basis for the moss production. Three types of propagation systems (direct sowing, suspension, and chopping of gametophytes) were examined in this experiment. Longest and highest numbers of gametophytes were produced by direct sowing for both culture conditions. Maximum number of gametophyte/flax was produced by 1 g inoculum density but percent fresh and dry weight per 10 gametophytes were increased in 0.5 g inoculum density for all conditions. According to our findings peat and perlite mixture in 5:1 (vol:vol) was beneficial to cultivation, and bark and perlite mixture in 3:1 ratio was suitable for acclimatization. Light shade of 50% showed the highest positive influences on gametophyte number, and on fresh and dry weight for moss production, but 70% shade resulted in longest and highest number of gametophytes during acclimatization. Surface watering was better than sub-surface watering for both culture conditions. In order to get adequate acclimatization and cultivation conditions, the established methods were modified.

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### (175) Influence of Daily Light Integral on Coleus Morphology and Leaf Variegation

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Coleus [*Solenostemon scutellarioides* (L.) Codd] is an ornamental foliage plant valued for its colorful variegation patterns. Cultivars of coleus are able to tolerate a broad range of light conditions. However, the leaf variegation that coleus is valued for has been noted to change depending on the amount of light in which it is grown. Successful coleus sales rely on a combination of dramatic coloration

and dense growth habit. To our knowledge, the exact light conditions required to promote these characteristics have not been determined. Therefore, two cultivars of coleus, 'Kong Red' and 'Wizard Coral Sunshine', were grown under four daily light integrals (DLI) (10.0, 5.8, 3.8, and 2.9 mol·m<sup>-2</sup>·d<sup>-1</sup>) to determine the optimal light level for production. 'Kong Red' and 'Wizard Coral Sunshine' coleus grown under a DLI of 2.9 mol·m<sup>-2</sup>·d<sup>-1</sup> exhibited reduced leaf areas of 66% and 63%, respectively, compared to those grown under a DLI of 10.0 mol·m<sup>-2</sup>·d<sup>-1</sup>. The number of leaves per plant followed the same trend, decreasing 64% in both cultivars when comparing those produced under the lowest and highest DLI treatments. Percent non-green area per leaf decreased by 18% for 'Kong Red' and by 23% for 'Wizard Coral Sunshine' produced under 2.9 mol·m<sup>-2</sup>·d<sup>-1</sup> compared to plants grown under 10.0 mol·m<sup>-2</sup>·d<sup>-1</sup>. Overall, both cultivars exhibited a more dense growth habit and greater degree of variegation (relative percent of non-green area per leaf) when grown under the highest DLI. Therefore, we recommend growing these two cultivars under a minimum DLI of 10.0 mol·m<sup>-2</sup>·d<sup>-1</sup>.

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### (176) Several Factors Affecting In Vitro Mass Propagation and Morphogenesis in Prothalli of *Pteris cretica* Wilsonii

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Present studies were undertaken to establish the mass propagation systems by examining adequate environmental conditions for culturing prothalli of *Pteris cretica*. Chopped prothalli were inoculated on 3 kinds of medium: 1/8, 1/4, 1/2, 1, and 2X MS with 3% sucrose and 0.8 agar, 0.3% Hyponex (N:P:K = 6.5:6:19), and Knop medium. The multiplication and growth of prothalli was highest with Hyponex medium. To see the effects of sucrose concentrations prothalli were again inoculated on Hyponex and MS medium containing 0 ~ 5% sucrose, and the highest growth was obtained with Hyponex with 1% sucrose. Most prothalli did not survive on MS medium containing sucrose, but in some prothalli the formation of parenchyma tissues, not gemmae, was observed. Divided in groups or chopped prothalli were placed on 3 media and results showed that division was better with MS, whereas chopped was with Hyponex. The agar concentration of 0.6% was most effective in prothallus multiplication. Solid and liquid medium (stationary or shaking) were employed in this experiment and solid medium proved to be effective in prothallus multiplication. The prothalli continued to multiply by the formation of gemmae in liquid shaking culture, but in solid culture parenchyma tissues were formed. This indicates that liquid shaking culture might be preferred for prothallus proliferation if cultured more than 8 weeks. In conclusion, solid culture should be used if the sporophyte formation by prothalli is wanted, but if mass propagation of prothalli is desired, liquid shaking culture is favored even if it takes longer time.

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### (177) Target Region Amplification Polymorphism (TRAP) for Evaluating Genetic Diversity in *Malus* Mill. Genus

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*Malus* belongs to Rose family and has 8-55 (78) species depending on various classification systems. Also, many synonyms and homonyms were existed. There are more than 7500 apple cultivars and more than 500 flowering crabapple cultivars in the world. Most of them were bred by open pollination and a few of them were controlled crosses. TRAP (Target region amplification polymorphism) was applied for elucidating genetic relationships in *Malus* genotypes. TRAP is a novel PCR-based molecular marker technique which uses gene-based information for primer design. 43 *Malus* samples from 27 species and varieties, 8 hybrid species, and 8 cultivars were selected for TRAP maker system analysis. Two fixed primers, designed using matK gene sequences of *Malus sieboldii*, paired with two arbitrary primers, were used to conduct TRAP PCR. A UPGMA dendrogram was generated based on a total of 197 unambiguous bands. Among them, 182 were polymorphic with an average of 45 polymorphic bands per primer combination. The bands ranged in size from 75 to 700 bp. TRAP PCR cluster analysis revealed that the closer relationships in the dendrogram of *Malus* samples are in agreement with the originations of these genotypes. TRAP is a potentially useful marker technique for genetic diversity studies in *Malus* genus.

### (178) Ornamental Peppers for the Gulf States

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This study investigated the garden performance of ornamental pepper (*Capsicum* sp.) cultivars at Hammond, Louisiana, and at Crystal Springs and Verona, Mississippi, over two years. Over thirty entries were evaluated in replicated plot at each location, with more than twenty-five entries common to all three locations. The trial was of smaller fruited peppers, not *C. annuum* bell-type peppers. Each plot was rated on a one to five scale monthly over the three to four month growing season for plant shape, uniformity, attractiveness of fruit, attractiveness of foliage, and overall garden performance. Cultivar performance varied across sampling dates within location. Across locations, cultivars often received similar ratings. Among the higher rated cultivars, ones that