



CONTENTS

Edward F. Gilman and Jason Grabosky

Growth Partitioning Three Years Following Structural Pruning of *Quercus virginiana*..... 281

Abstract. One codominant stem on each of 48 similar *Quercus virginiana* Highrise® trees was pruned to evaluate impact of pruning severity on growth suppression and partitioning. Targeted pruning severity (0, 25, 50 or 75% foliage and subtending branches removed) based on visual estimates of two people correlated well ($r^2 = 0.87$) with the ratio stem cross-sectional area removed: cross-sectional area at base of the pruned codominant stem. Pruning reduced cross-sectional area growth on codominant stems compared to the leader stem that was not pruned, especially during the first 12 months following pruning. Increased pruning severity reduced cross-sectional area growth on the pruned stem in proportion to amount of foliage removed. In each of three years following pruning, cross-sectional area of the unpruned leader stem increased more on trees receiving targeted pruning severities of 25% or 50% than trees pruned with the 75% severity or trees not pruned. Shift in growth from the pruned to unpruned portion of the tree reduced diameter ratio between the two stems, which should make the union stronger. Diameter ratio changed most for the 75% pruning severity.

Key Words: Branch Union; Codominant Stem; Diameter Ratio; Leader Stem; Reduction Cut; Removal Cut; Subordination.

Richard G. Rathjens, T. Davis Sydnor, and David S. Gardner

Evaluating Root Crown Excavation as a Treatment for Deeply-Planted Landscape Trees..... 287

Abstract. An experiment was conducted over a four-year period to evaluate root crown excavation (RCE) as a treatment for deeply-planted landscape trees. Tree growth, leaf chlorophyll, stress, and pest activity were monitored to determine plant response to RCE. Four of the sites, including shingle oak (*Quercus imbricaria* Michx.) street median strip trees, blue spruce (*Picea pungens* Engelm.) park trees, and honeylocust (*Gleditsia triacanthos* L. var. *inermis* (L.) Zab.) parking lot island and street trees failed to show any influence of RCE on tree growth and leaf chlorophyll. Two sites with maple (*Acer* spp.) park and street trees where RCE included removal of potential girdling roots resulted in a detrimental effect on twig extension and leaf chlorophyll. Measurements of chlorophyll on ash (*Fraxinus* spp.) park trees, and tree height and twig extension on lacebark elm (*Ulmus parvifolia* Jacq.) street trees, demonstrated a positive influence of RCE. The RCE treatment did not influence stress or pest activity at any of the experimental sites. Since tree disorders frequently require many years to develop it is speculated that a longer observation period may be necessary to see a greater impact of RCE on plant growth and health.

Key Words. Deeply-Planted; Main Lateral Root; Root Crown Excavation; Root Flare; Trunk Flare.

Eric Rosenfeld

Effects of Pruning on the Health of Palms 294

Abstract. This literature review gathers the findings of studies of the effects of pruning on palms in an attempt to answer questions about proper maintenance of ornamental specimens. Several species displayed reduction in size of new leaves after pruning. Pruning was found to worsen the health of palms deficient in mobile nutrients, but healthy palms showed only small changes in leaf nutrient composition. Two studies on oil palm (*Elaeis guineensis*) recorded higher incidence of weather-induced crown fracture, occurring among heavily-pruned specimens. Coconut fruit yield did not change in the first year of experimentation, but significant declines often occurred in subsequent years with continued treatment. Up to ten lowest leaves could be removed from a full-crowned coconut palm without negative effect on fruit yield. Research was lacking on the question of whether leaf pruning leads to reduction of stem diameter in palms. Research tailored more specifically to the concerns of arborists and landscapers working with palms as ornamentals is needed.

Key Words. Coconut; Cocos; Frond; Leaf; Palm; Pruning; Trimming.

E. Thomas Smiley, Liza Holmes, and Bruce R. Fraedrich
Paclobutrazol Foliar Sprays to Suppress Growth on Landscape Shrubs 300

Abstract. This study was conducted to determine the effects of Paclobutrazol (PBZ, Cambistat) foliar sprays on the growth of four shrub species (*Abelia* × *grandiflora* ‘Edward Goucher’, *Ligustrum japonicum* ‘Rotundifolium’, *Ligustrum sinense* ‘Variegatum’, *Loropetalum chinensis*) in the southeastern United States. After the shrubs were established, they were sheared to a defined size and sprayed with 1000 ppm PBZ, 4000 ppm PBZ or left untreated. Paclobutrazol was effective at reducing growth on the four shrub species tested. Total biomass of new leaves and twigs collected 20 weeks after treatment was significantly less with PBZ treatment when compared to the nontreated control in all species except *L. sinense*. There were no differences in biomass that can be attributed to PBZ between the 1000 ppm and 4000 ppm treatments in any species tested. The speed of effectiveness and longevity of this treatment varied with species. In general, the faster growing the shrub species, the greater benefit and the faster the response from spray applications of PBZ. This growth reduction should provide a desirable appearance, less pruning and faster clean up when PBZ is applied to fast growing shrubs.

Key Words. *Abelia* × *grandiflora* ‘Edward Goucher’; Bonzi; Cambistat; *Ligustrum japonicum* ‘Rotundifolium’; *Ligustrum sinense* ‘Variegatum’; *Loropetalum chinensis*; PBZ; Shrub Pruning.

Brian Kane, Mac Cloyes, Mollie Freilicher, and H. Dennis Ryan
Damage Inflicted on Climbing Ropes by Handsaws 305

Abstract. Arborists frequently use handsaws while climbing, and a recent accident highlighted the danger of cutting one’s rope with a handsaw. There do not appear to be any robust tests describing the ability of handsaws to cut ropes. The following study attached hand-saw blades to a pendulum, which swung into a rope, bringing the blade and rope, which was under tension, into contact. The percent of the rope’s diameter cut by the blade was measured, as well as the percent loss in the rope’s strength after it was cut. Type of blade was a more important factor than type of rope with respect to the percent cut and percent strength loss, and there was a nearly one-to-one relationship between those response variables. The results of this study are discussed in the context of a climber’s safety.

Key Words. Handsaw; Rope.

Gregory A. Dahle and Jason C. Grabosky
Review of Literature on the Function and Allometric Relationships of Tree Stems and Branches311

Abstract. The goal of maintenance pruning is the development of a tree canopy that meets a defined objective while minimizing the risk of failure. An indepth understanding of the primary functions of branches and how they influence canopy form is needed in order to assess the impacts of cultural practices such as pruning or plant spacing on canopy development. Allometric modeling describes the relationship between size and shape of organisms. This paper explores three allometric methods of modeling branch form (pipe model theory, fractal dimensioning, and power laws) and their potential in guiding pruning research. Additionally, two principal functions of plants—hydraulic and mechanical—are discussed in light of their impact of stem and branch form.

Key Words: Allometry; Biomechanics; Elastic Similarity, Hydraulics; Mechanics; Slenderness Ratio.