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**The Effects of Pruning on Drag and Bending Moment of Shade Trees** ..... 207

**Abstract.** Arborists assume that pruning can help reduce the risk of tree failure by reducing the pressure exerted on trunks by wind (drag-induced bending moment), but there are few studies that quantify this effect. We simulated wind by driving trees in the back of a pickup truck from 0 to 24.5 m/s (0 to 55 mph) and measured drag-induced bending moment as well as tree morphometric data for Freeman maple (*Acer × freemanii*), swamp white oak (*Quercus bicolor* Willd.), and shingle oak (*Quercus imbricaria* Michx.). Measurements were taken before and after application of one of three American National Standards Institute A300 pruning types (raising, reduction pruning, thinning). Reduction of drag-induced bending moment differed by pruning type, largely in accordance with the mass of foliage and twigs removed. The effectiveness of pruning types was also species-dependent because crown architecture affected how much mass each pruning type removed. In general, per unit of mass removed, reduction pruning more effectively reduced the drag-induced bending moment than thinning or raising. Reduction pruning reduced the center of pressure height and, presumably, increased crown porosity after pruning. Prediction of the reduction of drag-induced bending moment was not reliable based on reduction in crown area after pruning. We discuss the practical applications of our findings.

**Key Words.** Bending Moment; Drag; Pruning.

Ryan Eckstein and Edward F. Gilman  
**Evaluation of Landscape Tree Stabilization Systems**..... 216

**Abstract.** We conducted pull tests on newly planted 7 cm (2.8 in) caliper, container-grown *Quercus virginiana* ‘SDLN’ PP#12015, Cathedral Oak® to simulate wind loading on nine commonly used landscape tree stabilization systems. Maximum force required to rotate the root ball 20° was used to compare systems. Terra Toggle™, Brooks Tree Brace, and 2 × 2’s anchoring the root ball withstood the largest forces. Typically, trees secured by these three broke before the systems failed indicating that the systems were very effective. T-stakes, dowels, and Tree Staple™ performed no better than nonstaked controls. The three guying systems tested, ArborBrace®, Duckbill®, and rebar and ArborTie®, were statistically similar and required more force to failure than controls, but less than the group that withstood the largest forces. Direction of pulling had no influence on force to failure for any stabilization system tested.

**Key Words.** Bracing; Guying; Planting; Pulling Tests; Stabilizing; Tree Staking; Wind.

John Gathright, Yozo Yamada, and Miyako Morita  
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**Abstract.** This article explains how program design can increase the therapeutic and societal benefits from programs focused on technical recreational tree-climbing. We compare a recreational program with a tree-assisted therapy program that includes purpose-specific therapeutic, educational, and motivation elements. We find that the additional elements included in the tree-assisted therapy program were effective in enhancing the benefits from the tree-climbing activity.

**Key Words.** Community Forests; Environmental Psychology; Mood States; Outdoor Recreation; Societal Benefits; Tree-Assisted Therapy; Tree-Climbing; Urban Forests.

Catherine K. Singer and Chris A. Martin  
**Effect of Landscape Mulches on Desert Landscape Microclimates ..... 230**

**Abstract.** Effects of three landscape mulches: 1) composted ponderosa pine residue; 2) uncomposted shredded landscape tree trimmings; and 3) screened decomposing granite, were compared over the course of 2 years (2004 to 2005) for their ability to modify air and soil landscape microclimates in Phoenix, Arizona, U.S. Temperatures at the surface of the two organic mulches were generally higher during the day and lower at night than at the surface of either decomposing granite or soil without a mulch cover. During nighttime hours, decomposing granite mulch or soil without a mulch cover emitted more long wave radiation than the two organic mulches. Conductive heat transfer through the organic mulches was generally lower than through decomposing granite. Daytime temperatures of soil at 5 and 30 cm (2 and 12 in) depths were generally lower beneath the two organic mulches than under decomposing granite mulch or soil without any landscape mulch cover. Soil covered with organic mulch evaporated less water than soil without mulch. Under desert conditions, the two organic mulches were more effective at moderating heat gain and water loss from soil than decomposing granite mulch because of an increased resistance to heat transfer and evaporation.

**Key Words.** Soil Heat Flux; Soil Water Evaporation; Temperature.

Richard H. Yahner, Richard T. Yahner, and Bradley D. Ross  
**Plant Species Richness on a Transmission Right-of-Way  
 in Southeastern Pennsylvania, U.S. Using Integrated Vegetation Management..... 238**

**Abstract.** The Green Lane Research and Demonstration Area, Montgomery County, Pennsylvania, U.S., has been studied each year since 1987, making this 21-year-old project extremely valuable as a source of information on the effects of mechanical and herbicidal maintenance on flora and fauna along an electric transmission right-of-way (ROW). In this article, our objective was to document plant species richness among treatment units and in relation to wire and border zones on the ROW. We noted the presence of plant species from late May through mid-August in 2005 and 2006 and observed 114 vascular plant species in the ten treatment units; 35 (31%) of these species were exotic. Twenty-seven (24%) species were widespread on the ROW and seven of these (26%) were exotic. The total number of species per unit ranged from 46 (40%) species in handcut units to 57 (50%) in stem-*foliage* spray units. Of the total number of species, 103 (90%) and 81 (71%) occurred in wire and border zones, respectively. The number of exotic species was higher in wire zones (33 [29%]) than in border zones (22 [19%]).

**Key Words.** Exotic Species; Herbicides; Integrated Vegetation Management; Rights-of-Way; Southeastern Pennsylvania; Species Richness; Tree Control; Vegetation.

Richard Stalter and Dwight Kincaid  
**A 70-Year History of Arborescent Vegetation of Inwood Park, Manhattan, New York, U.S. .... 245**

**Abstract.** The arborescent vegetation located at three sites within Inwood Park, Manhattan, New York, U.S. was sampled by the quadrat method in October 2004 and May 2005 and compared with the trees present in the same quadrats on a map of trees at Inwood Park prepared by the federal Works Program Administration in 1935. Tulip poplar (*Liriodendron tulipifera*) was the dominant tree at the Moist Valley and South Slope sites in 1935 and 2005, whereas oak (*Quercus*) was the dominant genus at Dry Ridge in 1935 and 2005. Dogwood (*Cornus florida*) was the dominant subcanopy tree in 1935; it was unimportant in 2005, a victim of dogwood anthracnose. In terms of ecologic dominance, there has been no change in the first ranked genera at these sites in the past 70 years. Mean tree diameter (diameter at breast height) has increased from 32.3 cm (12.9 in) to 41.8 cm (16.7 in). The three sites have experienced a parallel pattern of increase in tree size from 1935 to 2005. Nonnative trees were not important in Inwood Park in 2005.

**Key Words.** Inwood Park; Manhattan; New York City; Urban Forests.

Betsy A. Goodrich, Ronda D. Koski, and William R. Jacobi  
**Roadside Vegetation Health Condition and  
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**Abstract.** Many abiotic and biotic factors affect the health of roadside vegetation, including the application of magnesium chloride (MgCl<sub>2</sub>) dust suppression products. Three hundred seventy kilometers (230 mi) of forested, shrubland, meadow, rangeland, riparian, and wetland roadside habitats were surveyed along major nonpaved roads in two Colorado counties. Dominant species composition and visible damages of woody roadside vegetation were quantified. The majority (72.3% to 79.3%) of roadside vegetation surveyed was considered healthy (less than 5% damage to crown or stem), depending on slope position from the road. Severely damaged (greater than 50% damage) vegetation ranged from 6.4% to 11.4% of roadside cover, with the most severely damaged vegetation occurring downslope from the road. Percent of plants with severe or moderate damage increased with increasing MgCl<sub>2</sub> application rates for roadside aspen, Engelmann spruce, and lodgepole and ponderosa pines. Further research is needed to determine the distribution of MgCl<sub>2</sub> ions, nutrients, and interactions between MgCl<sub>2</sub> and incidence of potential biotic damage agents in roadside soils and plants.

**Key Words.** Aspen; Lodgepole Pine; Magnesium Chloride (MgCl<sub>2</sub>); Ponderosa Pine; Road Dust Control; Road Stabilization.

Gary Watson

**Discoloration and Decay in Severed Tree Roots..... 260**

**Abstract.** Roots of honeylocust (*Gleditsia triacanthos* var. *inermis*), pin oak (*Quercus palustris*), tuliptree (*Liriodendron tulipifera*), and green ash (*Fraxinus pennsylvanica*) trees were severed at the root flare and 1, 2, or 3 m (3.3, 6.6, and 9.9 ft) from the trunk. After 5 years, the severed roots were excavated and all discolored and decayed portions were removed. The furthest extent of decay development ranged between 4.5 cm (1.8 in) in green ash and 10.8 cm (4.3 in) in honeylocust. The furthest extent of discoloration also varied between 6.3 cm (2.5 in) in green ash and 77.1 cm (30.8 in) in honeylocust. The root severing location producing the greatest decay or discoloration varied among species. Natural defect development as a result of severing roots of any size root at any distance is not likely to result in a threat to the health or stability of a tree.

**Key Words.** Compartmentalization; Defect; *Fraxinus pennsylvanica*; *Gleditsia triacanthos* var. *inermis*; *Liriodendron tulipifera*; *Quercus palustris*; Root Severing.

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Jason Grabosky and Nina Bassuk

**Research Note**

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