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Kenneth R. James

A Study of Branch Dynamics on an Open-Grown Tree 125

Abstract. This study investigates the dynamic properties of branches on an open-grown tree, where most of the mass is in the branches rather than in the trunk. When large branches on open-grown trees sway in winds, they individually and collectively influence how the whole tree sways. If branches are removed, as in pruning, the effect on tree sway has not yet been studied and the literature is almost nonexistent regarding recommendations for pruning open-grown trees to reduce wind damage.

Trees come in many shapes and sizes and in urban areas, usually grow in open spaces and develop many branches. In forests, and particularly in closely spaced plantations, trees grow with an upright central trunk and develop significantly less branch mass.

Forest conifers have been studied to identify their dynamic properties in winds, but the results may be different for open-grown trees. A 19.7 m tall silver maple (*Acer saccharinum*) with four codominant branches was tested by pulling and then releasing each branch to determine the dynamic properties. Branches were progressively removed and the tests repeated. The sway response was recorded with strain instruments attached to the trunk and accelerometers attached to each branch. The dynamic properties of frequency and damping were determined for all tests.

The tree with all branches attached, in full foliage was difficult to sway because of damping from the branches. Significant changes in oscillating frequency and damping were observed only after most of the branches (greater than 80%) were removed. The results support the concept that branches provide damping, which dissipates energy from the wind as a mechanism to help trees survive.

Key Words. *Acer saccharinum*; Branches; Damping; Dynamics; Frequency; Silver Maple.

Chanthammavong Noukoun, Gregory Bryant, and Steven D. Frank

The Effect of Sticky Bands on Cankerworm Abundance and Defoliation in Urban Trees 135

Abstract. Defoliation by insects can reduce tree growth, increase mortality, and increase herbivory of neighboring plants. In North Carolina, U.S., fall cankerworms (*Alsophila pometaria*) and spring cankerworms (*Paleacrita vernata*) are important early-season defoliators and have become more common in recent years. Female fall and spring cankerworm adults are wingless and climb tree trunks to mate and deposit egg masses. Therefore, sticky bands made by wrapping paper bands around trees and covering them with Tangle-Foot™ can intercept female moths as they climb, preventing oviposition and reducing subsequent larval abundance and defoliation. The authors hypothesize that sticky bands reduce cankerworm larvae and defoliation in the canopy when compared to unbanded trees. To test this hypothesis, cankerworm abundance and defoliation were measured on willow oaks with zero, one, and two bands. It was found that trees with two bands captured an average of 38.69% more moths than single banded trees. As a consequence, two-band trees had the least larvae in the canopy. It was found that larval abundance, sampled early in the season with trays of soapy water, was correlated with canopy defoliation at the end of the season. However, tree bands did not affect total canopy defoliation. Although many cities use sticky bands as part of cankerworm management, the authors did not find evidence for their efficacy when defoliation is low.

Key Words. *Alsophila pometaria*; Cankerworms; Defoliation; North Carolina; *Paleacrita vernata*; Tree Mortality; *Quercus phellos*; Willow Oak.

Henrik Sjöman, Johan Östberg, and Johan Nilsson

Review of Host Trees for the Wood-Boring Pests *Anoplophora glabripennis* and *Anoplophora chinensis*: An Urban Forest Perspective 143

Abstract. Two devastating insect pests have been introduced to North America and Europe – the Asian longhorned beetle (ALB) (*Anoplophora glabripennis*) and the citrus longhorned beetle (CLB) (*Anoplophora chinensis*). These two wood-boring beetles are argued to be one of the most serious threats to the tree landscape since they have a large number of host species and genera. With the aim of creating an up-to-date compilation of these hosts, a systematic review was made of the literature for information on tree species attacked and used by ALB and CLB as hosts for complete life cycle or for feeding. This review revealed that a large number of tree species and genera are liable to be attacked by ALB and CLB. However, based on the findings, the whole picture is still unclear. One reason for this is the lack of transparency in published studies regarding lists of susceptible tree species for ALB and CLB. Another factor that needs to be reported is whether a tree species supports the complete life cycle of the beetles or just feeding by adult beetles. Without this information, species possessing moderate host qualities are at risk of being incorrectly labelled as very good hosts and hence excluded as urban trees.

Key Words. *Anoplophora chinensis*; *Anoplophora glabripennis*; Asian Longhorned Beetle; Citrus Longhorned Beetle; Host; Pests; Review; Tree Selection; Urban Trees; Wood-boring Pests.

David L. Kulhavy, Di Wu, Daniel R. Unger, I-Kuai Hung, and Jianghua Sun

Comparison of Tree Condition and Value for City Parks and Stephen F. Austin State University in Nacogdoches, Texas, U.S. 165

Abstract. Trees in landscapes are valued for physical as well as aesthetic benefits and biodiversity. Trees on a university campus and in city parks also help to provide an environment in which students and visitors can study and relax. A critical decision facing urban foresters, arborists, and planners involves deciding when an existing tree should be removed and replaced; it is a decision often based on an evaluation of the tree's health, condition, and safety concerns. This project surveyed a total of 3,335 trees with 79 species on the campus of Stephen F. Austin State University (Nacogdoches, Texas, U.S.) and 1,572 trees with 44 species in Nacogdoches city parks. Tree health and replacement values of the two groups were statistically compared, as were the diversities of the two. Finally, the tree health conditions and distributions were spatially analyzed using a geographic information system. Although there was statistical evidence indicating that the campus trees were significantly healthier than the city park trees, neither of their biodiversity status was desirable. It is important to identify and remove trees with extensive wood decay and introduce new species when performing forest maintenance and management.

Key Words. Biodiversity; Campus; City Park; CTLA Method; Geographic Information Systems; Hazard Rating; Inventory; Risk Assessment; Species Diversity; Texas; Tree Valuation.

Edward F. Gilman and Michael D. Marshall

Fertilizer Rate and Number of Applications Impact Growth of Trees in Field Soil 178

Abstract. Fertilizer recommendations for producing shade trees in nursery field soil in North America appear to be based on tradition and tree performance; there is little empirical data. This study was designed to examine efficacy of reducing traditional or historical fertilizer amount (rate) and number of applications for two taxa and to present a protocol for growers to test fertilizer use efficiency. A traditional rate of fertilizer was applied along with four others: zero, one-third, two-thirds, or one-and-one-third traditional. Fertilizer was divided into one, two, three (traditional), or four equal amounts applied during the growing season. The study was conducted on a fine sand field soil with 680 trees of each taxa in adjacent plots of the same field. There were 16 factorial treatment combinations plus a non-fertilized control. Fertilizer rate cut to one-third of the historical rate, and number of applications reduced from three to either one or two, resulted in little if any reduction in trunk diameter or height growth over the four-year period. These taxa appeared to grow almost regardless of nitrogen application strategy. Growers can partner with a research team to find an efficient fertilizer rate and number of applications that could cut production costs.

Key Words. Fertilizer; Nursery; Tree Height; Trunk Diameter.
