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CONTENTS

This special issue of Arboriculture & Urban Forestry contains a series of papers related to urban tree growth and longevity. Research and new information on urban tree growth and longevity is important for improved management of our urban trees and forests, as well as assessing their function and value. The papers in this issue were presented at the Urban Tree Growth & Longevity Conference held on September 12–13, 2011 at The Morton Arboretum (Lisle, Illinois, U.S.). This international conference brought together researchers and practitioners to discuss the current state of knowledge concerning urban tree growth and longevity. The conference covered four topic areas: 1) Descriptive studies of tree growth, longevity, and mortality, 2) Roles of tree production and sales on tree growth and longevity, 3) Roles of site design and tree selection on tree growth and longevity, and 4) Roles of tree and site management on tree growth and longevity. The objectives of the conference and these papers are to: develop collaboration among professionals and researchers to help identify important gaps in our knowledge, foster discussions about promising new methodologies, prioritize research and education needs, and outline a course of action for future research and outreach on urban tree growth and longevity. A few additional papers from the conference will be published in a special section of a future issue of this journal.

Abstract. Selecting, locating, and managing trees to provide ecosystem services are becoming increasingly important facets of municipal and consulting forestry. The science of urban tree growth modeling is fundamental to quantifying these services. This paper describes three long-term tree growth studies conducted to evaluate tree performance because repeated measurements of the same trees produce critical data for growth model calibration and validation. Several empirical and process-based approaches to modeling tree growth are reviewed. Modeling is more advanced in the fields of forestry and pomology than in urban forestry. The USDA Forest Service's reference city research has developed over 1,800 growth equations from measurements on more than 17,000 trees in 16 cities. The database is a valuable source of information that reflects regional differences in species composition, climate, soils, site conditions, and management practices. Several examples illustrate how differences in local climate and management practices can influence growth of a single species and the resulting value of services. Further advances in urban tree growth modeling are needed to inform the design, management, and modeling of high performing landscapes.
Key Words: Allometry; Ecosystem Services; Predictive Equations; Tree Growth; Urban Forest.

Abstract. Urban forests provide important ecosystem services, but species composition and canopy structure influence provisioning of these services and long-term stability of the urban canopy. Two landscape-scale data sets (presettlement land surveys and an urban tree census) were used to explore relationships among modern land use, presettlement vegetation, and urban forest canopy structure, size structure, and composition in the Chicago, Illinois, U.S., metropolitan region. Presettlement vegetation and modern land use combined to influence urban forest composition and structure. Modern forested areas with high native species dominance, canopy cover, and structural complexity were associated with forest (rather than prairie) vegetation in the presettlement landscape. Oaks (*Quercus* spp.), which dominated presettlement forests and provide high ecosystem service value because of their large stature and wildlife value, were strongly associated with presettlement forest areas and modern natural areas. The Chicago region is in a transitional state where composition and structure of larger size classes is heavily tied to pre-urban vegetation. In the future, this landscape is likely to experience a shift in dominance from oaks to smaller-statured, shorter-lived non-native and opportunistic species. This shift, along with climatic change and introduction of exotic pests, may result in an urban forest with reduced potential to provide important ecosystem services.
Key Words. Canopy Structure; Chicago; Ecosystem Services; Land Use; Oak; Presettlement; *Quercus*; Urban Forest.

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Abstract. High diversity of species and genera and site adaptation are two important factors in achieving a healthy and sustainable urban tree population. This paper presents and discusses a selection procedure for the identification of trees adapted to inner city environments. The procedure is based on dendroecological studies of trees in natural habitats, with similarities in climate and site conditions as inner city environments. By studying trees in such habitats, firsthand information can be gained on the growth and performance of a wide range of species and genotypes. Two field studies were conducted, one in central China and another in northeast Romania and the adjoining Republic of Moldavia with the aim to identify tree species and genotypes adapted to inner city environments in the northern parts of central Europe and the adjoining milder parts of northern Europe. In total, 27 tree species were identified as specialists for warm and periodically dry habitats. Of these tree species, only four are currently used frequently or used to some extent in northern Europe, meaning that 23 other tree species identified in the case studies can be potential supplements for diversification of the urban tree population.

Key Words. China; Dendroecology; Moldavia; Romania; Selection; Urban Environments; Urban Trees.

Abstract. Ecotypic, clonal, and racial variation present in tree species across their native ranges represent a largely untapped opportunity to select superior seed sources or clonal materials to withstand a variety of unique environmental stresses imposed in built environments and managed landscapes. This paper focuses on three important woody plant genera (*Quercus* L., *Platanus* L., and *Taxodium* Rich.) and researchers' efforts to discover superior genotypes with tolerances to environmental stresses, including alkaline soil conditions, moisture deficits, and temperature extremes. The study authors are also interested in exploiting geographic provenances and open-pollinated family selection to identify unique genotypes or populations having desirable ornamental attributes, rapid root regeneration potential, and/or desirable plant architecture. A discussion of current results, potential impacts on selection of urban forest trees for managed landscapes, and plans for future development and research are presented.

Key Words. Built Environments; Managed Landscapes; *Platanus occidentalis*; *Quercus fusiformis*; *Quercus virginiana*; Seed Source; *Taxodium distichum*; Urban Trees.

Abstract. Soil quality assessments are needed to improve a professional's ability to manage urban soils and trees. This research was conducted to identify which soil properties are most useful for relating information on urban tree performance. In total, 48 soil properties were measured at 84 sites from five urban landscapes in the western suburbs of Chicago, Illinois, U.S. Key physical, chemical, and biological properties to be included in a minimum data set (MDS) for assessing urban soil quality were identified using statistical approaches and practical considerations. The MDS included: texture, bulk density, wet-aggregate stability, pH, electrical conductivity, soil organic matter (SOM), and particulate organic matter. The MDS was used to establish an urban soil quality index (USQI). The MDS and USQI were highly correlated with tree size attributes of height, trunk diameter, crown area, and age. Correlations between the MDS and USQI with trunk diameter growth rate, height growth rate, foliar N, and chlorophyll content were often significant, but less strong. Among the MDS parameters, SOM, pH, and texture appear to be the most informative measures for soil quality relating to urban tree performance. Soil quality and tree performance increased logarithmically following site disturbance, with a plateau after 50 years.

Key Words. Minimum Data Set; Organic Matter; pH, Texture; Tree Growth; Urban Site Index.

Abstract. *Quercus virginiana* Mill. Highrise® were planted into 10 L and then 57 L plastic nursery containers at two depths for a total of four depth combinations, and then root pruned in one of three different manners when planted into the landscape. Nursery planting depth had no impact on growth in the nursery or bending moment required to tilt trunks in the first two years following landscape planting. Root pruning when planting into landscape by either method tested had no effect on growth the first two years. Number of roots circling inside the root ball was reduced by shaving or deep root ball slicing two growing seasons after planting. Root balls that were either sliced or shaved generated more roots in landscape soil one growing season after landscape planting than those that were not root pruned, which probably explained the greater bending moment required to pull trees out of the ground. Total cross-sectional root area one growing season after landscape planting was greater on shaved trees than those not root pruned at planting. Bending moment at 20 degrees trunk tilt was best correlated with cross sectional area of roots growing straight across the periphery of the root ball and into landscape soil.

Key Words. Anchorage; Circling Roots; Landscape Planting; Lateral Stability; Root Ball Shaving; Root Ball Slicing; Stability.

Executive Summary. Researchers from around the world gathered at The Morton Arboretum (Lisle, Illinois, U.S.) in September 2011 to share their experiences and knowledge on the topic of urban tree growth and longevity. A roundtable discussion was held at the end of the second day's program, during which attendees discussed the state of current research in these areas and identified needs for future research. Four distinct subgroups were identified within the broader topic of urban tree growth and longevity: tree production; site design and tree selection; tree and site management; and the need for descriptive studies. Throughout the discussion, it became clear that there must be greater collaboration among researchers investigating tree growth, increased investment in long-term studies, the development of a clearing house for information, and the fostering of productive partnerships between the governmental, industry, and academic sectors. To strengthen the impact of urban tree growth research on the tree care industry, results and conclusions must be summarized and distributed through suitable means for a variety of audiences, which might include federal, state, and local governments; property owners and consumers; nurseries and growers; tree care and other green industry professionals; and urban planners, civil engineers, and landscape architects. To this end, the Urban Tree Growth & Longevity Working Group has been established to support communication between researchers and professional practitioners, enrich scientific exchange, and enhance the quality, productivity, and timeliness of research on tree growth, longevity, and mortality.