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CONTENTS

Abstract. Cities contain dozens of street tree species each with multiple arthropod pests. Developing and implementing integrated pest management (IPM) tactics, such as scouting protocols and thresholds, for all of them is untenable. A survey of university research and extension personnel and tree care professionals was conducted as a first step in identifying key pests of common street tree genera in the Southern United States. The survey allowed respondents to rate seven pest groups from 0 (not pests) to 3 (very important or damaging) for each of ten tree genera. The categories were sucking insects on bark, sucking insects on leaves, defoliators and leafminers, leaf and stem gall forming arthropods, trunk and twig borers and bark beetles, and mites. Respondents could also identify important pest species within categories. Some tree genera, like *Quercus* and *Acer*, have many important pests in multiple categories. Other genera like *Liriodendron, Platanus,* and *Lagerstroemia* have only one or two key pests. Bark sucking insects were the highest ranked pests of *Acer* spp. Defoliators, primarily caterpillars, were ranked highest on *Quercus* spp. followed closely by leaf and stem gallers, leaf suckers, and bark suckers. All pest groups were rated below '1' on *Zelkova* spp. Identifying key pests on key tree genera could help researchers prioritize IPM development and help tree care professionals prioritize their training and IPM implementation. Recommendations for future surveys include having more respondents and tree taxa represented and identifying trees to species within large genera, such as *Acer* and *Quercus*.

Key Words. *Acer*; Integrated Pest Management; *Quercus*; Scale Insects.

Abstract. Tree survival is a performance metric for urban forestry initiatives, and an understanding of the factors that influence mortality can help managers target resources and enhance survival. Furthermore, urban tree planting investments depend on tree survival to maximize ecosystem services. In this literature review, we categorized factors commonly associated with urban tree mortality and summarized mortality rates published in 56 studies, focusing on studies of trees along streets, in yards, and in landscaped parks. Study designs included quantitative field monitoring of uneven-aged tree populations and tracking planting cohorts of even-aged trees, as well as qualitative analyses. Annual mortality rates ranged from 0.6 to 68.5% for cohort studies and 0 to 30% for repeated inventories of uneven-aged trees. The 1st, 2nd, and 3rd quartiles of annual mortality were 2.8 to 3.8%, 4.4 to 6.5%, and 7.1 to 9.3% for planting cohorts, and 1.6%, 2.3 to 2.6%, and 3.0 to 3.3% for repeated inventories of uneven-aged trees (ranges reflect studies that reported a range for the time period or mortality rate). For cohort studies, annual mortality tended to be highest during the first five years after planting. The most commonly cited biophysical factors associated with mortality were taxa (15 articles), tree size/age (13 articles), and site characteristics (12 articles). The most commonly cited human-related factors were stewardship, maintenance, and vandalism (15 articles). More long-term studies are needed to investigate how site characteristics influence mortality, including rarely examined soil and microclimate characteristics. Future research should also examine institutional structures related to mortality outcomes, as well as parcel-level sociodemographic factors and resident behaviors.

Key Words. Ecological Monitoring; Street Tree; Tree Death; Tree Demography; Tree Population; Tree Survival; Urban Park; Yard Tree.

Abstract. City trees planted in parks and along streets are typically grown to large size in nurseries before being transplanted to their final growing sites. According to tendering rules within the European Union (EU), any business may compete for public contracts in any EU country, and this applies to purchases of valuable lots of nursery trees. There is however a risk of poor transplanting success if the trees are imported from very distant locations with a different pace of spring development. The aim of this study was to implement a Thermal Time model to predict the spring development of *Tilia* trees to find out in which geographical area the spring development is sufficiently similar to conditions in southern Finland, so that the success of transplantation of the trees is not unduly risked. We used phenological observations collected at the International Phenological Gardens (IPGs) over the whole of Europe, together with ERA-Interim weather data to estimate the model parameters, and then used the same date to predict the onset of leaf unfolding of

Tilia during the years 1980 to 2015. Producing maps of phenological development of *Tilia*, we concluded that there are no large risks of frost damage if tree import area is limited to northern parts of Baltics or to the west coast of Scandinavia.

Keywords. Leaf Unfolding; Phenology; Thermal Time Model; *Tilia* sp.; Urban Trees.

Abstract. This study on investigating change in the material properties of ash trees after infestation by emerald ash borer (EAB) (*Agrilus planipennis*) occurred at two locations in northeast Ohio in the summer of 2013. The trees at either site were divided into three groups based on % canopy lost from EAB (group I = 0 to 5%, group II = 6 to 25%, and group III = greater than 40%). A digital image correlation (DIC) system was used to evaluate and compare strain (tissue deformation) on ash branches that were (static) loaded to failure. Stress wave transmission times (T_m) of sound waves through stem wood and fine roots and root balls of the ash trees also were assessed. The DIC evaluations revealed that branches of ash trees that were in groups II and III exhibited significantly lower strain after static loading compared to that observed for trees in group I. Analysis of stress wave T_m revealed that group III trees had significantly higher T_m times compared to the other two groups. Fine root necrosis was significantly higher in group III trees and lowest in group I trees. Extracted root balls from group III trees had significantly higher percentage decay compared to that observed from trees in groups I and II. These data provide fundamental insight into the material properties of ash trees after infestation by EAB and can contribute to arboricultural guidelines for ash tree preservation and help develop safety protocols to address structural loss in trees after EAB infestation.

Keywords. Emerald Ash Borer; Digital Image Correlation; Root Necrosis; Stress Waves.

Abstract. The primary aim of this study was to communicate a method for locating natural habitats where trees grows under conditions that are comparable to those in urban environments in terms of water stress. This is presented by analyzing five different forest reserves in the southern Caucasus (Republic of Georgia) where calculation of net water balance over the period of a year was conducted. This provided an insight into the drought at the sites during the growing season. The data were thereafter compared with similar calculations for five different cities in Western Europe in order to see if there were any matches in drought stress between the cities and the forest reserves. To extend the analysis, conditions in the five cities were assessed for high density and low density areas, and for the current climate and a future climate scenario. The comparisons revealed some matches between conditions in the forest reserves and those in different scenarios/areas in the cities. A secondary aim was to identify specific ecotypes in the wild demonstrating great potential to handle growing conditions similar to those in urban environments based on inventories of woody plants in the forest reserves. A total of 44 woody species were found in the forest reserve systems with a random distribution throughout the five study sites. Based on the commitments presented above a preliminary screening can be done where future tree selection focus can be directed towards highly promising species and ecotypes, which would undoubtedly limit the time lag before proper plant material can be released.

Keywords. Diversification; Ecosystem Services; Ecotypes; Tree Selection; Urban Forest; Urban Trees.