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Albert A. Piñon, Enrique L. Tolentino Jr., Roberto G. Visco, Margaret M. Calderon, and Nappy L. Navarra
Heat Reduction Capacity of Street Trees in the Municipalities of Los Baños and Bay, Philippines 203

Abstract. Background: This study compared the phenotypic traits and microclimate parameters of street trees as affected by species origin (native [N] vs. non-native [NN]) and location (inside vs. outside the University of the Philippines, Los Baños [UPLB]). Methods: Tree traits were counted and measured using a meter tape and a range finder, while microclimates (air temperature, relative humidity, heat index, light intensity) under tree canopies and adjacent exposed areas were gathered using a multifunctional environmental meter and a light meter. Results: *T*-test analysis revealed that tree traits differed significantly but not in terms of microclimate, except for crown-shaded light intensity, with NN trees showing a significant reduction compared to N trees. Meanwhile, tree traits as affected by location showed significant variation only in the number of major branches, with trees outside UPLB registering more branches than the other location. Moreover, multiple linear regression indicated which part of the trees had a strong influence on crown-shaded microclimate, while results of correlation analysis showed that phenotypic traits, except for the relationship between total height and crown traits, regardless of their species' origin, were significant, positive, and strongly correlated. Conclusion: *T*-test analysis highlighted that street trees in solitary and/or small aggregates tend to enhance the production of protective (e.g., leaves) rather than productive (e.g., stems) traits, while correlation analysis suggested that interventions (e.g., pruning) could improve the trees' crown-shaded microclimate condition. These findings could provide technical guidance for a more sound decision for the inclusion or removal of street trees in urban areas.

Keywords. Crown-Shaded; Microclimate; Mitigation Effect; Protective Traits.

Yanina Honcharenko, PhD, Uliana Sokolenko, PhD, Nadiia Oleksiichenko, DSc, and Stanislav Zimich
Assessing the Allergenic Load of Tree Species in Kharkiv, Ukraine, Based on Aerial Pollen Survey 222

Abstract. Background: Urban landscaping enhances environmental quality but often overlooks the allergenicity of plant species, impacting public health. In Ukraine, pollen monitoring is not systematically regulated. This study aimed to assess the allergenic load of tree species in Kharkiv, Ukraine, based on aerial pollen surveys, and to identify the most allergenic species and peak periods of pollen emission. Methods: From March to June 2024, aerial pollen samples were collected in the Novobavarskyi and Saltivskyi districts of Kharkiv using the gravimetric Durham method at 1.5-m and 15-m height. Pollen grains from woody plant species were identified and quantified. Potential allergenicity was assessed through the CARE-S index, which considers immunogenicity, morphology, and pollen production characteristics. The newly proposed Total Pollen Allergenic Load Index (PL) allowed us to identify periods of high allergenic risk. Results: The survey detected pollen from 16 tree species, with *Betula pendula*, *Pinus sylvestris*, *Corylus avellana*, and *Juniperus sabina* showing the highest allergenicity. The integrated PL effectively reflected the cumulative allergenic potential of the airborne pollen spectrum, allowing identification of distinct seasonal peaks. The highest pollen deposition and allergenic loads were recorded between May 5 and May 15, when 8 tree species released pollen simultaneously, 2 of which—*B. pendula* and *P. sylvestris*—contributed most to the total allergenic load. Conclusions: Several indigenous and introduced tree species in Kharkiv contribute significantly to airborne allergenic loads. Regular monitoring using volumetric methods is necessary to create reliable pollen calendars and guide safer urban landscaping practices, ultimately improving public health outcomes.

Keywords. Allergenicity; Allergenic Urban Trees; Biological Hazards; Ecosystem Disservices; Urban Greening.

Shuta Tamura, Kaori Marubashi, Mizuki Nakamizo, Kako Matsunaga, Yumiko Kanazawa, Kojiro Suzuki, and Ian D. Rotherham
Fertilisation Effects on Edaphic Properties in Different Soil Types in Relation to *Castanopsis sieboldii* Sapling Growth 266

Abstract. Background: Urban soils often have low-nutrient levels, reduced biota, and frequently depauperate humus. *Castanopsis sieboldii* trees planted in cities may grow poorly in some areas. This study investigated the effects of soil chemical and biological properties on *C. sieboldii* growth. Methods: Individual and compound impacts of N (nitrogen), P (phosphorus), K (potassium), and Ca (calcium) on saplings grown in humic topsoil, humic subsoil, and river sand were investigated. Results: Addition of N alone and combined with P, K, and Ca affected *C. sieboldii* growth in humic topsoil and subsoil. Applications of N alone, in river sand with low levels of available nutrients, had no impact. However, combined nutrients such as N with P, K, and Ca increased shoot and root dry weights, number of leaves, and soil and plant analyser

development (SPAD). Additionally, NPCa and NPK resulted in higher values than individual N for dry weights of shoots and roots as well as for shoot dry weights in river sand. NPKCa application resulted in increased diameter at the base of the first branch in humic topsoil over N alone. NPK produced more leaves in humic subsoil than just N. Moreover, *C. sieboldii* produced the greatest growth in humic topsoil, followed by humic subsoil, and finally unfertilised river sand. Conclusion: Nitrogen application with additional P, K, and Ca was beneficial to growth under test conditions. *Castanopsis sieboldii* growth was enhanced under field conditions with humic topsoil and combined nutrients. Low available P, K, and Ca may be limiting factors restricting performance impacts of N when added alone to low-nutrient soils.

Keywords. Humic; Leaf Litter; Nitrogen; Soil Biological Property; Soil Nutrition.

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Tree Type and Urban Growing Conditions Associated with Street Tree Stress: Lessons from Two US Cities 289

Abstract. Background: Trees provide crucial ecosystem services for urban areas, but the stress of the urban environment can influence tree health and ecosystem service provision. Street trees grow in particularly stressful conditions, but often receive care from some combination of municipal agencies, private businesses, nonprofits, and individuals. Methods: In this study, we quantified tree stress using 4 canopy-based metrics (leaf discoloration, leaf defoliation, dieback, and overall crown stress) to see how stress varies with growing conditions and tree characteristics in 2 US cities: Chicago, IL, and Durham, NC. Using separate Bayesian models for each city, we examined the relationship between tree stress and tree characteristics (e.g., species), site-condition variables (e.g., land use) and cues to care (e.g., mulch). Results: In both cities and for most tree stress metrics, the degree of tree stress was associated with species group and either site type and/or land use. Cues to care were not clearly associated with reduced stress in either city. Defoliation was better explained by the models than the other metrics of tree stress. Discoloration, defoliation, and dieback provided unique information on tree stress and therefore can be useful indices for tree health monitoring. Conclusions: Consistent with arborist practices, species selection plays a large role in informing the degree of tree stress. Because the benefits of tree care were unclear, future work focusing on the context dependence of tree care effectiveness could clarify the conditions under which tree care (especially mulch) is most effective.

Keywords. Arboriculture; Cues to Care; Land Use; Planting Space; Urban Forest.

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The Differential Influence of Urban Soil Management Practices on Soil Properties, Tree Growth, and Ecosystem Services: A Review 333

Abstract. Urban land development often leads to compacted and degraded soils, hindering urban tree establishment and growth and related ecosystem services. Thus, there is a growing interest in restoring degraded soils through various urban soil management practices (USMPs). However, the impact of different USMPs on soil properties, tree establishment and growth, and ecosystem services has not been comprehensively documented and evaluated. To address this knowledge gap, we conducted a literature review, and 41 peer-reviewed articles were selected from 5,913 articles for this analysis. The key response variables included soil bulk density, soil pH, tree growth, total soil carbon, and soil infiltration rates. Existing USMPs were grouped into 4 main categories: (1) organic matter amendments; (2) organic matter with tillage/subsoiling; (3) organic matter with vegetation; and (4) vegetation alone. Urban soil research is unevenly distributed globally, with more than half (53.7%) of studies in the United States, and most studies (82.8%) were short term (≤ 4 years). Generally, USMPs improved soil properties and enhanced tree growth and ecosystem services by reducing 28% to 51% soil bulk density and increasing nutrient availability, microbial activities, infiltration rates, tree growth, and total soil carbon. These findings provide valuable insights on restoring degraded urban soils, sustaining/increasing urban tree canopy cover, and enhancing urban sustainability for urban foresters/planners, policy- and decision-makers, and researchers.

Keywords. Carbon Sequestration; Soil Amendments; Soil Compaction; Stormwater Runoff Management; Urban Forests.