Therefore, a holistic understanding of tree plantings and species with respect to a particular climate is necessary for urban sustainability. The integration of street trees inside the urban landscape is a strategy to alleviate the thermal stress of urban areas. However, trees have variable potential for the regulation of thermal comfort depending on their different canopy shapes/drag.

Abstract. Stress Mitigation in a Hot-Humid Urban Environment

Green Infrastructure with Actual Canopy Parameterization: A Simulation Study for Heat-Stress Mitigation in a Hot-Humid Urban Environment

Keywords. Boxwood; Cultivar Selection; IPM; Physiology; Winter Bronzing; Winter Color; Winter Damage.

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Background: The urban heat island (UHI) phenomenon, resulting from rapid urbanization and aggravated by persistent climate change, is intensifying heat stress and temperature anomalies inside the urban microclimate, requiring the implementation of suitable adaptation measures for sustainable development. The integration of street trees inside the urban landscape is a strategy to alleviate the thermal stress of pedestrians. However, trees have variable potential for the regulation of thermal comfort depending on their different canopy shapes/drag. Therefore, a holistic understanding of tree plantings and species with respect to a particular climate is necessary for urban sustainability.
Methods: In this study, computational fluid dynamics (CFD) that employ unsteady Reynolds-averaged Navier-Stokes (URANS) equations were performed using FLUENT solver to analyze the cooling potential of isolated tree species based on 5 morphological characteristics and canopy shapes (i.e., tree height, trunk height, crown width, crown height, and leaf area density) in an urban area. Results: Results revealed a variable temperature regulation (i.e., 0.6 to 1.2 \(^\circ\)K) depending on the tree species. Overall, the cooling effect was only observed in the vicinity of the tree canopy. This was due to the availability of shading and increased moisture content provided by the canopy foliage, which blocked shortwave radiation from the sun, as compared to its surroundings. Conclusions: The study findings show that leaf area density is the morphological trait that has the greatest impact on thermal comfort, as it results in low ambient air temperature irrespective of the type of urban density. Additionally, the most effective way to reduce thermal stress is to implement taller trees with uniform foliage density, which will produce a well-ventilated environment.

**Keywords.** CFD; Sub-Configuration Validation; Thermal Stress; Tree Morphological Characteristics; Urban Microclimate.