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Quantifying dominance of intra-storm phase of interception process by small isolated canopies

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Precipitation interception by vegetation canopies has long been recognized as a major component of the hydrologic cycle; however, historically most research has been dedicated to closed or sparse canopy forests. The goal of our research was to quantify rainfall partitioning by small isolated canopies in an urban setting.
The field experiment involved small forms of four shrub species (*Prunus laurocerasus, Cornus sericea, Itea virginica and Hydrangea quercifolia*) with crown heights 40 - 80 cm and diameters 35 - 60 cm. Each plant had ten rain gauges to measure throughfall with a sampling frequency of 5 seconds. An on-site automated weather station provided meteorological data. Leaf area index (LAI) was measured by manual counting. We estimated the canopy storage capacities of all four species to be less than 0.5 mm.
The obtained data showed statistically significant differences in interception properties among all four species, except between Cornus and Itea. Cumulative interception loss for the period of August-December 2013 was 10% for Cornus, 16% for Itea, 29% for Hydrangea, and 49% for Prunus. The observations revealed a weak relationship between interception abilities and LAI for all four species.
Throughfall and precipitation intensities (mm/hr) expressed very strong linear relationship (adjusted coefficients of determination were from 0.80 to 0.95) for the entire range of observed rainfall intensities. For Cornus the ratio of throughfall to precipitation intensity was close to 0.93:1, for Itea it was 0.82:1. The ratios were lesser for Hydrangea (0.65:1), and especially for Prunus (0.48:1). Therefore we show that reduced by the canopy, throughfall intensity results in the bulk of precipitation depth intercepted during the rain events. In contrast, the amount of water stored on the canopy and evaporated between and after rain events contributes minimally to interception.
Simulations of potential evaporation based on the Penman-Monteith method showed a large underestimation of evaporation from the wet canopies during the rain events. Approaches other than energy balance models of potential evaporation from a still water surface are being discussed in order to explain large evaporation from within a wet isolated canopy.