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# Differential stemflow generation due to crown structural interactions with wind-driven rainfall

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Meteorological influences on the variability of stemflow generation can affect the hydrology, ecology and soil chemistry of wooded ecosystems, yet the effects of directional wind-driven rainfall on differential stemflow production remain relatively un-researched. This study examines the correspondence of directional wind-driven inclined rainfall with stemflow generation in individual tree crowns utilizing multiple correspondence analysis (MCA) and intrastorm observations at 5 min monitoring intervals. In general, preferential stemflow generation at Fair Hill was observed during episodes of inclined rainfall driven by wind from the east to north-northeast (33.76-101.25 deg.). This was supported by MCAs which produced significant correspondences between stemflow production and periods of inclined wind-driven rainfall for nearly all monitored storm events. Intrastorm plots of stemflow production from dominant and subcanopy trees of each codominant species (Fagus grandifolia Ehrh. (American beech) and Liriodendron tulipifera L. (yellow poplar)) also verified this correspondence. Interspecific canopy characteristics of L. tulipifera and F. grandifolia affected crown position, canopy structural characteristics, and, thus, the canopy's response to inclined precipitation. The greater vertical canopy depth observed for F. grandifolia trees enabled them to more efficiently capture inclined rainfall for enhanced stemflow production; whereas, the greater horizontal surface area of L. tulipifera canopies enhanced their droplet capture efficiency and subsequent stemflow generation for periods of un-inclined rainfall. As inclined wind-driven rainfall occurred within a majority of rain events at this site, preferential stemflow production may be a significant process to consider when examining the spatial distribution of canopy-derived water fluxes to the forest floor of wooded catchments under similar meteorological conditions.