(44)

Quantification of Stem Flow in Seven Tree Species in an Urban Environment of Sri Lanka

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Abstract

Stemflow (SF) is a small fraction of precipitation which contacts with the canopy and reaches to the ground by flowing along the stem of the tree. The SF generation of urban environment in single rain events are less frequently reported than in forested ecosystem. Therefore, SF was studied for 20 rain events starting from dry canopy condition for 7 selected tree species with 3 replicates in University of Sri Jayewardenapura with reference to tree morphological characteristics. Stemflow collars were fixed at diameter at breast height (DBH) and connected to storage tanks. Tree height, DBH, canopy height, canopy diameter, and canopy volume, canopy diameter to height ratio, bark thickness, furrow depth and number of furrows per DBH were considered as tree morphological characteristics. Tree architectural models were determined for studied species by leaf shape, leaves arrangement and canopy shape. Gross precipitation was recorded using an automated weather station located in an open area in the study site. According to the results DBH, canopy volume and bark thickness have a negative relationship with SF. *Pterocarpus marsupium* Roxburgh and *Felicium decipien* have resulted the highest and the lowest DBH, bark thickness and canopy volume respectively since, the highest and the lowest SF were generated by *F. decipien* and *P. marsupium* Roxburgh respectively. However, there were no significant relationships between SF and other listed morphological characteristics as well as with the tree architectural models. The results suggest a significant variation in SF by species and study trees can be arranged as *F. decipiens*>*Mesua ferrea* L.>*Diptercarpus zelanicus* Thwaites>*Delonix regia* (Boj. ex Hook.) Raf.>*Azodrachata indica*> *Casuarina eqisetifolia* L.>*P. marsupium* Roxburgh in species specific SF. Thus, the results of the study will be useful for climate sensitive selection and siting of urban trees towards integrated rainwater management.

Keywords: Stemflow, Strom water management, Tree architecture, Tree morphology, Urban forestry