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Comparison of stemflow for two xerophytic shrubs in re-vegetated sand dunes in N. China

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Precipitation, as the sole source of water replenishment in the semiarid area, plays a key role in sustaining the desert ecosystem. Stemflow, a spatially localized point input of precipitation at the plant stem, of two xerophytic shrubs (Caragana korshinskii Kom. and Artemisia ordosica Krasch.) was quantified at the re-vegetated sand dunes of Shapotou Desert Experimental Research Station near Lanzhou. The results indicated that stemflow, expressed as an equivalent depth based on the canopy area of the sampled shrubs, averaged 3.3% and 7.9% of the bulk precipitation for C. korshinskii and A. ordosica, respectively. This is not a high value but important to be taken into account in the determination of the water balance of the desert ecosystem. An antecedent precipitation of 2.2 and 1.3 mm was necessary for the initiation of the stemflow for C. korshinskii and A. ordosica, respectively.
The relationship between funnelling ratios and rainfall suggested that there existed a rainfall depth threshold of 7 mm for the two shrubs; while large variability in funnelling ratio were found for rainfall intensity less than 4 mm h-1, but it tended to decease with increasing rain intensity when rainfall intensity was greater than 4 mm h-1. Significant positive linear relationships were found between stemflow production (l) and rainfall depth (mm) for the two shrubs. Statistical analysis showed that the volume of precipitation channelized as stemflow varies as a function of canopy area and canopy volume characteristics. There was a positive effect on redistribution of rainwater and funnelling ratio as shrub size increases for C. korshinskii , while, for A. ordosica, a negative effect on funnelling ratio was found.

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