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Variability of throughfall erosivity among crown positions in a teak plantation based on raindrop measurements and throughfall partitioning

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Knowledge of throughfall erosivity is necessary for the accurate prediction of soil erosion in some forests with little protective ground cover. This study compared throughfall drops and erosivity between open rainfall and for four different crown positions in a teak plantation in Thailand. Throughfall was partitioned into free throughfall, splash throughfall, and canopy drip using drop size distributions of both open rainfall and throughfall. Relative to open rainfall, we found the following: (1) throughfall drops were lower in number but larger in size due to the coalescence of raindrops on canopies; (2) throughfall drops, especially canopy drip, had lower velocity due to insufficient fall distance from the canopy to the forest floor to reach terminal velocity, which partly depends on crown base height and the vertical distribution of foliage; and (3) throughfall usually had higher kinetic energy due to larger drop size, which depends on the amount of canopy drip and the crown base height. Mid-crown positions were subjected to higher throughfall kinetic energy than in the canopy gap or near-stem positions. Compared to mid-crown positions, the gap position had smaller drops and less canopy drip, while the near-stem position had lower drop fall velocity. The erosivity of throughfall with respect to crown position is useful in the development of high-resolution soil erosion risk maps that can help maintain forest productivity in teak plantations.

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