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Dissolved organic carbon biodegradability from leaf litter leachates of riparian tropical trees

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It is generally assumed that leaf litter with varying chemical composition may show different rates of mass loss, dissolved organic carbon (DOC) release, and DOC biodegradability. Leaf litter is composed of different organic compounds, which may differ in their release rates. Some authors consider leaf litter chemical quality (carbon to nitrogen ratio (C:N) and polyphenolics content) as an indicator of leaf litter mass losses and DOC released into stream water through leaching. In this research, we determined if leachate's DOC biodegradability exhibited a positive relationship with leaf litter chemical quality and leaf litter mass loss due to leaching. In order to test these hypotheses, leaf litter from six riparian tree species (*Bambusa vulgaris; Castilla elastica; Artocarpus altilis; Cecropia peltata; Hura crepitans* and *Ficus maxima*), present in the lower reaches of a fifth-order stream in northern Venezuela was collected during the dry season of 2010. To evaluate leaf litter mass loss, air-dried leaves were incubated in Milli-Q water at room temperature in the dark. After 1h, 6h, 1d, 2d, 4d, 8d and 15d, microcosms were removed from the assay to determine remaining mass. DOC biodegradability was measured using 24 h leachates that were added into a 1L glass flask containing 250mL of unfiltered stream water, 4g of stream sediment, and nutrient amendments until all incubations had equal initial DOC concentrations. Biodegradability of DOC was measured at 0, 1, 2, 5 and 7 days as the decrease in DOC concentration through time. Chemical characterization of leaf litter involved the determination of total concentrations of C, N, and poliphenolics. Three replicates were used for all analyses. Initial chemical characterization of leaf litter showed that only two species (*C. elastica* and *A. altilis*), had similar C:N ratios ($\sim$31). The other four species, showed different C and N contents but presented C:N ratios between 21 and 23. Total polyphenolics content varied greatly among species. Based on the degree of DOC biodegradability, after 1d of incubation, all species could be grouped into three distinct categories (high, intermediate and low). Then, biodegradability of DOC declined steadily until reaching near-constant values at day 7 probably reflecting less availability of labile C compounds. Breakdown rates were not significantly correlated with DOC decay rates (r=-0.580, P=0.228, n=6). However when the remaining DOC and the remaining mass for all species was evaluated, a significant negative correlation was observed (r=-0.567, P=0.014, n=18) contradicting our initial hypothesis. Such results might be a consequence of the presence of secondary metabolites alongside labile DOC in some species leachates which could prevent microbial C consumption. Therefore, the quality of C released by leaching, measured as its biodegradability, does not seem to have a relationship with the amount of C lost by leaching. This could influence the C budget of the riparian ecosystem since the proportion of C consumed by stream microbes is affected by the chemical quality of leaf litter leachates.