



FUNGICIDE MANCOZEB SHORT-TERM EXPOSURE ALTERS MICROBIAL LEAF LITTER DECOMPOSITION AND SHREDDER BEHAVIOR IN TROPICAL STREAM FOOD WEBS

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Fungicides are increasingly recognized as important drivers of ecological change in freshwater ecosystems, yet their effects on detritus-based food webs in tropical streams remain poorly understood. In neotropical streams of the Atlantic Forest, fungicides may inhibit leaf-associated microorganisms and directly or indirectly affect shredders such as *Phylloicus* (Trichoptera, Calamoceratidae). This study evaluated how environmentally relevant concentrations of the fungicide Mancozeb affect leaf decomposition and the performance of *Phylloicus* sp. larvae, including leaf microbial decomposition, in microcosm experiments. Senescent *Inga vera* leaves were conditioned (14 days) with varying Mancozeb concentrations (0, 30, 15, and 40 $\mu\text{g L}^{-1}$) and stream water. Ten leaf discs were allocated in microcosms with ($n=30$) and without ($n=30$) *Phylloicus*, for 7 days at 18°C. Consumption, case size, and decomposition were corrected for larval biomass and quantified by log ratios via bootstrap. Survival rates were high across all treatments (80-88%), with no clear concentration-dependent mortality patterns. Leaf litter consumption (control: 6.24 ± 0.89 mg/mg) decreased by 30% at the lowest concentration (5.15 ± 0.62 mg/mg). Case-building (control: 4.04 ± 0.59 mg/mg) decreased by 32% at the lowest concentration (3.09 ± 0.25). Microbial decomposition declined by approximately 35% in intermediate and high concentrations. Interocular distance remained unchanged under all treatments. Our findings demonstrate that environmentally realistic fungicide exposure can disrupt multiple and interconnected pathways of detritus processing before detectable effects on shredders' growth become evident. The decoupled responses between microbial conditioning and shredder behavior suggest that fungicides may operate through distinct mechanistic pathways across trophic levels, simultaneously altering microbial functioning and consumer performance. These results highlight the ecological importance of sublethal and non-monotonic responses to fungicides and reinforce the need for ecotoxicological risk assessments to incorporate functional and behavioral endpoints in addition to conventional



mortality-based metrics, particularly in tropical freshwater ecosystems that are strongly dependent on detrital energy pathways.

Palavras-chave: *ecotoxicology; emerging pollutants; agricultural fungicides; detritivores; Trichoptera; microbial activity.*