Leaf Processing in Streams and the Determination Of Fungal Biomass via a Chemical Index

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Abstract

Leaf processing of two plant species, sugar maple (*Acer saccharum*) and river birch (*Betula nigra*), was studied in two, north central Pennsylvania streams of different orders during the summer and fall. Processing rates, or k values, organic content, and macroinvertebrates were monitored at 7, 21, 28, and 35-day intervals in the summer and at eight intervals from 8 to 48 days in the fall. Ergosterol was extracted from incubated leaves using procedures by Newell (1998) and measured with HPLC. The effect of incubation time, plant species, season, and stream pH on leaf processing was assessed. Organic contents of both plant species decreased over incubation time due to nutrient leaching and microbial degradation. Processing rates for *Acer saccharum* and *Betula nigra* were significantly lower in the third-order stream than the second-order stream because of a significantly lower pH and colder water temperatures (P=0.786, P=0.159). *Acer saccharum* decomposed significantly faster in the summer than *Betuga nigra* in both Mill Creek and Big Bear Creek (P=0.787, P=0.689, α=0.05). Summer fungal biomass levels were significantly higher in the second-order stream due to the lower pH of the third-order stream (P=0.066, α=0.05). The highest fungal biomass concentration found was 2.28 μg/mg for the 7-day, *Acer saccharum* incubation. A significant difference was found between the summer and fall fungal biomasses of *Betula nigra* (P=0.500, α=0.05). However, *Acer saccharum* had no significant difference in its summer and fall fungal biomass, possibly due to its fast decomposition rate (P=0.024, α=0.05). Total invertebrates in the summer increased as fungal biomass decreased. In conclusion, this study showed increased fungal biomass in the fall and increased processing rates in the summer. Future studies should try other methods of incubation and extraction, along with a larger sample size because

uncontrollable weather conditions cause sample loss.