

The Comparison of Leaf Processing Rates in Streams, Percent Organic Content,
and Fungal Biomass in the Summer vs. Fall/Early Winter

Christina Panko

Dr. Mel Zimmerman, project supervisor

Presented to the faculty of Lycoming College
in partial fulfillment of the requirements
for Departmental Honors in Biology

April 2002

Abstract

The purpose of this study was to determine processing rates, percent organic content, and fungal biomass with regard to season, three different leaf species, two sites and two methods. The leaf species of concern were Sugar Maple (*Acer saccharum*), River Birch (*Betula nigra*), and Pin Oak (*Quercus palustris*). The leaves were incubated in two different creeks in North-central PA; Mill Creek, which is a second order stream, and Big Bear Creek, which is a third order stream. The two methods used in the study were the leaf pack method and the leaf disc method. For the leaf pack method, incubation periods were seven, fourteen, twenty-one, twenty-eight, and thirty-five day intervals. The leaf disc method was a modified version of a previous study. Discs were incubated at 4 to 5 day intervals. Water chemistry was analyzed on a weekly basis to determine differences in pH, alkalinity, and nutrients and how they affected leaf processing and fungal growth. Ergosterol indicates fungal growth therefore, it was a method for quantifying fungal biomass. Ergosterol was extracted from incubated leaves and measured through high performance liquid chromatography. Spores were also filtered from 300mL stream water on a weekly basis. Spores may correlate to maximum fungal biomass activity. Sugar Maple had fast processing rates in the summer, while the leaves slowed to medium decomposers in the fall. River Birch and Pin Oak were both medium decomposers in the summer, but fall processing rates fell in the slow processing rate category. Fall processing rates were considerably slower than summer processing rates for all species. Percent organic content decreased over incubation time due to leaf decay and nutrient leaching. There were higher fungal biomass amounts in the fall as opposed to the summer. Invertebrate densities tended

to increase with fungal growth during the fall, however there were significantly fewer invertebrates in the fall than the summer. There was a direct relationship between sporulation and fungal biomass in the fall. After significant leaf disc loss by the second incubation week, the leaf disc method was not found to be a useful means for analyzing fungal biomass. No comparisons could be made between methods or season due to leaf disc loss. Improvements on the leaf disc method, leaf pack incubation method, spore analysis, and post-incubation leaf storage may be useful to future studies.