A comparative study of beech leaf breakdown, energetic content, and associated fauna in acidic and non-acidic streams

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With 7 figures and 1 table in the text

Abstract: We performed an eight-month study on beech litter breakdown and caloric content in two headwater streams characterized by different degrees of acidification (mean pH = 4.5 and 7.2). We also compared macroinvertebrate colonization of the leaves in the two streams. Beech leaf breakdown rate was 9 times slower under acidic conditions, which is a decrease greater than in other records from the literature. In both streams leaf caloric content decreased as litter decomposition proceeded but was always lower in the non-acidic one. Furthermore, results of energy loss per litter basket showed that the acidified stream was energetically inefficient when compared with the circumneutral stream. *Gammarus fossarum* dominated the shredder assemblage in leaf packs placed in the circumneutral stream. *Gammarus* was lacking in the acidified stream where *Leuctra* assumed greatest importance. This suggests that the absence of an efficient shredder, *G. fossarum* may have partly accounted for the slow leaf breakdown and the resulting accumulation of leaf litter in the acidified stream.

Introduction

Despite the reduction of acidic emission (among which SO₂), recent studies still report detrimental effects of acidification on aquatic and terrestrial ecosystems (GUÉROLD et al. 1995, DIXIT et al. 1996, DURSUN et al. 1996, KIMMEL et al. 1996, LOGIE et al. 1996, VENTURA & HARPER 1996). During the last three decades, high rates of acidic deposition in the Vosges Mountains have caused serious damage in running water ecosystems and, more specifically, in macroinvertebrate communities and fish populations of headwater streams draining...