

The effect of saprophagous macrofauna on litter decomposition

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Previous experiments show that feeding of the larvae of Bibionidae on leaf litter cause short term increase of respiration but in long term the decomposition of bibio feces is slower than decomposition of litter from which feces were produced. To understand why excrements of decompose more slowly than leaf litter, we fed *Bibio marci* larvae the litter of tree species differing in litter quality (*Alnus glutinosa*, *Salix caprea*, and *Quercus robur*) and then measured respiration induced by litter and excrements. We also measured respiration induced by the same litter artificially modified to mimic faunal effects; the litter was modified by grinding, grinding with alkalization to pH 11, grinding with coating by kaolinite, and grinding with both alkalization and coating. Decomposition of excrements tended to be slower for willow and was significantly slower for oak and alder than for the corresponding litter. With oak, decomposition was slower for all artificially modified litter than for non-modified litter. The reduction in the decomposition was similar for excrements and for alder and willow litter that was ground, coated, and alkalized. In alder, a similar reduction was found in ground and alkalized litter. ¹³C NMR indicated that gut passage increases aliphatic components and decreases polysaccharides. Pyrolysis indicated that gut passage increases the ratio of guaiacyl to hydroxymethyl derivatives in lignin. Our findings indicate that the decreased decomposition rate of excrements might result from the removal of easily available polysaccharides, the increase in aliphatic components, an increase in the resistant components of lignin, the accumulation of microbial cell walls, and the binding of nitrogen into complexes with aromatic components. Several of these mechanisms are supported or determined by litter alkalization during gut passage.