

Effects of gamma irradiation on instream leaf litter decomposition

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Abstract

Leaf litter decomposition is a key process in stream ecosystems, the rates of which can vary with changes in litter quality or its colonization by microorganisms.

Decomposition in streams is increasingly used to compare ecosystem functioning globally, often requiring the distribution of litter across countries. It is important to understand whether litter sterilization, which is required by some countries, can alter the rates of decomposition and associated processes. We examined whether litter sterilization with gamma irradiation (25 kGy) influenced decomposition rates, litter stoichiometry, and colonization by invertebrates after weeks of instream incubation within coarse-mesh and fine-mesh litterbags. We used nine plant species from three families that varied widely in litter chemistry but found mostly consistent responses, with no differences in decomposition rates or numbers of invertebrates found at the end of the incubation period. However, litter stoichiometry differed between irradiated and control litter, with greater nutrient losses (mostly phosphorus) in the former. Therefore, the effects of irradiation on litter chemistry should be taken into account in studies focused on stoichiometry but not necessarily in those focused on decomposition rates, at least within the experimental timescale considered here. © 2021, The Author(s).

Author keywords

Betulaceae; Breakdown; Coordinated networks; Fagaceae; Litterbags; Moraceae; Sterilization; Stream ecosystems