DISSIMILAR *EUCALYPTUS* SPP. LEAF TRAITS AFFECT LITTER PROCESSING: RELEVANCE FOR RIPARIAN AFFORESTATION PRACTICES

Sara SIMÕES[1], Ana Lúcia GONÇALVES[1], Jorge Manuel CANHOTO[1], Guilherme GONÇALVES[1], Cristina CANHOTO[1]

1. *CFE – Centre for Functional Ecology, Department of Life Sciences, University of Coimbra, Portugal; sara.cs3@gmail.com; aga@ci.uc.pt; jorgecan@ci.uc.pt; goncalves94_gsr@hotmail.com; ccanhoto@ci.uc.pt.*

RESUMO

Forested streams are detritus-based systems, relying on their riparian forest as the main source of energy and nutrients. Once in the stream, leaves from the terrestrial system are decomposed by a specific biota, mainly composed of fungi and shredder invertebrates, and incorporated into the stream food webs; the process of litter decomposition is a key ecosystem-level process, sensitive to environmental factors, also used as a tool to evaluate stream functional integrity.

Eucalyptus sp. is one of the most cultivated genera in the world; extensive monocultures frequently replace native forests and riparian corridors. The consequent loss of plant diversity is suggested to impair stream functioning, mainly through changes in litterfall seasonality, diversity and quality. As the decomposition process is primarily defined by litter traits, such changes critically affect the structure and function of streams, ultimately compromising their capacity to provide essential services. In Portugal, information on the effects of native temperate riparian corridors being replaced by *Eucalyptus* monocultures are based on the dominant *E. globulus*. Nonetheless, other species such as *E. camaldulensis*, *E. grandis* and *E. nitens* also occur in monospecific patches or mixed with other species across the country, depending on the local climatic conditions and/or forestry goals. No information exists on the decomposition of such *Eucalyptus* species in temperate streams, which may show important chemical and structural leaf dissimilarities that may determine distinct susceptibility to degradation, potentially affecting the streams' functioning. In this study we used a microcosm approach to compare the relative importance of traits variability among congeneric *Eucalyptus* species (*E. camaldulensis*, *E. globulus*, *E. grandis* and *E. nitens*) and two temperate native species – alder (*Alnus glutinosa*) and oak (*Quercus robur*) – on microbial-mediated decomposition and shredder (*Sericostoma vittatum*) consumption.

Our results indicated that distinct leaf physico-chemical characteristics, and its resilience upon immersion, determined differences in decomposition dynamics between the four exotic species. *E. camaldulensis* stood out among the other exotics, showing a 37% dry mass loss and performing closely to the high-quality native alder (42%). This fast mass loss was promoted by the rapid detachment of the cuticular layer, after 7 days. Such loss of leaf physical integrity and chemical defenses seems to have facilitated hyphal invasion and mycelial growth quickly increasing leaf litter quality. A slower biomass accrual and lower fungal diversity – with only one aquatic hyphomycete species dominating – was observed in the other exotic species (20-24% dry mass loss), likely promoted by the resilience of the cuticle, leaf toughness and lower litter chemical (e.g. C:N ratio) quality. Stream invertebrates showed higher consumption rates when fed the N-rich alder leaves (0.014 g leaf dry mass g^{-1} individual dry mass h^{-1}), followed by *E. camaldulensis* (0.009) and oak (0.009). Consistently lower consumption was observed in the cuticle-retaining *Eucalyptus* group (22-35% lower than *E. camaldulensis*).

Our results contribute to explain the observed discrepancies in the dynamics of decomposition across *Eucalyptus* species observed in different systems and reinforces the need to preclude generalizations on the effects of *Eucalyptus* spp. on stream ecosystems. Considering the "native-like" decomposition dynamics of *E. camaldulensis* leaf litter, and despite the need to additional extensive and comprehensive field tests, we conclude that this species may present traits that facilitate its incorporation into the stream food webs, opposed to the other tested exotic species. Nonetheless, the presence of native riparian buffer strips remains a crucial and indispensable key management solution to already established *Eucalyptus* monocultures; if confirmed, the use of *E. camaldulensis* patches within such systems of economic interest could also help mitigate the critical deleterious impacts of native forests replacement.

Palavras-Chave: Leaf decomposition; exotic species; litter quality; aquatic hyphomycetes; detritivores feeding behavior