Is litter decomposition driven by biomass-ratio or functional diversity ?

Nicolas Rossignol[1] and Anne Bonis*[2]

[1]CNRS-Université Rennes I (ECOBIO) – CNRS : UMR6553, Université Rennes I : UMR6553 – Campus Beaulieu 35042 Rennes cedex, France
[2]UMR 6553 (UMR 6553) – CNRS : UMR6553, Université Rennes I : UMR6553 – Campus Beaulieu 35042 Rennes cedex, France

Abstract

Relationships between CWM traits and Ecosystemic processes were shown to scale up from leaf to community with additive effect, accordingly to the Biomass ratio Hypothesis (i.e. each species contributes in proportion to its abundance). Non-additive effects – such as synergistic effects between species – may however occur and weaken the prediction made based upon average trait value of the assemblage. We tested whether synergistic effects in litter mixtures decomposition rates are driven by trait values dissimilarity
To disentangle the effects of CWM and functional dissimilarity, we set up a decomposition experiment in controlled conditions with species assemblages comprising orthogonal values of CWM and dissimilarity for LDMC trait. Species assemblages were composed of three species and four different species combinations. Synergistic effect in assemblages was assessed as the difference between observed mass loss and predicted mass loss based on individual species performances

The results showed that

- Most of species assemblages tested achieved higher mass loss in combination than expected under null hypothesis, showing that synergistic effects were common in plant assemblages' decomposition.
- Synergistic effects were promoted by highest dissimilarity values but only for species assemblages with high average LDMC

This suggests that fast-decomposing species promote decomposition of slow-decomposing species but for assemblages which are characterized by high Leaf Dry Matter Content. Possible interpretations of these patterns will be suggested.

Keywords: Decomposition, litter, trait average value, trait dissimilarity, Functional diversity, ecosystemic process

*Speaker