07-Oct-2021  
Soil fauna accelerate litter mixture decomposition globally, especially in dry environments  
JEcol-2021-0358.R1  
  
  
Dear Dr Juan Zuo,  
  
  
Thank you for submitting the revised version of your manuscript. We have assessed your revision and while it is much improved, there are still several points that need to be addressed. As you will see below, one of the reviewers is satisfied with the changes you have made, whereas the other has made some helpful suggestions to further improve your paper. We ask that you address all of the points raised and provide a point-by-point account of how this has been done. The reviewer and Associate Editor comments are included below my signature.  
  
Please note that this letter does not guarantee eventual acceptance of your manuscript. Your revised manuscript will be reassessed by the Associate Editor and will likely be sent for further review.  
  
Please find information on how to submit your revised manuscript, below. The deadline to submit your revision is: 06-Dec-2021.  
  
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If you have any problems submitting your revision, or any other queries, please contact Rhiannon Robins in our editorial office at [admin@journalofecology.org](mailto:admin@journalofecology.org).  
  
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We look forward to receiving your revision.  
  
Best wishes,  
  
Richard Bardgett  
Executive Editor, Journal of Ecology  
  
  
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Associate Editor's comments:  
  
Associate Editor  
Handling Editor Comments for Authors:  
As you will see, one reviewer (Reviewer 1) who previously assessed your manuscript is very positive about your revised version and applauds you for this important manuscript. Reviewer 2 provide excellent comments to improve your manuscript and find that the rationale of the experiment is not sufficiently justified by ecological theory. Reviewer 2 suggests to improve the introduction and discussion by further clarifying the rationale and the explanation of the results.  
  
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Reviewers’ comments:  
  
Reviewer: 1  
  
COMMENTS FOR THE AUTHOR  
(There are no comments.)  
  
Reviewer: 2  
  
COMMENTS FOR THE AUTHOR  
This paper presents a quantitative analysis of results from litter mixture experiments with strong focuses on fauna-mediated non-additive litter mixing effects on litter mass loss. I find the topic interesting and timely, especially in view of the growing  attention paid to soil animals as potential drivers of soil biogeochemical processes. The authors adopted a meta-analytical approach to assess litter mixing effect size and to identify predictors. Comparisons of effect sizes for litter decomposition in coarse vs fine mesh bags were performed to test the hypothesis that fauna alters litter mixing effects on decomposition. The meta-analysis seems to be well-conducted and presented although I feel that some essential information are missing from the manuscript. My biggest concern is that the rationale for the study and working hypotheses lack sufficient justifications based on ecological theory and empirical knowledge on litter diversity effects on decomposition and on the ecology of soil fauna. Based on what I know about the decomposition of litter mixtures and what the authors tell in the introduction, I do not get why we should expect that fauna promotes synergistic litter mixing effects on decomposition, notably in dry environments. This hypothesis is in line with a key result from this study; however, limited knowledge and ambiguous evidence of how invertebrates influence litter mixture decomposition should have led the authors to elaborate alternative hypotheses. For instance, Swan and Palmer (2006, Oecologia) found that aquatic detritivores led to antagonistic litter mixing effects on litter decomposition, possibly due to altered foraging behaviour. while effects of detritivores on litter mixture decomposition may actually differ between aquatic and terrestrial ecosystems, the underlying mechanism identified by these authors (i.e. preferential feeding) operates broadly, suggesting that terrestrial fauna, too, may hamper litter mixture decomposition. A more exhaustive review of the literature on the biology and ecology of soil fauna may lead the authors to identify other plausible mechanisms underpinning the interaction between climatic conditions (precipitation) and faunal effect on decomposition. For instance, it is unclear to me whether inconsistent faunal effects on nonadditive decomposition in wet region is due to harsh environmental conditions that make fauna less efficient at using diverse resources or to faunal community structure and composition that are different from other drier regions.  
A large portion of the manuscript is devoted to analyses of species richness effects on litter mixture decomposition, which yields to findings that have been repeatedly reported in several paper published over the past two decades. There is now clear evidence that species richness is quite unimportant in driving non-additive mixing effects on decomposition (see also Srivastava et al., 2009 Ecology, which is worth citing in this manuscript). More relevant questions highlighted by the authors relate to the effects of litter trait dissimilarity which, unfortunately, is not properly examined in the paper.  
Below, I provide further comments and suggestions which, I hope, the authors will find useful.  
>>>Thank you for taking your time to go through the manuscript and offering constructive comments. We have incorporated your suggestions and comments in our new version of the manuscript. We have addressed the questions you raised and have included the papers the papers you suggested in our manuscript.   
  
l.75-78: it is also conceivable that translocation of deterrent compounds (e.g. phenolics) from one litter species to others reduces litter decomposition. Therefore, it is not fully correct to state that dissimilarity leads to synergies. In general, I find the authors do not sufficiently present mechanisms that likely cause negative diversity effects.  
>>> We acknowledge that this is a possibility in litter mixtures and the translocation of deterrent compounds (e.g. phenolics) from one species to another could reduce litter decomposition. Here we acknowledge this by the statement “Such dissimilarity in litter mixtures is likely to boost litter mixture effects (but see Hoorens et al. 2003)”.  
  
l.119-121. I do not agree with this statement. It is pretty clear from previous studies, including former meta-analyses, that nonadditive litter mixing effects on decomposition are idiosyncratic with regard to the number of leaf species/genotypes in mixtures.  
>>>Sorry for the confusion caused here. We meant that in light with the mechanistic hypothesis that have been brought forth by previous studies explaining the decomposition of litter mixtures it is still not possible to determine the direction of litter decomposition prior to the experiment. It could accelerate, decelerate or have no effect on decomposition.   
  
l.122-124. it is not crystal clear why apparent inconsistent findings from previous studies arose because of soil fauna. Do the authors mean that soil fauna contributed to litter decomposition to variable extent across studies (e.g. some studies used fine mesh litter bags whereas others relied on coarse mesh bags)?  
>>>Here we meant to say that the inconsistent findings from previous studies could be as a result of not considering the effect of soil fauna on litter mixture decomposition. The exclusion of soil fauna by use of fine mesh size litterbags in some studies and inclusion of soil fauna by use of coarse mesh size litterbags in others could explain the observed discrepancies in the outcome of litter mixtures decomposition  
  
l.132-133. the authors’ names are not cited in the correct order. Hättenschwiler is the first author of that PNAS paper.  
>>>Sorry for the wrong order of the authors in this citation. We have now corrected it to Haettenschweiler and Gasser 2005. See line #  
  
l. 166-167. The citation “Chauvet, 1988” is not referenced in the bibliography at the end  of the paper. I am pretty sure I know this paper and, if my guess is right, I would say that it is not an appropriate citation here.  
>>>We have replaced “Chauvet, 1988” with ## and have included it in the bibliography at the end of the paper.   
  
l.232. I think the authors made a mistake while reporting the threshold for mesh size. Fauna is more likely to enter litter bags with mesh > 1mm than mesh < 1mm.  
>>>Thank you for the observation. It was indeed a mistake that went unnoticed. We have now corrected this mistake and now the statement reads “….. fauna present (mesh size >1 mm) and fauna (except microfauna) absent (mesh size <1mm). See line#  
  
l.253-254 cf Eqn 3. I am wondering how the authors obtained standard deviation for expected mass loss for each litter species combination. In many studies, expected mass loss is calculated based mean values of litter mass loss in monoculture treatments and, therefore, standard deviation is often not reported.  
>>>The mean mass loss of each single species litter was given together with the standard deviation or values that could be used to calculate the standard deviation. For the expected mass loss standard deviation, we calculated the pooled standard deviation (weighted average of standard deviations for more than one group).  
  
l.266. Dissimilarity in litter chemical traits should be quantified by some sorts of functional diversity index. The manuscript does not give any clues about the calculation methods used and I do not see any results pertaining to the assessment of “dissimilarity effect”.  
>>>Thank you for your suggestion. Actually, we believe we have already included the information on the heterogeneity levels for each data categories that we reported as seen in the figures. The number of studies in each data category is indicated in the parenthesis on the y axis of figure 3,4, and 5.   
  
General comment on results:  
When the dataset is split into categories, sample sizes can be quite small and, therefore, results may be strongly influenced by a single or few studies, and they may not reflect general trends. The authors should provide information on the heterogeneity levels (i.e. number of regions and studies covered) within each bin.  
  
Discussion:  
The authors did discuss how fauna can influence litter decomposition, though they overlooked the fact that soil fauna is not just detritivores and bioturbators but also predators that can have strong indirect effects on decomposition. However, they provide little explanations for how fauna can trigger non-additive effects on decomposition.  
  
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