General comments

The manuscript “Pairing litter decomposition with microbial community structures using the Tea Bag Index (TBI)” combines recently widely applied Tea Bag Index, introduced by Keuskamp et al. (2013), with data on microbial diversity and abundance in soil, green tea and rooibos litter, which should explain the decomposition patterns across three habitats in vineyards. In the whole, the study is rather interesting and highlights the importance of decomposers communities for early stages of decomposition of less or more recalcitrant litter across four seasons. The results are novel, tested hypotheses are clear, the applied methods are relevant, and the results are well discussed and consider the recent literature. The title and the abstract reflect the content of the manuscript. The presentation quality is good.

• Thank you for your assessment and the time you took to critically read our manuscript. We are very appreciative of your constructive comments and hope that the revised version will be acceptable for publication in SOIL.

Special comments

I have not detect any serious flows in this study, therefore there are few comments to improve the manuscript.

1. In introduction it would be good to add some information about stabilization mechanisms, and which factors other than microbes, may influence it, such as links with cations of Al or Ca.

• Thank you for this comment. We have added a sentence to the introduction.

2. Also some notes about the mechanism of colonization of tea bags by bacteria and fungi would be relevant. While fungi proliferate with hyphae, how do bacteria reach tea bags? Is it known, if all the groups of bacteria have the same possibility to get inside the tea bag, so only best decomposers increase their abundance?

• Thank you for this comment. Indeed, there may be differences between the ability of different taxa to reach and proliferate inside of the teabags. Interestingly, Albright et al
2019, mBio have shown that unicellular bacteria and fungi do not differ in their dispersal abilities. We are not sure whether growth via hyphae would, alone, be a means of reaching the litter inside the tea bag faster for fungi, since bacteria have been shown to use fungal hyphae as ‘highways’ and will likely utilize them for their own dispersal. We therefore assume that the pace and success of the colonization of the teabags may rather depend on connectivity of the tea bag with water filled soil pores, as well as microbial traits such as growth rates, adhesive ability and competitive ability as also discussed in Albright et al 2018, ISME J. Once a microbial cell or hyphae has reached the litter, their unique traits (as mentioned above) may then influence their population dynamics and can even lead to higher abundances inside the litter bag than in the surrounding soil (Albright 2018). Such an abundance pattern is reflective of positive selection, but the underlying mechanism remains unknown at this point. We have added a section touching upon this matter into the discussion (lines 281-287).

3. Lines 102 – 103: Add the reference to soil types.

- A reference has been added.

4. Line 202: “The results were surprising…” Maybe, the lack of correlations of some soil properties with decomposition rate may be caused by small gradients, at least in pH, which is important for microbes activity, and within this study covers only good conditions for decomposition.

- This is a good point and we have added this possibility to the sentence.

5. Figure 3 has the panels too small and rather difficult to explore. Instead, Figure S3 with ordination results clearly shows the differences between spectra of decomposers, and I’d like to see it in the main text.

- We understand that Fig. 3 in its current (manuscript) form is hard to read. However, we decided to leave it the main text because much of the discussion deals with differences in the composition of specific orders and not simply the entire community, and this is not possible to see in the ordination. Moreover, the resolution of the figure in the published version of the ms will be higher. In addition, we now moved Figure S3 to the main text.

Technical comments


- Thanks for pointing it out. We’ve added those references.

7. Line 133: “were collected at each season for comparison.” – This needs clarification. The comparison of microbial community structure?

- We’ve omitted this line entirely because the description of the soil sampling appears in a separate section.

8. Line 210: at low temperatures.

- Corrected

9. Line 224: Table 1 shows.

- Corrected
10. Lines 266 – 267: sort references by years.
   • Corrected

   • Corrected

12. Also check for the spelling of word “Stabilisation” (as it is usually given in the text) versus “Stabilization” (line 252), the last should be correct. The same about the word “colonization”.
   • Corrected throughout the ms.