Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-545-AC1, 2018


Biogeosciences Discussions

# *Interactive comment on* "Understory vegetation plays a key role in sustaining soil microbial biomass and extracellular enzyme activities" *by* Yang Yang et al.

**Yang Yang et al.**

974386771@qq.com

Received and published: 15 March 2018

The authors Yang et al., present timely results of microbial abundance and activity in fir planted soil with and without understory removal

Strength of MS:

Hot topic Broad indicator Setup

Weakness of MS:

Hypotheses lack on novelty and a concise discussion



Discussion shows serious flaws such as Content and style of writing, which should be strongly improved

The content of discussion should be improved, as the authors showing really interesting data (Suggestions are attached)

Nevertheless, I think this study is worth for publication in BG after a careful improvement of the MS

Response: We would like to thank you for the helpful and constructive comments, which would further improve the manuscript. We have carefully revised our manuscript to take account of your comments and suggestions. Please find below our responses (blue font) to comments (repeated in an italic font).

Suggestions:

1. Please use the right terminology throughout the MS. eg. Content not conc. or organic C not soil C and many more (find in the attached PDF)

Response: We have revised the inaccurate terms throughout the manuscript according to your comments, such as changed soil environmental factors to soil abiotic properties, changed soil C (DOC, POC and SOC) to soil organic C (DOC, POC and SOC), and changed concentration to content, and changed microbial biomass to PLFAs.

2. Hypothesis should be more attractive to the reader (example attached)

Response: We have revised the Hypothesis as "We hypothesized that the removal of understory vegetation decrease rhizodepostion and therefore microbial biomass and activity." according to your suggestion.

3. Results should be clarified eg. MBC vs. PLFA

Response: We have revised microbial biomass to PLFAs contents throughout the manuscript.

4. Inferences should be drawn newly and in accordance to the literature eg. NAG is also in bacterial cells or AP activity is higher compared to others does not mean automatically that there is a P Limitation.

Response: We have revised the sentence “Chitin, a major structural component of fungal cell wall” to “Chitin, a major structural component of bacterial and fungal cell wall (Loeppmann et al., 2016)”.

In highly weathered red soil in southern China, P is the most limiting element, and most soil P is presented in organic form or is immobilized by high contents of Al and Fe (Margalef et al., 2017). Soil microorganisms may produce more phosphatase to mineralized organic P and release phosphate to meet their demand for P (Allison and Vitousek, 2005). In our study, the activity of AP is the highest of all the enzymes we assayed, which could reflect the fact that P was limiting nutrient in the study area.

5. Suggest to calculate different Indices to improve your inferences accordingly e.g. Specific Enzyme activity or Enzyme Indices (Moorhead et al., 2013; Loeppmann et al., 2016)

Response: We have analyzed the specific enzyme activities normalized by total PLFAs and SOC contents, as well as the stoichiometry of enzyme activity through calculating the ratios of C/N and C/P acquisition activity, as indicated by the ratios of ln($\alpha$G+$\beta$G+$\beta$X)/lnNAG and ln($\alpha$G+$\beta$G+$\beta$X)/lnAP, respectively.

6. M & M Section: Should be strongly improved - more details (See my comments attached)

Response: We have revised the Material and Methods section according to your comments, such as, we have added the soil classification “The main soil in the study area is classified as Udults using the USDA-NRCS soil taxonomy (1996).”; we have explained the buffer zone was set between each plot as “to avoid the influence between each plot”; we have rephrase the plots design as “Each plot was divided into four 15 $\times$ 15



m subplots and contained two treatments: understory vegetation and litter removal (None) and understory vegetation left intact but litter removal (Understory). The two subplots with the same treatment in one plot were distributed across each plot to avoid the effects of slope (Fig. 1) and were averaged as one analysis replication. The litter and understory were managed on a monthly basis. For the None treatment, we removed all litter and understory vegetation from the plot. For the Understory treatment, we removed the litter from the plot, but left the understory vegetation intact”.

We have described the determination method of soil enzymes in more detail as “Soil enzyme activities were measured following the methods of Saiya-Cork et al., (2002). The specific substrates and functions of the enzymes assayed are listed in Table A1. Five hydrolase activities were assayed using fluorogenically-labeled substrates. Briefly, a soil suspension was prepared by adding 1 g of fresh soil to 125 mL of 50 mM acetate buffer. We added 200 $\mu$L of the soil suspension and 50 $\mu$L of the substrate solution (200 $\mu$M) to 96 microplates in eight analytical replicates. Methylumbelliferone (MUB) was used for calibration of hydrolase activities. The microplates were incubated in the dark at 20 $^{\circ}$C for up to 4 h. After incubation, 10$\mu$L of 1 M NaOH was added to each well to terminate enzymatic reaction. Following termination of each reaction, the fluorescence was measured using a microplate fluorometer (SynergyH4, BioTek) with excitation and emission filters of 365 nm and 450 nm, respectively”.

7. It is not clear why just some data was analyzed with time? Suggest to show all data throughout the whole samplings

Response: The data we have presented in the text was the average data of April, July and November. And we have also presented the data of soil abiotic and biotic properties, such as PLFAs contents, and extracellular enzyme activities in different months in the Supplementary Material. And we will discuss the temporal variation of PLFAs and enzyme activities in the modified version of the manuscript.

---

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2017-545, 2018.