

Interactive comment on “Effects of two contrasting biochars on gaseous nitrogen emissions and intensity in intensive vegetable soils across mainland China” by Changhua Fan et al.

Changhua Fan et al.

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Dear Reviewer: Thank you very much for your great support and critical comments. Those comments are all valuable and very helpful for revising and improving our paper, as well as further important guidance for our researches. We have made corrections which we hope to meet with approval. Please see the following point-by-point answers. 1. Thanks for your nice comments! However, it is relatively hard to get general results on all the parameters as affected by biochar in all the vegetable soil, which is largely depending on soil and biochar type. Thus, we have tried our best to summarize

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and integrated the results on Page 10 lines 16-17, Page 11 lines 7 and 12-13. 2. Yes, you are right. It is true that N₂ emissions could be substantial and were not contemplated in the present study. Therefore, we defined the NH₃, N₂O and NO emissions as GNrE short for “gaseous reactive N emissions”, which would be more accurate and appropriate. In addition, we have changed the “GNE” and “GNI” into “GNrE” and “GNrI”, respectively, throughout the manuscript. Specific comments: 1. The title could be improved. It should state the main results. For instance: “Biochar mostly decreases NO and N₂O emissions but slightly increases NH₃ emissions in intensive vegetable soils across mainland China”. Or something similar. What is your main general conclusion? That should be your title. A: Thank you very much for your nice comments! Actually, general conclusions could not be drawn easily for those parameters due to the complexity of soil and biochar properties. Besides, vegetable yield is also another important index we concerned about. Taking into all the parameters (NH₃, N₂O and NO emissions and yield) into account, GNrI would be a better indicator evaluating biochar effects on various soils. Therefore, the title “Biochar can decrease the gaseous reactive nitrogen intensity in intensive vegetable soils across mainland China” might be more appropriate for the paper. Thank you so much! 2. The abstract should also be better developed. For instance, it is not mentioned that wheat straw biochar performs better than the manure biochar regarding N₂O mitigation. A: Yes, thank you! We have added the result that Bw performs better than Bm regarding N₂O mitigation on Page 3 line 11. 3. Line 89. Please also include the amount of biochar added to each pot, not only the Kg/Ha. A: Thank you! We have added the amount of biochar “282.6 g pot⁻¹” on Page 6 line 12. 4. Line 191: substitute “enhanced” for “increased”. A: Thank you! We have substituted “enhanced” for “increased” on Page 10 line 9. 5. Line 259-260. Please do not link your N₂O results with your DEA results. From Figure 1 we cannot know if biochar is decreasing total denitrified N or decreasing the N₂O/N₂ ratio. A: Yes, you are right! We have deleted the sentence on Page 13 line 10. Thank you! 6. Line 303: There a spelling mistake (bicohar). A: We are sorry for the inconvenience. We have corrected it on Page 14 line 21. Thank you! 7. Biochars should be characterized

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for elemental analysis (Corg, N, H, O). This is important since the atomic ratio H:Corg has been found to be a relevant index for N₂O mitigation. A: Thank you for your nice recommendation. We have added the elemental analysis data (Corg, N, H, O) on Page 3 in the supplementary material and the corresponding measuring methods on Page 6 lines 22-25 in the material and method section. 8. The X axis in Figures 2 and 3 must be wrong. They start in 1/15 and they finish in 1/15. A: We are sorry for the inconvenience. We have corrected Figures 2 and 3 on Pages 30 and 31. 9. Does Figure 1 (DEA) only report N₂O? Why is N₂ not included? A: Yes, it does. Based on the method for DEA determination, acetylene (10%, v/v) was added to inhibit N₂O reductase activity (Yoshinari et al., 1977). Therefore, DEA indicated N₂O emissions from the processes “NO₃→NO₂→NO→N₂O” not the final step from “N₂O→N₂”. The reported N₂O emissions should include the potential N₂ emissions. Thank you for your understanding! Yoshinari T, Hynes R, Knowles R. Acetylene inhibition of nitrous oxide reduction and measurement of denitrification and nitrogen fixation in soil[J]. Soil Biology & Biochemistry, 1977, 9(3):177-183.

Thank you once again for your great support and comments!

Sincerely yours, Zhengqin (on behalf of all authors)
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Please also note the supplement to this comment:  
<http://www.biogeosciences-discuss.net/bg-2016-487/bg-2016-487-AC2-supplement.pdf>

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