

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.

Anonymous Referee #2

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The study “Effects of two contrasting biochars on gaseous nitrogen emissions and intensity in intensive vegetable soils across mainland China” is a relevant piece of research. It shows N₂O, NO and NH₃ emissions from a greenhouse experiment with 4 vegetable soils during 5 consecutive crops. Apart from the high value of the data itself, the results are interesting and open new research questions that the authors could follow in future works. The differences found in N₂O mitigation in the different soils could be linked to different N₂O formation pathways. Strong points: 1) It analyses several N gases. This is quite unique, since most studies just focus on N₂O emissions. 2) It uses 4 types of soil (with contrasting properties) and it follows gas emissions for

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a whole year with 5 crop rotations. Weak points: 3) Only 3 replicates are used. This is a bit limited for pot studies. A minimum of 5-6 replicates should be used. Of course using more replicates limits the number of treatments that can be included, but it would give statistically stronger results. 1) The writing could be improved. The language is mostly correct, but the story line is sometimes missing, making it hard to follow. There’s a lot of “biochar increases in this treatment and this soil and it decreases in this other soil...” Please summarize and integrate results. This would make the paper much more attractive. It is not necessary to comment on all the results, they are shown in the figures and tables. 2) I do not totally agree with summing up NH₃, NO and N₂O and naming it “gaseous N emissions”. This misleads to think that these are all the N gas losses and the fact is that N₂ emissions have not been contemplated in the study and could be substantial. Specific comments: 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. 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. Line 89. Please also include the amount of biochar added to each pot, not only the Kg/Ha. Line 191: substitute “enhanced” for “increased”. 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. Line 303: There a spelling mistake (bicohar)

Biochars should be characterized 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. The X axis in Figures 2 and 3 must be wrong. They start in 1/15 and they finish in 1/15. Does Figure 1 (DEA) only report N₂O? Why is N₂ not included?