

Interactive comment on “Does thermal carbonization (Biochar) of organic material increase more merits for their amendments of sandy soil?” by Y. Wu et al.

Anonymous Referee #2

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General comments: The authors report the use of a product (furfural) and its biochar as a soil amendment in a saline soil. This is an interesting article, in particular considering that reports comparing the effect of both, a biochar and its feedstock are scarce compared to those reporting just the effect of biochar. In addition, the use of biochar in soils in saline soils is scarce. Thus, in my opinion the article is suitable for publication in this special issue of SE. However, I have detected a number of weaknesses in the manuscript which should be addressed before publication. Overall, the authors should undertake major amendments, mainly as specified in the next section.

Specific comments: The authors will need to present a more focused introduction, add some important references that I found absent in the text and to improve data presenta-

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tion. The English used through the manuscript has much room for improvement. I have pointed out some but not all of the mistakes regarding the use of English language.

Page 537, line 12: I am a bit confused here and in page 538, line 4. There are not much details about the product used to prepare the biochar. Firstly, I think the authors want to mean “corncob” and not just “cob”. Secondly, I understand that they do not prepare the biochar directly from corncob (as in the references cited in page 537, line 12, which should then be deleted), but instead distillate the corncob. Much more information is needed in the materials section about the process of distillation and the characterization of the product obtained. Is it all furfural, this is a heterocyclic aldehyde with chemical formula OC_4H_3CHO , or is there a mixture of products? Please, note that the information given at this point must be very precise to allow the reproducibility of the experiment.

In the introduction I would highlight what I believe is a strong point of this article. This is: “While most scientists have reported the effect of biochar in the soil, there is a dearth of studies (but see exceptions such as Gascó et al., 2012; Wu et al., 2013; Méndez et al., in press) comparing both biochar and its feedstock”.

Gascó, G., Paz-Ferreiro, J., and Méndez, A.: Thermal analysis of soil amended with sewage sludge and biochar from sewage sludge pyrolysis. *J. Thermal Anal. Calorim.* 108, 769-775, 2012.

Wu, F., Jia, Z., Wang, S., Chang, S.X., and Startsev, A.: Contrasting effects of wheat straw and its biochar on greenhouse gas emissions and enzyme activities in a Chernozemic soil. *Biol. Fertil. Soils.* 49, 555-565, 2013.

Méndez, A., Paz-Ferreiro, J., Araujo, F., and Gascó, G.: Biochar from pyrolysis of deinking paper sludge and its use in the treatment of a nickel polluted soil. *J. Anal. Appl. Pyrol.* DOI: 10.1016/j.jaap.2014.02.001

Please, also notice that, even there is not a lot of literature available, biochar has been

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used before as amendment in saline soils. Please, take into account the article from Lashari et al. (2013) in the introduction and when discussing the results.

Lashari, M.S., Liu, Y., Li, L., Pan, W., Fu, J., Pan, G., Zheng, J., Zheng, J., Zhang, X., Yu, X. Effects of amendment of biochar-manure compost in conjunction with pyrolytic solution on soil quality and wheat yield of a salt-stressed cropland from Central China Great Plain. *Field Crop Research* 144, 113-118, 2013.

Page 540, line 20-21: How has this been tested? It cannot be done with a one-way ANOVA. In my opinion it is better for this experimental design to use a repeated measure ANOVA (RMANOVA) instead of the analysis done by the authors. I would also advice the authors to provide a better characterization of the biochar used, including proximate analysis and porosimetry.

Technical corrections:

Title: It is very vague at present. There is no mention to the type of organic material. Also, would it be better to highlight the salinity of the soil instead of the textural characteristics? Maybe a better title would be: Furfural and its biochar improve the general properties of a saline soil.

Page 536, line 2: "of a saline soil"

Page 536, line 12: Do not write "5% of the furfural addition", write "furfural addition at a rate of 5%" or similar.

Page 536, line 20: Please, re-write as: In general, furfural and biochar exhibited a different effect depending on the property.

Page 537, line 3: This reference has not been included in the reference list.

Page 537, line 6: "The fertilization of organic materials" change to "Amendment with organic materials"

Page 537, line 9: Please, delete "Axing"

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Page 537, line 10: Delete "which is corresponding with the research results of Li (2008)." And start the sentence "Cai et al. (1997) and Li (2008), reported that furfural. "

Page 537, line 11: "from furfural"

Page 537, lines 15-16: This sentence is very general and does not need references.

Page 537, line 27: "stones and vegetation were removed by hand"

There should be more information about the soil. What is the texture? Please, classify the soil according to FAO or USDA. In which Province was the soil sampled? What are the climatic characteristics of the sampling area? When was the soil sampled? Page 538, line 1: "natural withered". Do you mean air-dried? Do not repeat "screen" and "screaned", write "then sieved in a mesh to 2-mm".

Page 538, line 5: As I mentioned before, more information is required here.

Page 538, lines 8-10: This should go to the results section.

Page 538, line 22-23: Please, specify both the volumes of rainfall added and the amount of leachate collected.

Page 539, line 20-21: Please, check this sentence.

Page 540, line 5: Always report the same number of decimals for a same property.

Page 540, line 6: Indissolvable?

Page 540, line 11-12: Please, rewrite.

Page 540, line 14, a RMANOVA will allow to add a P and F value to this sentence.

Page 540, lines 21-22: This is possibly because SOM losses or gains in a short time are difficult to be measured directly because of 1) the large amount of organic matter in soils and 2) the low magnitude of changes compared to the total organic carbon stored in the soils.

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Page 540, line 24: "8 times compared to"

Page 541, lines 2-3: Please, do not mention crop yields here. It is still uncertain the mechanisms involved in the increase of soil productivity after biochar addition. Page 541, line 21: This is a very general sentence to include here as the porosity of this biochar has not been measured.

Page 542, line 1: This is written in a confusing way. In fact available P is maximum at nearly neutral pH values, which are the values after biochar or furfural addition. The authors seem to imply in the sentence that available P is maximum in acid soils.

Page 542, lines 5-6: Is not the other way round? The furfural performing better?

Page 542, line 8: Please, provide a reference to justify that the mechanism is immobilization.

Page 542, lines 9-11: This explanation seems not to be very plausible in the context of the biochar.

Page 542, line 23: Please, notice that in the reference Bhupinder is the first name of the author. Thus, it should be Singh et al. 2010. Move the reference to the corresponding alphabetical order in the reference list. Moreover, what is the reference indicating here? That this author obtained similar results? Please, clarify.

Page 543, line 12: There are other parts of the text where this happens, but this one is particularly notorious. The word increased/increasing is repeated 3 times in the same line. Please, avoid the repetition of words.

Page 543, line 19: Do you mean concentration or availability instead of "activity"?

Page 543, line 21: There is no conclusive evidence in this study. I would suggest, "This is possibly related. . .". Same in line 25.

Page 544: Lines 1,2. This is a bit confusing. Please, re-write.

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Page 544, line 6: "was not reduced"

Table 2: Please, complete the name of the treatments.

Figure 3: Please, add the units for TOC in the graph.

Figures 1 to 8: When you affirm that "different letters represent significant differences", I guess you mean "different letter, for the same sampling date, represent". Please, be specific.

Interactive comment on Solid Earth Discuss., 6, 535, 2014.

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