

Interactive comment on “Can worms be used to produce amendments with reduced CO₂ emissions during co-composting with clay and biochar and after their addition to soil?” by J. Barthod et al.

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Dear reviewer 1,

We sincerely appreciate your interest in our study and would like to thank you for your time and effort. We took into consideration your recommendations and suggestions you've made to improve the paper. The following was done:

Reviewer 1: This interesting study has as its goal to determine if adding clay, biochar, or both to precomposted wastes can reduce CO₂ emissions during composting or vermicomposting, and “after the use of the final products as soil amendments.” The

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experiments seem well-designed, and the paper's results are useful.

Thank you very much.

I recommend two major revisions to this paper focusing on 1) logical flow and 2) figure quality and clarity.

Ok, we revised the paper in particular with regards to these comments.

1. logical flow: The paper struggles with logical flow in a few places, and the paper would be stronger if this were addressed prior to publication. Parts of the paper seem to be advancing the argument that clay, biochar, and worms can act together to reduce CO₂, while in other places the paper stays closer to the data, which mostly do not show this. The paper would still be interesting if the authors argued (as the data seem to) that most combinations of biochar, clay, and worms speed up soil CO₂ loss. However, parts of the text are confusing because of the advocacy for adding worms to reduce CO₂ emissions. Figure 2, which shows CO₂ emissions vs treatment, does not show that worms help reduce CO₂ emissions except in one of the five scenarios, with the other 4 scenarios leading to either increased CO₂ emissions or unchanged CO₂ emissions. This makes sentences like this one, from the end of the abstract (line 28), seem like a non sequitur: “In summary, the addition of worms during co-composting with clay and biochar may be a promising technology for reducing CO₂ emissions and increasing soil carbon storage.”

We thoroughly revised the text in order to stay more closely to the data and removed inadequate statements advocating worms' beneficial effect on reduction of CO₂ emissions. In particular:

Abstract: Consequently, the sentence (line 28) was changed to “In summary, the addition of worms during co-composting with clay and biochar speeds up CO₂ emissions in most cases. Therefore, the production of a low CO₂ emissions...”

In the objectives (line 85), “their mixture to pre-composted wastes can influence CO₂

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emissions". Word "reduce" will be changed by "influence".

Line 88: "two different amounts of on the changes of CO2 emissions". Word "reduction" will be changed to "changes".

In the conclusion: We finally started our conclusion with "This study tested the influence of worm species of the Eisenia genus on CO2...". At the end, we changed one sentence to "worms generally speed up carbon mineralization except in treatment with low clay dose".

The paper's title would benefit from revision for clarity. The use of a question as a title suggests that the authors have not yet decided what the conclusions of the work are. Either a conclusive title (e.g. "Worms can increase CO2 emissions during co-composting with clay and biochar") or a declarative title (e.g. "The effects of worms on CO2 emissions during co-composting with clay and biochar") would strengthen the paper.

Ok, the title was changed. It reads now: "The effects of worms, clay and biochar on CO2 emissions during production and soil application of co-composts".

Section 3.3 would benefit from focusing and shortening.

The results paragraph will be shortened as you suggested.

Section 4.1 should be moved to the results section.

Most of this section was moved into the section 3.1, but we prefer to keep some sentences in this section for discussing these results.

Section 4.2 would also benefit from focusing and shortening. For example, the paragraph starting at line 328 ("When biochars were added") would benefit from a thesis-statement – what is the main idea that this paragraph is conveying? The paragraph starting on line 351 would also benefit from similar focusing.

Line 328: This paragraph will focus on the treatments without worms and the potential

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effect of the biochar on the carbon emissions and will be shortened.

Line 351: In the same way, this paragraph will be shortened and will focus on the biochar addition on the worm activity, potentially explaining the carbon emissions.

2) Figure quality and clarity:

Figure 2 captions: suggest revising "Letters a,b,c, d, e, and f means the statistical difference" to "columns with the same letter are statistically identical," or "different letters indicate statistically significant differences."

Suggestions to clarify and enhance the quality of the figures will be take into account. Text above the figure 2 will be changed into "Different letters indicate statistically significant differences".

Figures 3, 4, and 5: legibility would be improved if the axes numbers were in black font, not gray

Figures 3, 4 and 5 Axis number will be in black font

Figure 6: this figure is not comprehensible because the text is so highly overprinted

Figure 6: Figure was changed in order to ameliorate its comprehension (text will be moved and reduced)

Other items: Introduction: Paragraph beginning at line 37: this paragraph would benefit from proofreading for clarity. For example, the second sentence does not logically follow from the first. In addition, this paragraph would benefit from proofreading for punctuation (line 45).

Line 37: As you mentioned, the second sentence does not logically follow the first. We finally started with "Land use changes are responsible for the steady increase of CO2 in the atmosphere, along with industrial activity and the use of fossil fuels."

Line 45: Sentence were change to "Increasing soil C may be possible with the use of

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composted organic wastes as alternative fertilisers (Ngo. . .), which could counterbalance...". Punctuation has been added.

Line 127: are the units here of mg/m correct? Should they be mg/mg instead? Lines 142-143: typos: "weighted" should be "weighed," "juvenils" -> "juveniles," and "airdried" -> "air dried."

The units mg/m² used are correct because we mentioned a specific surface area.

Line 142-143: corrections will be done: "weighed", "juveniles", "air dried".

Line 190: the assumption that biochar does not release any CO₂ during incubation experiments is questionable, as there are many studies showing release of CO₂ during biochar incubation. However, it's possible that the authors have found an outlier condition where this is the case, by choosing a biochar made at extremely high temperatures (1200C). Please make this clear.

Line 190: We have made the assumption that the biochar used in this study does not release any CO₂ during incubation experiments, based on the previous study of Naisse et al (2014, Effect of physical weathering on the carbon sequestration potential of biochars and hydrochars in soil). In this study, the biochar was produced at 1200°C and in the same conditions as our biochar. Their results showed that the total soil carbon mineralized amended with biochar was under 0.5 mgC g soil⁻¹ for 200 days. Furthermore, we will make clear our assumption by adding this sentence: "Biochar produced at high temperatures showed a very low carbon emissions during a 200 days incubation in soil (Naisse et al, 2014), so that we can hypothesize that its mineralization can be neglected compared to OM mineralization during 21 days".

Line 309: provide data supporting the statement that the soil surface area doubled.

Line 309: We could not provide data that the soil surface area doubled. Consequently, we will change the sentence by "This is in line [. . .], when clay content and thus potentially available surface area increased".

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Line 402: change "to use" to "of using";

Ok, was done.

Throughout the text: Eisenia is a genus, not a species

Ok, we changed.

Please also note the supplement to this comment:

<http://www.soil-discuss.net/soil-2016-35/soil-2016-35-AC1-supplement.pdf>

Interactive comment on SOIL Discuss., doi:10.5194/soil-2016-35, 2016.

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