

SOIL Discuss., referee comment RC1
<https://doi.org/10.5194/soil-2021-136-RC1>, 2021
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Comment on soil-2021-136

Anonymous Referee #1

Referee comment on "Polyester microplastic fibers affect soil physical properties and erosion as a function of soil type" by Rosolino Ingraffia et al., SOIL Discuss.,
<https://doi.org/10.5194/soil-2021-136-RC1>, 2021

General comments

The paper presents the results of experiments to study the possible effect of microplastic fibres on soil properties and soil erosion. Even if there already some studies focused on changes in soil properties, it is surely one of the first studies to tackle this subject, at least with respect to water soil erosion. Overall, I find this an informative study on an important subject: How does MP effect soil and potential soil erosion? In my view the experimental design is sound, laid out well, and the results are overall well presented and be summarized. I would like to thank the authors for this interesting study and the results. When discussing the results, I miss the clarification that this study is about laboratory experiments that may not always reflect reality. We are still in the knowledge level of estimating.

Specific comments

Nevertheless, I have four fundamental critics to the paper which should be clarified:

- This study deals with microplastic fibers – as written in the title. This is not always clear stated in the paper. Especially the introduction is very generally about MP and not focused on fibers. Since the present study deals purely with fibers, I would also go into more detail on fibers in the introduction. Also in the methods and results/discussion it is often not clear you talk about microplastic at all or microplastic fibers in detail. It always has to be clear stated.

- The preparation of the fibers (size/shape) used in the experiment are described in the methods. After this description the fibers are mixed with soil via a blender. This makes the size/shape of the used fibers (still fibers at all?) unclear again and that is dangerous for the entire interpretation of the results. I expect a statement in the methods that justifies the use of a blender and how you deal with the lost information about size and shape of the fibers.
- Can the method described in this study for selecting the water-stable aggregates be cited? And with it results are compared? To my knowledge, in soil research, soil aggregates <53 µm are referred to as water-stable. In this study it is aggregates up to > 2 mm. I don't think that all water stable aggregates identified by different methods and defined with different sizes can be compared 1x1 in the discussion. On the one hand, I expect an explanatory statement on the aggregate selecting method used in the method section. On the other hand, I expect a realistic classification of the results (water-stable) in previous literature on soil erosion and soil aggregates in the discussion.
- I would be more open with the final conclusions of this study. In the discussion and conclusion, everything needs to be considered in context that the results are based on a microscale laboratory experiment and may not present natural conditions. I generally lack the courage to "don't know". It should be dealt with more consciously that the results provide estimates and do not yet close any knowledge gaps. Even with the results of this study, we still know too little about the effect of micoplastics on the soil ecosystem.

Here are some more suggestions I have for the authors:

Material and Methods:

- The description of the differences in the soils could be more precise. In the description clarify with comments like "this is the soil with most soil carbon" or with indication by value. Or shorten the text and refer to the table for comparisons.
- The information that the recorded procedure could not be continued because of the pandemic does weak your method description. I would leave that out and accordingly only say that the samples were incubated for 6 months. If you are sure that your samples were okay, I see no reason to be suspicious of this statement.
- The soil samples are dried to determine the BD. I assume at a temperature of 105 ° C. Can it be confirmed that this temperature has no effect on the MP-soil interaction? Even if polyester has a melting temperature of 150 ° C, e.g. 100% polyester fabric must not be washed above 40 ° C, as the fibers can then shrink or melt. Melting would, however, affect the analyzed parameters especially soil aggregation. I would add a sentence to this context to the methods.
- Fibers with a diameter of >2 mm were prepared. Are you sure they can move down to a sieve to 0,106 mm? Is it not obvious you will "analyse" a rise in water stable soil aggregation and by that overestimate this effect? You have an idea about the movement behavior of the fibers in the sieves?

Discussion

- Broaden your discussion due to the soil erosion. At present the discussion focuses on the differences between soils. While that is perfectly fine (but always be focused on fibers) it would be good to place the topic of the rain simulations also in a somewhat broader framework. The size of the plots you studied implies that you mainly measured interrill erosion. This also implies that your results may would change depending on scale. You should discuss this. What are the implications at a real landscape scale?

Technical corrections

There are more small comments and some textual suggestions in the annotated pdf attached.

Please also note the supplement to this comment:

<https://soil.copernicus.org/preprints/soil-2021-136/soil-2021-136-RC1-supplement.pdf>