

Interactive comment on “What do we know about how the terrestrial multicellular soil fauna reacts to microplastic?” by Frederick Büks et al.

Frederick Büks et al.

frederick.bueks@tu-berlin.de

Received and published: 14 April 2020

Dear Referee #1. First I would like to express my sincere thanks to you for thoroughly reviewing our manuscript and for your very helpful and precise suggestions. In the following I will answer your points. You will also find the corrections highlighted within our final response to the referees. Best regards, Frederick Büks

Abstract [1] Lines 20-21: “Most of the studies applied MP concentrations similar to amounts in slightly to very heavily polluted soils.” This sentence makes the reader expect that generally, the concentrations in the experimental environments are mostly the same as expected in the environment, but is this really the case? I would suggest showing the percentage of experiments with high microplastic exposure that is not

C1

representative of most soils. -> Thanks a lot for this point. We now write: “About 58 % of the studies thereby use inappropriate concentrations or units, but 42 % applied MP concentrations similar to amounts in slightly to very heavily polluted soils.”

Introduction [2] Line 53: Instead of “microbial decay”, I’d suggest “processing by soil organisms”, since this includes any process relevant for the generation of smaller plastic particles. ->Done.

[3] Line 61: I’d suggest changing the sentence to “intensive use of plastic mulching and sewage sludge”, for the former, Huang et al. (2020) show an increase in microplastic by approx. 1 order of magnitude between fields with 5 and 24 continuous years of plastic mulching. ->Done.

[4] Line 95: Suggest changing “feed on” to “inadvertently ingest”, otherwise it sounds like the organisms are actually able to metabolize the microplastics. ->Done and reference added.

Search pattern [5] The cut-off dates (time period that was considered) of the search should be mentioned somewhere. ->Information added to this chapter. [6] Figure 1: This figure shows the phylogenetic tree of edaphic fauna, rather than “edaphic tree of faunal life”. ->Thank you. And done.

Data collection [7] Line 113-122: I’ve been having some difficulties understanding the search methodology and table 8 (table 8 should be moved at the appropriate place to become table 1). We moved the table to line 124 and mentioned that it contains the number of found studies. All table numbers were adjusted within the text. It would be great if the authors could re-word this, specifying: a) What does it mean that some combinations would have caused too much search effort? ->It means e.g. that searching for a taxon only in combination with “PET” gives results for PET bottles for cultivation and experiments and also the “use” as pets, if the search is not case sensitive. We now tried to clarify this in our text. b) “Organism-plastic” is not a type-shape combination. ->Oh, yes, that’s right. Corrected. c) What exactly does the number of studies

C2

in table 8 mean? The number of articles or single experiments (sometimes more than one taxon or plastic type is used in one article)? ->The number counts for how often type-shape combinations were used in all reviewed experimental setups independently of organism. d) Some articles are included that studied the uptake of macroplastics by organisms, mainly termites and ant species. It is reasonable to include these studies, but it should be mentioned more prominently, in the abstract and aims of the review, that macroplastics are included. ->Where macroplastics were used in the reviewed studies, the size was explicitly mentioned in the article text, so we do not see a necessity for elaborating the text. We did add a mention of "macroplastics" to the abstract. e) Maybe also in the synthesis, a sentence about the proportions of experiments using macro-, micro-, and nanoplastic would be a helpful piece of information. ->Now mentioned in "4.2 Limitations of previous studies" [8] Tables 1-7: What does N/A mean in the tables? In some cases I assume "not analysed" (e.g., passive transport), but in other cases it should mean "not mentioned" (e.g., aging, coating, etc.) or "not observed" (e.g., measured adverse effects). I think this needs to be specified. Usually, N/A refers to "not applicable", but this doesn't fit in the tables. ->In this work it means "(data) not available". We marked it at the tables.

Synthesis Lines 549-550: Could you cite the studies that imitated weathering in the described way? ->We did so. Tsunoda et al. (2010) artificially aged their plastic by soaking in hot water at 90°C for 21 days, and then it was sanded/scratched with medium-grade paper prior to the test. Gebhard and Forster (2018) incubated particles in seawater for 4 weeks to stimulate the formation of biofilms. [9] Lines 555-557: This is true, but it should be acknowledged that these additives are mainly present in commercial plastics, and therefore, mentioning of additives is not expected for "clean" microbeads specifically synthesized for the experiments. Nevertheless, the disadvantages of using these microbeads has been clearly discussed earlier in this section. ->Done.

Conclusions [10] Line 620-621: I am a little concerned about describing the results as

C3

"alarming". Is it really? The following sentences actually refute this rather strong statement. ->Replaced with "considerable". [11] Lines 624-629: I would suggest changing the sentence to: "To elucidate [...], the most exact reproduction of plastic concentrations and properties [. . .]". However, the difficulty here is that very scarce data of limited quality is available on concentrations of microplastic in soils, so a range of concentrations need to be used for future experiments in order to match the "real world" concentrations in soil, while expecting a decrease in uncertainty in analytic results in the future. Especially in the lower size ranges (<100µm) quantification is currently challenging. Therefore, little is known about size distributions occurring in soils. It might be worth mentioning this dilemma in a sentence. ->Done.

[12] Technical corrections: ->All done.

Interactive comment on SOIL Discuss., <https://doi.org/10.5194/soil-2020-4>, 2020.

C4