

Interactive comment on “Compared impact of compost and digestate on priming effect and hydrophobicity of soils depending on textural composition” by Amrei Voelkner et al.

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The authors of the manuscript entitled ‘Compared impact of compost and digestate on priming effect and hydrophobicity of soils depending on textural composition’ address an important question of the effect of addition of composted organic substances on physical and biological soil properties. The study investigates the effect of compost and anaerobically fermented digestates on wettability of soils and the soil respiration. The study is novel and of potentially large interest, however, the research design and the overall description of the study present some potential problems. I find this extremely hard to understand the research design used in this study. The authors mixed two soils of different texture with digestate and compost and investigated the effect of addition on

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wettability and microbial respiration soon after the soil was predried to -60hPa matric potential. I think the real effect of organic substance addition on wettability can't be assessed only based on such immediate measurement after mixing, instead soil should be exposed to wetting/drying processes or possibly incubation for a period of time before testing water repellency. It is not clear why the authors chose to measure carbon content of the soil-amendment mixtures immediately after mixing (and air drying), water repellency immediately after pre-drying of soil samples to -60hPa and analysing BAS 6 days after the incubation at 22_C. I find this research design very inconsistent and therefore unable to answer stated research question. → The experimental setup is criticized as inconsistent due to different incubation times before the measurement of Corg and BAS. It is true that the incubation time before the measurement of Corg was lower than the incubation time before the BAS was investigated. Nevertheless, we would assume that the observed effect (decrease of the Corg content as a result of mineralization) would be more intensively in the Ss soil if a longer incubation period would have been chosen. The second point is that the Repellency Index should have been better measured after several wetting and drying cycles. In addition to the measurement of the sorptivity of moist soil samples, the RI was also determined after more intensive drying processes of the samples. The results are not shown in the manuscript, since the differences to the results shown after dewatering to -60 hPa are very low. The results presented in the study are extremely surprising especially the depletion in carbon content after addition of compost or digestate. The authors argue that the reason behind the carbon depletion can be the boosted organic matter decomposition after addition of the organic amendments but it is a very unlikely case given that C content has been measured immediately after mixing soil with the organic amendements. The discussion contains a lot of speculations not supported by the results. Authors discuss the increase in soil hydrophobicity where in fact the results show a slightly higher repellency index in amended soil samples but still classified as a wettable ($RI < 1.95$). At this state I find the manuscript not suitable for publication. → The reviewer mentioned that a discussion on increased hydrophobicity is unjustified since

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the increase of RI is on average lower than 1.95. It is true that the RI is not significant in all amendments, but an consistent trend is apparent. Individual values in the variants C10, C30 and D40 were > 1.95 which is not visible in the tabular representation.

Detailed comments

P1 Abbreviation for soil types Ut3 and SS are not intuitive, I suggest to change it to something more logical → Ss and Ut3 should not be the abbreviations for the soil types, but for the soil textures. In our opinion these abbreviations are suitable to underline the differences in and focus on soil texture differences. P2L21 exudates → We agree and changed. P3 The samples are claimed to be collected from A-horizon 0-10cm depth, but the samples from Dikopshof are sampled from a Cv horizon so the subsoil is that correct? → This statement is right. Both samples are collected from the topsoil horizon, which is important for the impact of compost and digestate amendment. P4 digestate and compost addition has been stated in different units and therefore hard to compare the amounts, please convert to the same units P4 Did the digestate and compost soil mixtures resulted in similar soil moisture contents? Or was the digested more in a liquefied state and resulted in higher soil moisture contents after mixing. This information could help understanding why soil C content was lower after amendement addition. → No, this was taken into account during the admixture. The lower water content during composting was compensated by the addition of distilled water, so that all batches had the same water content before further sample processing. This remark was added to the method part 2.3. P4 research design is very unclear, what is the rationale to measure the wettability after -60hPa pre-drying and respiration 6 days later? P5 explain more about the interpretation of RI results, most of the results from the study had RI between 1-1.95 so were the wettable or water repellent? → A Repellency Index of > 1.95 indicates water repellency of the soil. The single RI values showed partly hydrophobic conditions after digestate and compost application, the mean value demonstrates RI values between 1 and 1.95 which do not display hydrophobicity. P5 very hard to read values for Ut3 soil C content → One main question was the effect of

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the two amendments on chemical parameters of a loamy and a sandy soil. To get a direct comparison between these two textures, the scale was chosen. The main specific aim would be to see the differences of Corg content directly between both textures. P7 why C content was lower after addition of digestate and compost? The high respiration is very unlike to cause such a quick depletion in SOC within a few days → This question is not comprehensible. The observed priming effect in the sand is debated in detail in the discussion part. The decrease of Corg content in the Ss soil was significant in all variants. P8-9 discussion very speculative and doesn't correspond with the results, water repellency is basically undetected in the samples therefore there speaking about hydrophobicity and BAS correlation seems incorrect.

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