Response with revised manuscript: "Estimation of soil properties with mid-infrared soil spectroscopy across yam production landscapes in West Africa" by Baumann et al.

https://soil.copernicus.org/preprints/soil-2020-100/

Letter of response

Dear Dr. Hauser,

We would like to express our gratitude for the chance to improve the consistency of our manuscript. We appreciate the on-point comments and concrete suggestions made by the reviewer and the reviewing editor. These were very helpful to improve our contextual study.

We have addressed all the comments made according to the response to the reviewers made earlier. The text changes in the improved version of the manuscript are marked in green in the PDF document. Please find the summary of the main changes made in the sections below.

Given the relevance of developing cheap soil diagnostics to evaluate region and farm specific soil security and nutrient status for improved crop management, we appreciate that this work will be accessible to a wider audience in the open-access journal SOIL. We are happy to answer specific questions and concerns and looking forward to acceptance and publishment of the article.

Best regards,
Philipp Baumann, on behalf of all co-authors

1 Introduction

Page 2, line 20: We have changed the sentence to: *"The deforestation and expansion of agricultural land has in many places caused soil degradation."*

Page 2, lines 50–52: The importance and the complementarity of conventional laboratory analytical methods for soil infrared spectroscopic calibrations is now phrased more clearly.

Page 3, lines 55–58: We wanted to inform about the variable predictive capability that has been reported for soil properties that are less directly related to soil organic matter and hence are more difficult to model. Therefore, there are two additional sentences that address the the variable performance of infrared spectroscopic estimates found for extraction-based soil methods.

Page 3, lines 55–58: This is an amendment made that further emphasizes the motivation for our study. We have firstly added that there is a lack of of cheap and fast soil diagnostic tools to identify factors limiting yields and to derive site-specific fertilizer recommendations for yam and other high-value crops. Secondly, we have made it clear to the reader that the outcomes and interpretations made can be transferable to other crops in the regions.

Page 3, lines 75–78: We now finish this section with stating that this work addresses the performance and applicability of soil mid-IR spectroscopic models. Further, we have noted that the spectroscopic evaluation for the soil's capacity to retain and release nutrients is discussed.

2 Discussion

Page 17, line 287: We have modified the title of the section: "Accuracy *and relevance* of mid-IR spectroscopy for agronomic diagnostics".

Page 17, lines 299–310: The review had indicated that we need to more clearly separate the activities to improve crop yields and maintain or improve soil fertility. Hence, we have added a new section that concisely addresses one of the major issues with soil fertiltiy in the West African yam belt: the risk of depleting soil organic matter due to increased land use frequencies and shorter fallows that hamper the restoration of soil organic C pools. Moreover, we have elucidated that innovative soil and crop management solutions need to be incorporated to improve this issue, but that both quantitative scientific soil methods (based on conventional and spectroscopic estimates) and local farmer's soil knowledge needs to be considered. Finally, we discuss the importance of assessing the chemical and physical controls on nutrient availability at trial sites (e.g., pH) and also inherent soil fertility (texture, soil organic C).