

SOIL Discuss., referee comment RC2
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Comment on soil-2020-100

Stefan Hauser (Referee)

Referee comment on "Estimation of soil properties with mid-infrared soil spectroscopy across yam production landscapes in West Africa" by Philipp Baumann et al., SOIL Discuss., <https://doi.org/10.5194/soil-2020-100-RC2>, 2021

Comments on manuscript soil-2020-100

The manuscript tackles an important issue: yam production is marred by declining yields and a lack of positive fertilizer responses, the absence of current fertilizer recommendations and generally old and traditional cropping systems and technologies.

The title somehow promises to be yam specific, yet the manuscript does not really produce data or results that would be specific to any crop. Although this is not a short fall, I would recommend that the authors reflect upon the need to have yam as a target crop – sure the samples were taken in yam fields and this could be taken as a reason, yet not a strong one.

The set of chemical variables (elements) measured is rather wide and gives the impression it was done because it was possible. The manuscript does not give any indication of how important these elements are for yam growth and yield, except for N and K in a by-sentence. Although the focus of the manuscript is clearly on the IR predictions and models, the manuscript would gain quality if nutrient requirements of yam and the problems of yam plant nutrition were considered to a larger extend.

I would appreciate it if the authors added a short section on which of the accurately predictable chemical or physical properties and elements would be of importance to monitor soil quality for yam. In addition a critical assessment of the differences between total element and available element data – which one matters more?

To talk about West Africa (Senegal to Cameroon – all yam producing countries) after sampling in two countries is as well somewhat far-fetched. The authors may consider a change in the title.

The manuscript has several highlighted text portions the comments in detail on these portions are either in the note boxes or below.

Page 2 line 20: population growth does not cause soil degradation it is the increased land use frequency and intensity that causes soil degradation.

Combine with previous sentence to create a correct statement.

Page 2 line 25 – A particularly strong positive

Page 2 line 31: into the physical, chemical and biological major components

Page 2 line 36: not only mineral fertilizer but as well the soils' inherent fertility or nutrient status. Additional factors are the tillage regime, the planting date, staking, and stake height see: Enesi, O.R., Hauser, S., Lopez-Montez, A., Osunobi, O. (2018) Yam Tuber and Maize Grain Yield Response to Cropping System Intensification in South-West Nigeria. Archives of Agronomy and Soil Science, 64:7, 953-966.

Page 2 line 48 is it really the case that the IR approaches complement the wet chemistry or is it more that the IR approach requires the wet chemistry to make sense of the spectra?

Page 2 line 52 is it only often that IR spectroscopy needs wet chemistry references or is it more that currently they are the essential part of interpreting the spectra?

Page 4 line 89 YAMSYS in full please

Page 16 line 273 I would challenge the importance of SOC to store water – it is mainly the soil texture that determines water holding capacity, whereby SOC may play a positive role in aggregation and thus improve water holding capacity yet it is not primarily the "body" holding water. Please rephrase or remove the water

Page 16 line 275 – land use pressure is a bad term what we look at is a higher land use frequency and shorter fallow – please rephrase accordingly.

Page 16 line 276 – the sentence is too long and combines too many factors. It is correct that fallow and slash and burn go together, with the burning at least partially destroying the C input to the soil – please phrase to show the consequences of the cropping system in brief – monitoring the soil quality is a different aspect and would need being discussed in connection with the farm households ability to engage with such activities.

Page 16 line 278 – this sounds like closing the yield gap is a process that simply runs parallel to improving soil quality, however it would be the consequence and not something that happens automatically. Please break down the long sentence and separate cause and effect here. It would be of particular importance to clearly single out the monitoring of soil properties from activities improving soil properties – make sure it is clear that there are tools to improve soil quality and tools to monitor soil quality.

Page 16 line 281 - Proposed sentence: To give a specific example, yam requires relatively large quantities of N and K (e.g., O'Sullivan, 2010); on light-textured soils yam can attain high tuber yields but at a high risk of losing large proportions of applied N and K, to the environment (e.g., Diby et al., 2011).

To be considered here is that if a large portion of N and K are lost yields are unlikely to be high

Please also note the supplement to this comment:

<https://soil.copernicus.org/preprints/soil-2020-100/soil-2020-100-RC2-supplement.pdf>