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Interactive comment on "Precision of farmer based fertility ratings and soil organic carbon for crop production on a Ferralsol" *by* P. Musinguzi et al.

Anonymous Referee #3

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This manuscript approaches the problem of evaluating soil fertility whit scarce resources. The topic is timely and the results are interesting. However, the presentation of the results and the discussion is sometimes unclear. The description of the statistical analyses would benefit from some clarifications. The language of the paper would also benefit from editing. I had some difficulties in understanding long sentences, and there are problems with wording in several places that confused me.

I will enumerate the aspects (minor revision) to be corrected before considering the manuscript for publication.

INTRODUCTION:

P1239 L8: Change the ";" to ":" between being and use.

P1239 L29: Insert "and" before biological.

P 1240 L2: "The theoretical basis for SOC USE AS SOIL FERTILITY ESTIMATOR. . ."

P1240 L8: I am not sure that wholesome is the right word in this context.

MATERIAL AND METHODS

P1240 L20: Ranges from about . . . to . . .

P1240 L22: What is the meaning of "may" here?

P1240 L25: Ranging from . . . to . . .

P1243 L18: I do not have clear if the 30 fields were used in both seasons. It seems so according to this sentence, but in P1242 L2 it is said that each farmer identified an extra field for the second season.

P1244 L15 – L21: I do not find clear enough the statistical analyses. In the ANOVA, I guess that the factor is fertility according to SOC, why did you not carry out the same analysis with fertility – FFE as a factor?

P1244 L27: The mention of control plots add confusion to the explanation. I understand from P1243 L23 that, in this study, only plots without N application were used.

RESULTS

P1245 L20: I think it should be useful to specify which fertility index is being used in each case. Maybe "fertility-FFE" and "fertility-SOC" could be used.

P1245 L21: It should be interesting to test if SOC increased significantly when fertility-FFE was considered as factor.

P1245 L21: If you rated fertility according to SOC, it is normal that you have significantly different SOC values between fields with different fertilities.

P1245 L23: What do you mean with control? This experiment do not have any control treatment.

P1246 L2-3: I think it is more correct to say that fertility had a significant effect on yield.

P 1246 L7: I do not understand this sentence.

P1246 L9: Place the bracket after “components”.

P1246 L9 – L18: The interpretation of the PLS analysis is not clear to me, neither is the explanation in the text. According to the section 2.3, yield is the response variable. For PLS, each component is obtained by maximizing the covariance between the response variable (yield) and all possible linear functions of the set of predictors. Thus, it is not correct to say that the first components defined the direction of different soil properties that exhibited the greatest variations, since the response variable is also taken into account. I do not understand neither the rest of the paragraph, which should be rewritten completely. For example, explain the meaning of the percentages of each property associated to each component, are they loadings, loading weights?

DISCUSSION

P1247 L5-6: How do you know that SOC and N were enough to determine soil fertility as perceived by the farmers? I do not find direct comparisons between both methods in the manuscript and SOC variation between fields with different fertility-FFE is not analyzed.

P1247 L10-12: The selective transporting should affect concentrations in both layers, why do you find differences in the 15-30cm layer only?

P1247 L14: How do you test the influence of SOC on soil properties? The objective of the study was testing SOC as INDICATOR of soil fertility. The fact that a property can be used as indicator of soil fertility does not mean a direct relation of influence on the rest of soil properties.

P1247 L16-19: It is said that clay content increases with fertility, but according to the explanation below, a higher clay content means higher SOC and thus higher fertility, so the relation is in the opposite direction.

P1247 L24: Please rephrase this sentence.

P1247 L26: Corroborated or correlated? Anyway the correlation between fertility and yield was not analyzed. The mixed effect model is not a correlation analysis.

P1249 L8-9: Please rephrase this sentence.

P1249 L10: “. . . a close relationship. . .”

P1249 L12: Correlation between N and fertility was not analyzed. Please see comment P1247 L26.

P1249 L24-27: Could you explain this statement?

P1249 L27 – P1250 L1: I do not understand this sentence.

P1250 L11-13: Responsiveness to what? I do not understand the further statement.

P1250 L17-20: I do not find these rates “similar”.

CONCLUSIONS

P1251 L10-12: This result is not mentioned in the results or discussion sections. Add some text in these sections to support this conclusion.

TABLES

Tables 1 and 2: The use of letters to denote significant differences between fertility levels would help to interpret the tables.

Table 3: Yield is the response variable, so it is correct to express the % of variance explained by each component. However, for the rest of the property, I do not agree with this interpretation. You should represent the loadings (comparable to the loadings

of a PCA) of each property on each component.

Interactive comment on Solid Earth Discuss., 7, 1237, 2015.