Response to Joseph Tamale

Dear Sir, thank you very much for your suggestions which substantially improved the quality of our manuscript.

Title

The title should be adapted to reflect the effect of applied rock powders on soil fertility as well because a bulk of the findings is focused on soil mineralogical and physicochemical properties.

Answer: Modifications were made, and the type of soil was added. The new title is as follows: Effect of trachyte and basalt rock powders on maize (Zea mays L.) growth and yield on Fluvisols in Cameroon's Sudano-Sahelian zone (Central Africa)

Abstract

Line 18–19, you indicate that the study followed a completely randomized block design. What was your blocking factor?

Answer: The environmental heterogeneity and variability in the soil's natural fertility served as the blocking factor, which guided the choice of the experimental design. Further details on this choice are provided in Lines 130–132.

Additionally, Line 18–19 could be rewritten as: "The experiment followed a completely randomized block design with six treatments (T0, T1, T2, T3, T4, and T5) and three replications."

Answer: done

What does T0–T5 mean in terms of application rates of N, P, and K?

Answer: Dear Sir, the meanings of T_0–T_5 are provided in Table 2.

Line 19–20, I find it interesting that your soil consisted of kaolinite, sepiolite, quartz, and smectites, but the sand fraction dominates its texture, and the pH is close to neutral (6.98). Could you include the soil classification of your profiles as per the latest WRB guideLines in the text?

Answer: This soil is classified as Ochric Dystric Fluvisols according to the WRB. The information was added in Line 25

Additionally, why report OC and ON instead of total C and N?

Answer: For the study, only the organic carbon (OC) was analyzed. It is the form suitable for the study

For all the findings, please report mean values with the standard error of the mean instead of ranges. Please maintain this format throughout the manuscript.

Answer: suggestion adopted in the abstract (Lines 22-25). In the physicochemical part of the manuscript, standard error was added to mean values associated to ranges. Modifications were made where they were forgotten (Lines 309, 313).

Line 23–25, I find this sentence hanging.

Answer: " The studied soils are moderately suitable for maize cultivation" was changed into **"These soil characteristics are moderately suitable for maize cultivation"**

Line 24–26: What growth parameters did you look at, and how different were they between treatments? Please add them here.

Answer: The growth and even yield parameters were specified in the Methodology, under "Collection of maize parameters " section in Lines 221-222 in the submitted version. They were added in Lines 19-20.

Line 24–26: At what rate of trachyte and basalt additions did you attain the highest increase in maize yield?

Answer: There was no variation in rate. The rate for the two powders was 2000kg ha^{-1}. The highest increase in maize yield was obtained when 104.17 kg ha^{-1} of urea was added. This information was in Table 2 and Table 9.

Introduction

With the exception of maize suitability evaluation for the sahel region, nearly all the details required for the introduction are there, but the flow and coherence of ideas are still lacking and could be enhanced by avoiding repetitions of some concepts. Additionally, authors should consider highlighting why specifically trachyte and basalt rock powders? Furthermore, authors

need to mention the yield gap in maize and how using soil fertility amendments helped close the yield gap.

Answer: information on why specifically trachyte and basalt and about yield gap were added in lines *89 – 94, 99 – 109*

Materials and methods

Please merge Line 107–109 with 105–106.

Answer: suggestion adopted in Lines 117-118

The authors could make a better map of the area.

Answer: Improvements were done

Table 1: Please report for rainfall, three significant figures for temperature, and the aridity index.

Answer: For the harmonization interest, we have opted to keep two significant figures for all the data because rainfall and temperature data were obtained with two figures. Some modifications were made to the table.

Experimental design

Line 119: A control is also a treatment. In other words, you have six treatments and not five. Could you also mention the blocking factor?

Answer: The choice of a completely randomized block design accounts for environmental heterogeneity and variability in the soil's natural fertility by randomly distributing treatments within each block, thereby minimizing the influence of uncontrolled factors. Thes in formation was added in Lines 130-132.

Line 121: T0–T5 needs to be written as T_0–T_5 (numbers as subscripts) to maintain consistency.

Answer: done in all the manuscript

Line 123: Is CMS-9015 an open-pollinated variety or a hybrid? Please clarify.

Answer: CMS-9015 is an open-pollinated variety. This information was added in Line 136.

What are the quantities of N, P, and K (kg N or P or K/ha) supplied through the addition of the trachyte and basalt powders and urea fertilizers? This is more important than stating the bulk amounts of the rock powders and urea fertilizers added per square meter. I would write out Table 2 as text.

Answer: We did not quantified the amounts of nitrogen (N), phosphorus (P), and potassium (K) supplied through the application of trachyte and basalt powders and urea fertilizers. But we think that compared to synthetic fertilizer, basalt and trachyte powders release necessary elements for plant growth progressively and might significantly improve the cation balance.

I would use a graphics program to produce Figure 2.

Answer: Dear Sir, we use Adobe illustrator to produce Figure 2.

How were weeds managed, and what was the frequency of weeding during the experiment?

Answer: Manual weeding was carried out throughout the experiment, based on the appearance and development of weeds, to prevent excessive competition with the crops. This information was added in lines 138-139

<u>Rock sampling and analysis</u>

Line 130: Give coordinates where the rock samples were collected from.

Answer: coordinates of localities were added in lines 145-147 and that of samples were already specified in table 3 of the rock samples

Line 134–135: This sentence is hanging.

Answer: The sentence was deleted

Line 138: Specify the country where the University of Maroua is located.

Answer: The country (Cameroon) was added in line 154

Line 144–145: First write out all the elements in full before using acronyms.

Answer: done in line 161

Line 145–146: Give the country where Osaka City University is located.

Answer: done in line 163 (in Japan)

Line 145: Give the manufacturer and country of the manufacturer for the Rigaku RIX2100, and the same for ICP-MS.

Answer: *Rigaku RIX2100 is* manufactured by Rigaku Corporation (Japan) and the *ICP-MS* Is manufactured by Thermo Fisher Scientific, USA. This two information are given in lines 161 and 162-163 respectively

Line 147–148: Write out the acronyms for the acids in full.

Answer: The acronyms are given in Lines 165-166: Nitric Acid (HNO_3), Perchloric Acid ($HClO_4$), Hydrochloric Acid (HCl), and Hydrofluoric Acid (HF)

Line 151–152: Write out the acronyms in full.7

Answer: done in Lines 169-170: Niobium (Nb), Lead (Pb), Yttrium (Y), Tantalum (Ta)

Figure 3 could go to the appendices.

Answer: We think that it is important to leave the Figure 3 in the text to permit to visualise the physical aspect of trachyte and basalt samples used.

Line 159–160: Please specify the guideLines you used to describe the soil profile.

Answer: Soil profile was described in situ following the guidelines for soil profile description according to Baize and Jabiol (2011). The information was added in lines 179.

Line 163–164: Is this to suggest that your profile had six horizons? If not, add details about the sampling depth and also the total depth of the soil profiles. What was the slope at the site?

Answer: Yes, our soil profile had six horizons. Details are in figure 5 and information about the slope is given in the study area section (Line 120). The terrain is characterized by a relatively flat topography.

Line 167: First write out all the exchangeable bases in full before using acronyms.

Answer: done in line 188

Line 173: V is an inappropriate acronym for base saturation.

Answer: Modification was made. The acronym is "BS"

Line 174: What does SEB stand for?

Answer: "sum of exchange bases" was replaced by "Total exchange bases (TEB)" in lines 190 and 194

Line 188: Please give the country where the weather station is located, and coordinates as well.

Answer: The weather station is located in Cameroon, 10°27'0" north latitude and 14°15'0" east longitude. Information was added in line 209-210.

Line 190: Give a reference for the formula of the climatic index.

Answer: done in lines 212 and 217 (Sys, 1985)

Line 195: Please first contextualize the land quality index in the introduction before using it in later sections of the manuscript.

Answer: Dear Sir, there was an error. It was" land index" and not "land quality index". Corrections were made in the text in line 215.

Line 202–204: Needs revisiting. The phrasing is vague

Answer: The phrasing was revisited in lines 221-223.

Line 204: Maize plants can grow up to 2–4 meters. I am just wondering if a tape measure would be the best tool to measure maize height.

Answer: The measuring tape is one of the best tools available to us for measuring maize height. The variety we used has an average height of 2.5 meters.

How did you deal with the influence of edge effects on the mean value of response variables of interest? How were weeds managed, and what was the frequency of weeding?

Answer: To minimize the influence of edge effects on the average value of the response variables of interest, only the plants located at the centre of each experimental plot were considered for measurements. This information was added in lines 222-224. Information about the frequency of weeding was already provided in lines 138-139.

<u>Data analysis</u>

Did all the data follow a normal distribution? How about variance between treatment groups? What did you do in case of non-normal distribution of the data and heteroscedasticity? How did

you analyze time series data from repeated measurements, especially the growth parameters? I also missed details on how you handled temporal pseudo-replication in the repeated measurements, because this compromises the predictive capacity of statistical tests for repeated measurements. What level of statistical significance did you use?

Answer:

All data did not follow a normal distribution. This permit to us to make a non-parametric test and carried the Spearman's correlation coefficient to appreciate the relationship between parameters. Time series data from repeated measurements were summarized by a mean value for each experimental unit. The title of the table was modified by adding "Mean ± SD". Differences with $p < 0.05$ were considered statistically significant; information added in the text in lines 246-247.

Results

Line 224: Please check the grammar.

Answer: an "s" was added on the two verbs in line 250: outcrops, exhibits

Line 225–226: Could you refer to a table or figure with these results? Otherwise, sounds like literature from another study presented as your findings. Same for Line 228. Specify where we can find this result (table or fig): "Olivine, present in some samples, is often altered to iddingsite." No reference to your results as well, Line 230–231.

Answer: Concerned figures were added in lines 251 and 253. In addition, since the work is not focused on the petrology of these rocks, we only presented the interesting photomicrographs for the present developed problematic.

Morphological and mineralogical characteristics of the soil

Line 258–259: Should go to materials and methods.

Answer: Done in lines 177-179

Line 260: Please provide an actual photo of your soil profile.

Answer: The photo was not expressive. That is why we preferred to draw.

Figure 5 could also go in the appendix.

Answer: Dear Sir, we think that it is better to leave the figure here to better appreciate the organization of the soil profile and the sampling points.

Line 263–264: Did you mean diffuse boundaries? The progressive soil boundary description is quite unclear.

Answer: The term "progressive" was replaced by the term "gradual" (Line 290)

Table 4 could also go in the appendix.

Answer: Dear Sir, we choose to leave the table here in order to permit to rapidly access morphological characteristics of soil.

Figure 6 is of low quality. Please save your X-ray diffractograms as high-resolution images.

Answer: The quality was improved

Physicochemical characteristics of the soil

Line 282–284: This Line is unnecessary, please delete.

Answer: The sentences were deleted.

Suitability of the studied soils for maize cultivation

Besides this part not being fully contextualized in the introduction, I also do not fully get why it matters to do a suitability assessment for just your study location. Wouldn't it carry more weight if the suitability assessment were for the Sahel region, and you would present a map showing which areas in the Sahel region are highly, moderately, and less suitable for maize cultivation?

Answer: The soil was classified to identify the type of soil. The results will therefore be extrapolated on this type of soil in all the Sudano-Sahelian region.

Evaluation of the effect of trachyte and basalt powder on the growth and yield of maize

Line 341: Check grammar.

Answer: Dear Sir, unfortunately, we couldn't find the grammar error in this Line.

Table 9: Maintain one decimal point for all the reported parameters.

Answer: Since the data in this table are mean values, we think that it will be better to maintain two decimals for more precision. Bulk results from the fields were with one decimal before data analysis.

When reporting the results, please re-state what T0–T5 mean.

Answer: done

Please report p-values in brackets where you mention significant differences between treatments.

Answer: done

Effect of trachyte and basalt powder on maize yield parameters

Please report p-values in brackets where you mention significant differences between treatments.

Answer: done