

## Author responses to comments of Referee 2

Dear Referee,

We thank you for your precious time in reviewing our paper "**Relationship between the stocks of carbon in non-cultivated trees and soils in a West-African forest-savanna transition zone (MS No.: egusphere-2022-209)**". We appreciate your valuable comments that will help us improve our manuscript.

The authors have carefully considered the comments and tried our best to provide the below point-by-point responses for your comments and questions.

Thank you very much for your interest in this manuscript.

Sincerely,

The authors

<b>I. Referee #2</b>	
<b>Conceptual issues</b>	
<b>Comment / Question</b>	<b>Our reply</b>
<p><b>R2Q1.</b> 1- The discussion part is too concise and does not depend into the fact that landscape/soil conditions is a major driver in determining land use, and in some extend management within the same land use. As part of the general improvement of the discussion section, I suggest to address this issue in more detail.</p>	<p>Ok, we will improve the discussion in more detail.</p>
<p><b>R2Q2.</b> The dataset presents, as it is usual in this kind of large surveys, a large variability. Since the hypothesis to test depends on the ability of</p>	<p>We did not find a strong relationship between tree density and SOC stock in all land uses. For example, in annual cropland <math>R^2 = 0.05</math>.</p>

sampling to represent the soil properties of the plot

I wonder how much of this variability for the land uses of density on non-cultivated trees (e.g. annual cropland) comes the variability in soil OC and TN that should be related to the distance to the tree, which according to the sampling method (see line 110) might be a relevant factor. This might be worth discussing in the manuscript, particularly when the higher variability in the regressions (see Figure 6) tend to appear in the land

uses with lower non-cultivated tree density.	
<b>R2Q3.</b> One of the land used (forest) has a very small number of samples (n=2) which might limit the statistical power of the analysis made on this land use. It will be a good idea to include some caveat on this in the result and discussion section, and comment its possible implications.	Indeed, the number of the observed forest was only (02) two. It limited our statistical analysis. Ok, we will explain it more in the results.
<b>R2Q4.</b> The authors are right, in my view, to claim that their hypothesis is validated for some land uses. In some areas of the world more skilled farmers or	Indeed, we will discuss it more in the manuscript.

<p>shepherds, tend to be also paying more attention to other positive landscape elements, like non-cultivated trees. Perhaps the authors want to consider this as potential underline factor in their discussion, particularly since this been true a more careful management of the grassland and cropland might be taking place.</p>	
<p><b>R2Q5.</b> Line 286. "... mainly driven..." I wonder if the authors want to qualify this statement. They have demonstrated that it is a major driver, given some</p>	<p>Yes, we mean "major driver" when we mention "mainly driven"</p>

<p>of the other factors involved perhaps they want to qualify this statement.</p>	
<p><b>Editing issues</b></p>	
<p><b>R2Q7.</b> Line 64. There are also many studies in Mediterranean type of climate as compared to tropical regions in Africa.</p>	<p>Ok, we will compare our results to studies in Mediterranean type of climate.</p>
<p><b>R2Q8.</b> Line 103. “main crop”. Does this mean that the non-cultivated tree has some use, e.g. wood occasionally? Please clarify</p>	<p>Yes, the non-cultivated trees could have multiple uses such as medicinal use, grazing use, firewood collection and nutritional use. According to the native people questioned, for example <i>Daniella oliveri</i> Hutch. &amp; Dalz was used for wood collection. <i>Piliostigma thonningui</i> (Schum.) Millne-Redhead was used as fodder. <i>Parkia biglobosa</i> (Jacq.) Benth. was used as fodder and the pulp and grains was used for human consumption. <i>Albizia ferruginea</i> (Guill. &amp; Perr.) Benth. was used as paint in art activities.</p>
<p><b>R2Q9.</b> Line 110. Was proximity to the non-cultivate treed considered somehow in the land uses</p>	<p>No, the proximity to the non-cultivated trees to the land uses with low non-cultivated tree density was not considered. We considered the non-cultivated trees in each plot.</p>

with low non-cultivated tree density?	
<b>R2Q10.</b> Line 120. Indicate also the number of samples, not only the percentage.	The 15 % represent 90 soil samples while the total number of soil samples was 594 soil samples. We will add it in the manuscript.
<b>R2Q11.</b> Line 123. Some reference (or results of internal test) to validate this assumption?	The pH of these LDSF sampled soils were not measured. However, for other study of my PhD, 38 soil samples were taken in yam fields of the LDSF site at 0-30 cm soil depth. The pH of yam fields soil samples was measured. The results showed that 87% of the soil samples presented a mean pH was 6.05. The pH varied from 5.2 to 6.8.
<b>R2Q12.</b> Line 125- It is always better to indicate the chemical name not the commercial one.	Calgon is a combination of sodium hexmetaphosphate and sodium carbonate. Ok, we will indicate the chemical name of calgon in the manuscript instead.
<b>R2Q13.</b> Line 131 add regression $y=mx+n$ in Figures S2, S3 and S4 to allow the reader to see possible biases as compared to the 1:1 line.	Ok, we will add regression $y = mx + n$ in figures S2, S3 and S4.

<p><b>R2Q14.</b> Line 143-145. It is a bit confusing. Did you use bulk density from measurements and coarse fragments (frag) from Hounkpatin et al. (2018) or both from Hounkpatin et al. (2018)? Please clarify. Please revise titles of Table S2 to indicate this.</p>	<p>Coarse fragments (frag) was from our measurement while bulk density was from Hounkpatin et al. (2018). As the number of plot of LDSF site was high (160 plots), the auger for soil sampling was the standard manual auger not cylindrical. Thus we estimated the soil volume and we got under-estimated soil volumes that lead to some aberrant results (BD= 2.5 or 2.8 even 3).</p>
<p><b>R2Q15.</b> Line 154. I guess that Figure S4 should be Figure S5. Please revise.</p>	<p>Indeed, we will correct it in the manuscript.</p>
<p><b>R2Q16.</b> Line 189 Table S3. Indicate what the numbers mean in the Table caption. I have another question. Why not statistical analysis has</p>	<p>Impact of fire, erosion and grazing data were collected by looking in the surrounding plot the visible signs. So, for each land use, the presence of signs was counted and we obtained one data for each land use. Thus, statistical analysis could not be done, we presented those data in percentage in table S3.</p>

<p>been carried out on Fire , Erosion...?</p>	
<p><b>R2Q17. Line 171.</b> Where the conditions for normal distribution and variance tested for proper use of ANOVA? Please indicate, or correct of needed.</p>	<p>Yes, the conditions for normal distribution and variance were tested. We used log to normalize the data.  We could add the data distribution figure in supplementary material if necessary.</p>
<p><b>R2Q18.</b> Line 192. What do you mean by restrictions? That sampling could not be carried out because a rocky horizon was found? Please clarify. In Table 2 indicate n (number of samples) at each depth which can provide a glimpse on how many</p>	<p>Yes, the sampling could not be carried because of the presence of mostly lateritic rocks. In some part of the area lateritic rocks could be observed at soil surface as shown in the below figures.</p>

times this happened for any given depth.





**R2Q19.** Line 231, Section 3.5 An additional Figure showing the cumulate SOC and TN stock with depth should be included (it could go in Supplementary material or in Figures). It can help to provide a complementary view of

Ok, we will add an additional figure showing the cumulate SOC and TN stock with depth including statistical significance of means values.

your results and clarify the presentation. It should include an analysis of the statistical significance of differences in mean values of SOC and TN stock which are not shown now.