

Comment on bg-2022-63

Anonymous Referee #1

Referee comment on "Contrasting strategies of nutrient demand and use between savanna and forest ecosystems in a neotropical transition zone" by Marina Corrêa Scalon et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-63-RC1>, 2022

The manuscript entitled "Contrasting strategies of nutrient demand and use between savanna and forest ecosystems in a Neotropical transition zone" by Marina Corrêa Scalon et al. presents a study of nutrient demand and use in two plant communities from Brazil. Such studies are ambitious and innovative because they quantify nutrient demand and nutrient flows at the community scale. They provide a valuable information for understanding the transition between savanna and forest ecosystems, focusing on the nutritional strategies of plants. Although the studies at community scale have their limitations, this study provides an unavoidable first step towards quantifying nutrient demand and use. Despite these strengths, I have identified some issues that require attention by the authors. I explain them below together with some suggestions that we hope help the authors get the best of their interesting study.

1.- Introduction needs some information. Particularly in relation to introduce important concepts for the better understanding of this study such as nutrient concentration, nutrient resorption, nutrient demand vs nutrient uptake, and then nutrient uptake efficiency vs nutrient use efficiency. Furthermore, the hypotheses will should clarify whether the study focuses on the species scale, on the community scale or both.

2.- Materials and methods need some clarification. Particularly in relation to the experimental design of field sampling. Information is needed on how many replicates were sampled. Are there only two replicates per vegetation type (cerrado and cerrado), and they are referred to as plots in the manuscript? Where were soil samples collected, under the tree canopy or outside? How was species abundance measured, which method was followed? Could you describe species abundance and basal area? All species are found in the all replicates? Also, all sampled species are trees? I recommend adding this information in table S1, and this table add on the manuscript. Information is also needed on how you have measured net primary productivity. It is really important parameter in this study, and there is very little information in the methods. Also, were senescent leaves collected from the same individuals collected previously in January 2008? Information on analytical techniques of soil data is also needed.

3.-Information on some statistical methods needs to be improved. In particular, the reason behind the use of community weighted mean to scale up species values to community for nutrient concentrations, which affects nutrient demand, nutrient use, and nutrient use efficiency and nutrient uptake efficiency parameters at community scale. Species selection would produce a strong bias in the community value, especially when target species belong to different families. Could you justify species selection in the methods, indicating for example their abundance in plots. Furthermore, the use of community weighted mean is only suitable for use with many replicates to avoid Type I error, or to include random effects on the models. For this reason, more information is needed on the statistical methods. Did you include any random factors on the MANOVAs and ANOVAs? What are the variables, the fixed terms and the random terms? And what R function did you use?

4.- Results need some clarification. Most of results seem purely descriptive without any statistical test, although it seems indicate it in the methods. Are differences between sites in terms of species mean comparisons, nutrient resorption, net primary productivity, nutrient demands statistically significant? I suggest adding all statistical analyses in the manuscript or supplementary files, providing sample size and test value, not just asterisks in figures. Also, why are soil data not treated in the results, but are treated in the hypothesis and discussion? Why did you not show the z-score in the manuscript related to nutrient use efficiency and nutrient uptake efficiency, and show the means and SE when you calculating differences based on the z-score?

- Discussion section would be clearer if separate paragraphs were used to discuss each hypothesis, indicating the key results of this study. In this sense, the authors dedicate the first and the second paragraphs to discuss a higher P content in wood by Cerrado species than Cerradão species as a key result when they did not report any statistically significant test value in the results for sapwood and heartwood (line 178, Fig1, Fig S1), as they did for inner bark. Could they justify this or report a test value in the results?

Minor comments:

-Throughout the manuscript try to homogenize concepts as plots, area or sites, and to differentiate between species scale or community scale.

-Species name would be in italic format in the text, such as *Hirtella glandulosa* and *Emmotum nitens* in line 117.

-Plant nutrient concentrations would be in mg/g instead of %.

- You should clarify the statements of results and discussion in lines 229-230 and 278-280, because they can be misinterpreted. Ca uptake should always match demand and never resorption because the differences between nutrient demand vs nutrient uptake, and nutrient uptake efficiency vs nutrient use efficiency is based on use or not the nutrient resorption efficiency, which for Ca is zero.

-Are there significant differences between sites on N uptake efficiencies? On the figure 4 is indicated, but not on the text (line 224).

-I recommend modifying Figure 4 and deleting the last row, because it is a repeat of Figure 3. Also, could you please provide test value for the Nutrient Use efficiency of P, because it does not seem significant in Figure 4, as well as for the nutrient uptake efficiency of K?

- I recommend reducing the importance of statements related to fine root production, because the sampling carried out is not accurate and other non-target species, such as grasses, could be measured.

- I recommend to avoid any reference to figures or tables in the discussion, because they should be indicated on the results.