

Comment on bg-2022-165

Anonymous Referee #2

Referee comment on "Phosphorus regulates ectomycorrhizal fungi biomass production in a Norway spruce forest" by Juan Pablo Almeida et al., Biogeosciences Discuss.,
<https://doi.org/10.5194/bg-2022-165-RC2>, 2022

This is an interesting and timely manuscript, but the presentation needs to be better structured and more succinct. The ms revisits Almeida et al. 2018 with many design and analytical improvements (and more untested assumptions) and some different findings. The Discussion in particular is too long, it should be broken into sections e.g. hypotheses, limitations. The paper overall needs to be more readable, easier to navigate for the reader. Redundancy/repetition should be reduced. There are also too many figures and tables, need to select the most important ones and move the rest to supplement. Unfortunately, no links are made to recent papers on nutritional thresholds or tipping points in EM for European (incl. spruce Swedish) forests. There are no links made to recent studies of P limitation (i.e. beech in Germany). There is no mention of mycorrhizal fungi suppressing decomposers (Gadgil effect). There is frequent mention of tree C allocation, as if this was being measured directly, but this is not the case. It is indirect and incomplete (via fungal growth and without respiration); so this needs to be qualified consistently throughout, e.g. "potential tree C allocation". It is often unclear if apatite amendment is the same as P fertilization, which it is not; both are used interchangeably, which is confusing.

The abstract needs to mention how P fertilization was done, e.g. superphosphate twice.

24 - high P status is vague - of soil, fungus, tree? What is the standard/threshold used?

What is the evidence for P limitation?

72. Quantifying biomass and growth?

78. Is there evidence for nearly zero non-ECM growth into bags?

91-3. Is there any evidence supporting these assumptions?

157. Total experimental site area?

163. Is this above published thresholds for EM?

166. Why 200kg?

171. Why 50um?

172. Acid-washed quartz?

173. Why 2%, 50-250nm, 0.5%?

181. Why 30, 60, 90, 120 or 150d?

215-6. Would there be significant disturbance effects?

219. Up to how long?

221. Why not chitin or nucleic acids?

302. Which relative (related?) publications?

367. Were there normal average temp and ppt at the site in 2015 summer/autumn?

Figure 2. Why show this as 1 vs 2 months? Redundant?

Figure 3. Could saprobes use carbon in urea?

Discussion: Any practical recommendations for future studies? Tradeoffs in replication/design/power?

479. shown indirectly in the current results?

480. P means superphosphate and/or apatite?

505. and/or shifted EM community? Could these cross the EM tipping point?

511. P-limitation - were trees tested, e.g. foliar chemistry?

523-524 - observed or assumed?

528. smooth mantle, not mycelium

514-538. This paragraph could be shorter (less speculative) and more sophisticated/precise. Why talk about Tylospora when no fungal community data is presented? I am hoping there won't be a follow up paper where fungal community data is presented separately, if it is available, it should be presented here.

601. But not measured, is this this a hypothesis?

616-617 - explain in methods section.

700 - P - meaning superphosphate and/or apatite?