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Discussions

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Interactive comment on "Variations of leaf N, P concentrations in shrubland biomes across northern China: phylogeny, climate and soil" *by* X. Yang et al.

Anonymous Referee #2

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The authors use a series of shrubland sites in northern China and investigate the relationship of leaf N and P concentrations to several environmental factors. In essence, the study attempts to assess the leaf "economics spectrum" (sensu Wright et al. 2004), but over a much smaller latitudinal gradient (i.e within northern China). I think the paper has potential but needs reworking and additional analyses (it is perhaps an editorial decision as to whether that constitutes a minor or major revision, given the amount of additional work finally recommended). The key difference between the Wright et al. (2004) paper and this study is the large range of sites in the former. Wright et al. (2004) attempted to explore worldwide patterns; however, when the scale is considerably smaller (albeit large) other factors may confound the results.

Overall, I think the paper is limited by only looking at leaf N and P and only temperature and precipitation; other (leaf) traits are not touched upon, yet recent syntheses (e.g. Reich 2014, J Ecol) highlight the importance of other traits and factors, not just leaf N and P. I think it would be far better to take other traits into account in some way, not only because it brings it up to date with broader hypotheses (see Reich 2014) but also because with such varying habitats (desert through to alpine shrublands) these traits could affect the results. For example, plants at the "slow" end of the economics spectrum may have lower absolute concentrations of leaf N and P even if the ratios (N:P) are roughly similar. At the very least, these varying habitats should be accounted for. I suspect that a linear mixed model, treating the different type of shrubland as a random effect, would likely indicate that within each region there was limited, or no, effect and that the significant regressions observed were due to the changes from one region to the next. All of which is fine, but other factors certainly play a part in that. Some of those factors might be correlated with (co-linear to) the traits assessed (e.g. annual precipitation) but only additional analyses would reveal that. Considering additional factors/traits I think would place the study better in the journal's stated scope. Furthermore, I would be surprised if the authors did not have additional data available to them to extend the analyses.

Specific comments relating to the following pages and line numbers are as follows:

pp. 18975, 18976: The three paragraphs starting at line 14 could be condensed a little; structurally, it might all be better as one paragraph.

p. 18976 line 14: "proved to prior to others" needs correction; there's a wrong word there. line 15: insert "been" after "have"

p. 18977 line 4: insert "the" after "have"

line 6: ", plants" does not flow. I'm guessing you meant "and plants"

line 7: Did you mean "soil P availability"? If not, you need to explain why "nutrient

availability" in general would affect leaf [P].

line 11: "remarkably", I presume you meant "markedly".

line 14,15: The Allen paper was concerned about the prevalence of ECM vs AM in different habitats (e.g., mesic vs xeric) and the generalisation "the infection of mycorrhizal fungi mainly depends on environments" is neither quite right or justified by that reference.

line 15: "in contrast, N is relatively sufficient". I don't know quite what you mean here and I'm not sure how it relates to the Allen reference.

line 21: "expanding", I suppose you meant "encompassing".

p. 18978 line 2: insert "then" after "were"

line 4: "sites" should be singular.

line 10: "leaves under 950C for combustion" needs rewording, e.g., "were combusted at 950..."

line 15: It would be good to see the correlations/other data in a supplement for those depth intervals.

p. 18980 line 10: "and explain them" needs rewording. I'd suggest something like: "with climatic and soil nutrient factors as explanatory variables".

line 13 and in other parts of the paragraph: tense should be the past tense, e.g. "We can then extract the SS" should be in the past tense.

line 22: It would be better to include the AIC values (in the supplement).

p. 18981 line 3, 4 and 5: This sentence is not really necessary.

line 7: You don't need to mention the base package because it's loaded by default.

line 10 and the Results section in general: Appropriate numbers of significant figures

should be used – there are too many in some places.

line 22, 23 : insert "a" before "significant"

p. 18982 line 13: "Come to the" doesn't make sense here.

line 20: "focused" should be "focus" presumably.

p. 18983 line 7: shrub should be "shrubs".

line 24: P does not diffuse well at all in most soils, but rather is usually quickly and tightly bound to soil particles.

p. 18984 line 17: "is" should be "are"

line 18: These ratios are indicative only but further tests are needed to say for sure.

p. 18985 line 2: Available nutrients are not necessarily the best, as "available" measures are typically based on agricultural plants that often lack the root specialisations or root symbionts (mycorrhizal fungi, for example) that can allow access to other forms of N and P. That is, there is other literature to support the use of total elements.

line 20: Better to change the tense here, e.g. "Climate influenced..."

line 24: insert "a" after "exhibited"

p. 18986 line 1, 2: That's a big statement and as other factors weren't included I don't think it's justified.

line 14, 15: A somewhat obvious statement.

line 18: nutrient should be "nutrients". Additionally, given the results it would be better to suggest/surmise, e.g. "we surmise that the influence...".

Paragraph starting with line 15: The sentences in this paragraph to line 22 seem to be a bit of a rehash of the paragraph starting at line 7.

line 24-25: That's not a true statement and not what the Allen paper concludes.

p. 18987 line 10: "along climate" should be "along the climatic"

p. 18993: Table 1. Appropriate numbers of sig. figures should be used (i.e. less in some places). It would be better to have only one header column, giving a taller table. "non-significance" should be "not significant".

p. 18994: Table 2. Again, appropriate numbers of sig. figures should be used. "non-significance" should be "not significant".

p. 18995: Figure 1. "Dessert" should be "Desert".

p. 18996: Figure 2. "Dessert" should be "Desert". A dash between "community level" would be better. "logarithm transferred" should be "log-transformed".

p. 18997: Figure 3. "Dessert" should be "Desert". A dash between "community level" would be better.

In one of these figures (e.g. Fig 1), or all, the acronyms (AP etc) should be spelt out in the caption.

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