

Summary

Schmitt et al. (bioRxiv 2022.07.27.501745, revision submitted to PCI Ecology) evaluated the importance of intraspecific variation for tree growth potential, in addition to evaluating for taxonomic and phylogenetic constraints. They found that most of the variation in growth potential occurred at the individual level, with phylogenetic conservatism in the responses. The authors also identified functional traits that predicted species' growth potential. Overall, this is a compelling, large-scale study that emphasizes the importance of intraspecific variation for ecological (and potentially evolutionary) patterns and processes. I have read the previous reviewers' comments and the responses and revisions by the authors. I only have two main comments for the authors that I hope will be helpful.

Major Comments

1. Clarification of the step procedure for the species growth potential by functional trait models.
 - 1.1. Lines 257-259: "We used a linear model with a step selection of the best model explaining species log-transformed growth potential with log-transformed functional traits to meet the normality assumptions (model 3)."
 - 1.2. It is not clear to me what time of step procedure was used (e.g., forward, backward, or stepwise); however, any variant of stepwise selection can bias the model structure and, in turn, the resulting model parameters (Johnson & Omland, 2004; Whittingham et al., 2006; Grueber et al., 2011; Tredennick et al., 2021).
 - 1.2.1. Forward selection successively adds significant terms while backward selection removes nonsignificant terms. Stepwise selection uses the general process of forward selection. Regardless of the exact procedure, this type of model selection can cause biases in slope estimates (either under- or over-estimating slopes based on a significance test) and relies on a single 'best' model from a larger suite of candidate models (Whittingham et al., 2006). While parameters were noted to be averaged over models (lines 259-260, see major comment 2), it is not clear if these models were statistically equivalent based on a set threshold for information-theoretic criteria (e.g., AIC, AICc, BIC) or just the adjusted R-squared of the model.
 - 1.2.2. I would also generally advise against using any stepwise procedure and instead creating a candidate set of models based on the biology and knowledge of the system. From that candidate set, parameter estimates can be averaged.
 - 1.2.2.1. I acknowledge that 19 functional traits can make this procedure prohibitive and why stepwise selection can seem more appealing.
 - 1.3. For readers to have greater understanding and confidence in the results, the step model selection procedure should be clarified.
2. Effects of model structure on relative importance of functional trait predictors.

- 2.1. Lines 259-260: “We measured functional traits relative importance in explaining species growth potential averaging over orderings of regressors (Groemping, 2007).”
- 2.2. Linked to the model selection procedure, it was not clear how the relative importance of predictor variables was averaged over the model(s). As the R-squared value is dependent on the sums-of-squares, the ordering of the terms in the model can affect the sums-of-squares (reviewed in Groemping 2007). Could the authors clarify how the order of terms in the model was controlled for when calculating relative importance?
 - 2.2.1. I think specifying and briefly describing the metric within the `relaimpo` package that was used would be helpful.
- 2.3. In addition to order of terms, it would be helpful to evaluate and then note any correlations between traits included in the models that could affect their estimates and relative importance (Groemping, 2007; Grueber et al., 2011).

I am only bringing up these 2 major points because I think the functional trait results are quite interesting, but I do think the methods should be clarified to make the results more robust.

Reviewed by:

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Please do not hesitate to contact me directly via electronic mail if any of my comments were not clear or require further clarification during the review and revision process.

References (Peer Community Journal format from Zotero Plug-In)

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- Tredennick AT, Hooker G, Ellner SP, Adler PB (2021) A practical guide to selecting models for exploration, inference, and prediction in ecology. *Ecology*, **102**, e03336. <https://doi.org/10.1002/ecy.3336>
- Whittingham MJ, Stephens PA, Bradbury RB, Freckleton RP (2006) Why do we still use stepwise modelling in ecology and behaviour? *Journal of Animal Ecology*, **75**,

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