

The structure of the Introduction does not best underline the general scope of the paper. The first paragraphs on P3 are about specific environmental factors likely to most constrain community assembly in Amazon forests.

When starting reading the manuscript, it gives a feeling that the manuscript is very focused on a specific context of these forests.

But I think the manuscript is about more general questions on the nature and role of ITV in species and community dynamics.

Therefore, I would suggest first introducing your general questions on the issue, and then come to present how the Amazon forests provide a relevant context to test the hypotheses.

There is much focus on the evolutionary background and genetic variation potentially related to ITV (especially on P5 of Introduction).

But it is clearly outside the scope of the paper. You should rather focus on the ecological mechanisms related to ITV irrespective from the genetic basis.

See for instance the conceptual framework proposed in Cyrille Violle et al., « The return of the variance: intraspecific variability in community ecology », *Trends Ecol Evol* 27 (2012): 244-52.

The main point that should better be underlined in the Introduction is that classical functional traits do not necessarily represent well the intraspecific variation in ecological responses, and that development and growth trajectories should be also acknowledged.

The issue is even more general and could also concern the analysis of BTV (a point that could be mentioned in Discussion).

There is lack of explanation in Introduction on why and how functional traits (basically leaf and wood) and growth trajectories are influenced by soil variation. Some more precise explanation of the underlying mechanisms and some related references would be needed. It would help discuss whether and why growth trajectories are more sensitive to environmental variation in the context of the present study

In addition, it is important to note that leaf/wood functional traits and growth trajectories represent different biological properties. Functional leaf and wood attributes can be related to the ability to get and store resources at a given time, while the growth trajectory represents how the resources are used over time.

Therefore, the absence of functional trait variation across environments is not necessarily inconsistent with a variation in growth trajectories.

A variation in growth trajectory and biomass storage can reflect changing metabolic activity over time irrespective from a difference in leaf and wood attributes.

You should consider mentioning some works who specifically addressed the relationship between functional traits and growth, such as Anaïs Gibert et al., « On the link between functional traits and growth rate: meta-analysis shows effects change with plant size, as predicted », *Journal of Ecology* 104, 5 (2016): 1488-1503.

One of the questions asked in the paper is whether intraspecific trait variation (ITV) is consistent with between-species trait variation (BTV) across environmental contexts. However, the study is focused on analyzing ITV in a single species, and we lack information on BTV in the communities where *Cecropia* individuals are sampled.

The authors mention results from other studies ("usually found at the interspecific level", L21), but there is no quantitative information on it.

Because the authors state that ITV is comparatively weaker than BTV, it is important to provide some more quantitative comparison. Because there is not study on BTV in the same sampling plots (as I understand it), the limits of the comparison should also be discussed.

Another option is to tune down the ITV and BTV comparison, and to focus on the idea that ITV of functional traits is far lower than ITV on growth trajectory.

## Detailed comments:

- Title: I would suggest changing the title to better underline the take-home message. For instance, "Growth trajectories better reflect the influence of soil variation than functional traits in a widespread neotropical tree"

### Abstract:

- P3L2: "environment-driven" is not very clear. The sentence concerns trait variation across species, which indeed represents adaptation to different contexts, but the term "environment-driven" also suggests environmental filtering driving trait composition of communities.

- P3L6: "are retained" is not very clear.

I would suggest an alternative wording such as "we assessed whether intraspecific variation was consistent with interspecific variation across contrasted environments".

- P3L11: here it is not clear why you "also examined the architectural development".

You should introduce a specific hypothesis motivating the analysis of architectural development. It should allow better characterizing and understanding intraspecific variation in ecological response to changing environment.

- P3L13: "soil-related phenotypic variability" would sound better.

- P3L13-15 seems unnecessary in the abstract.

- P3L22: not sure that "retrospective analysis of architectural development" is easily understandable for most people.

I would suggest an alternative such as "an analysis of growth trajectory based on architecture analysis".

- P3L24-25: this sentence is rather vague (what "can be captured" means by the way?), and it is a pity that the last sentence of the Abstract does not convey a more striking insight.

### Introduction:

- P4L3-7: you should include less references here.

- P4L12: there is deeper soil on hilltops?

- P4L18: not clear what "directional" means here. It seems that you simply talk about a contrast here (without specific direction).

- P4L19: "accruing" sounds weird.

- P5L5: there is an important idea that could be better introduced: it is that BTV should basically be compared to the ITV of more generalist species.

You should briefly explain why ecological generalism should be related to higher ITV, and to ITV likely to be congruent with BTV.

Some references can be found on this issue.

- P5L8-13ff: although the question of evolutionary processes and genetic diversity is per se interesting, it is outside the scope of the present study (you do not investigate these aspects).

- P5L32: I don't think that the present study can address "eco-evolutionary dynamics", it is focused on ecological processes.

- P6L21: "bridge these caveats" sound weird.

- P6L31-32: "eco-evolutionary dynamics" is again outside the scope here.

- P7L1-3: the way you will capture soil-related variation in architectural development is elusive here, although it is a key point.

The Introduction should formulate hypotheses on how architectural development should reflect the influence of soil variation.

- P7L3: "variation" instead of "patterns"?

- P7L7: unclear what "phenotypic variance strategy" means.

Material and Methods:

- P8L10: the fact that there is rainfall difference among sites can be connected to the different results found among sites.

The point should be tackled in Discussion.

- P8L17: "had grown... formed..."

- P8L21: "at the basis"

- P9L15: you mention here  $11+18=29$  individuals while earlier you mentioned 32 individuals (P8L19).

- P9L16: although the seasonal variation does not fall of the scope of the study, the fact to sample different individuals at different season can affect the assessment of ITV and should be discussed.

- P9L21: acidity = pH?

- P9L22: "content"

- P9L24: "correlations" instead of "auto-correlations"?

- P10L6-21: you should be more explicit on whether and how the measured architectural traits allow characterizing different growth trajectories and strategies.

This is more clearly explained later in the manuscript: for instance, there are variations in annual shoot length but different possible contributions of internode length and node number. You should explain whether and how these measured variation represent ecologically different strategies.

- P11: this part is quite long and technical and gives the feeling a main objective of the paper is to provide a detailed architectural analysis (but it is not the case).

I suggest to shorten it, and to include additional methodological information in Appendices.

The elements kept in main text should synthesize the assessment of growth strategies and trajectories.

- P12L1-2: "higher organizational level..." is not clear.

- P12L11-18: I don't understand why you use clustering here. Why not performing analyses of ITV across soil types based on the raw quantitative indexes or on the axes of the PCA performed on them?

It is unclear why there should necessarily be well-defined clusters.

- P12L25: why "proper" soil comparison?

- P12L26: I am not sure to understand what "ontogeny-related effects on leaf trait variation" exactly means here.

Results:

- P12L34: what "regardless" means? Do you mean "globally"?

- P13: as in M&M, the presentation of architectural analysis seems to be too much detailed. You should synthesize more the basic information reflecting the variation in growth trajectories across soil types and sites.

Additional results can be moved in Appendix.

- P13L28: what do you mean by "based on confidence intervals"?

- P13L31: expand AS here.

- P13L32: "There was no significant difference"

- P14L4: "first years"

- P14L11: what "largest range of trajectories" means?

- P14L14-18: you already talked about the growth phases before. Maybe it is possible to avoid redundancy and present it only once?

- P14L18: it is unclear for me how the "optimal" number of clusters is defined. More details would be welcome in M&M, but anyway I am not convinced that a cluster analysis is really relevant (see above). The number of clusters is not equal to the number of site x soil combination, the mapping between the two could be formally tested.

- P14L32: "in terms"

- P15L1: consider including "However, ..."

- P15L8: why not using the term "PCA" as you did before?

- P15L9-10: strange to say that an axis "cluster" individuals. An axis is related to a variation of individual scores with or without clustering.

Discussion:

- The Discussion section is quite detailed but lacks a clear logic. The connection between subsections and the global message emerging from the different aspects presented here should be made clearer.

- P15L21-23: the sentence is a bit misleading because you did not compare architectural and functional traits, but analyzed their variation with environment separately.
- P15L26: this sentence is problematic because you did not quantify BTV, so you could not formally compare your quantification of ITV to BTV in the same context. You should be more cautious on this point.
- P16L15: what is the ecological meaning of "is avoided" here?
- P16L24: not clear what "hindering their competitive abilities" means.
- P1627: the term "posit" is not appropriate here.
- P16L33-P17L2: this sentence clearly shows that eco-evolutionary dynamics cannot be addressed in this study.  
Therefore, you should not put emphasis on it in the paper (see also comments on Introduction).
- P17L14: "accruing" sounds weird.
- P17L16-19: (too) many references here.
- P17L21-23: I agree that it is an important perspective here, but you should formulate (here and/or elsewhere) more specific hypotheses on how soil variation should influence developmental trajectories. Otherwise, the point of this paragraph sounds a bit trivial.
- P17L27: you mean "community composition"?
- P17L32: "It implies"
- P17L33: "high water use efficiency" is not explicit enough.
- P18L1: unclear what "according to species soil specialization" means.  
Is it that the functional changes in forest community composition across soil types are related to the attributes of specialists occurring in each context?  
Then we need to clarify that there are still generalists that should have ITV related to these functional changes, which is connected to point (ii) on "species colonizing both FS and WS" and on the topic of the next subsection.  
The point on specialization vs. generalism needs clarification.
- P18L2: unclear what is your point about the bounded phenotypic range, isn't it obvious that it is bounded?
- P18L6: unclear what a "strong enough driver" would be.  
There is lack of some quantitative reference of the expected functional variation (based on BTV?).  
Same need of a reference on L9-10, "does not mirror the interspecific functional level composition".
- P18L7: maybe mention "leaf and wood trait", as it does not concern architectural features here.
- P18L8: "were differentiated"
- P18L11: "are generally found" is vague, and there is a single reference.

Are there still exceptions?

- P18L14: missing year for Gleason et al.

- P18L15: unclear what "self-sufficient" means?

- P18L15-18: this is a general sentence, and it is not explicit that it explains the patterns observed in present study.

- P18L19: "in contrast" or "contrasting"

- P18L19-25: what is the point about "maternal habitat", it concerns here genetically inherited trait variation?

Note my general point about the fact that distinguishing genotypic or non-genotypic ITV is beyond the scope of the study here.

- P18L26-27: this other study still concerned quite different leaf traits.

- P18L34: "non-exclusive"

- P19L6-7: "greater influence of hydric stress"

- P19L12: "stressed"

- P19L17ff: this section is about architectural variation and growth strategies, so the title should be more explicit on that.

- P19L18-19: "did not affect... drove..."

- P19L23: unclear what "carbon savings" ecologically means.

- P19L27ff: the idea of "minimizing carbon expenses" is not clear for me, as well as the idea of "optimizing".

If there is less opportunity to acquire resources, there is less biomass production, but there is not a specific mechanism minimizing carbon storage.

It can be more a constraint than a specific response.

The term "expense" is also unclear here.

The idea of these sentences should be clarified.

- P19L28: "heliophilous"

- P19L32: I guess it is rather "is not optimized".

- P19L34: "smaller stem/shoot increments"

- P201-9: these sentences are rather long and unclear.

You could only state that greater variation in both functional traits and growth strategies were found in the site where the contrast of FS and WS were greater.

- Conclusions: as previously mentioned, I would put less emphasis on the eco-evolutionary aspects, and underline the need to better understand how ITV in terms of both functional traits and growth trajectories determine species dynamics and coexistence in different environmental contexts.