Divergent causes of leaf and wood trait variation

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Leaf Economics Spectrum [1]

Production *vs.* persistence

Trade-off between fast acquisition and conservation of resources

Long lifespan
Less nutrients
High LMA

Short lifespan
More nutrients
Low LMA

Foliar tissues have the highest nutrient concentrations in plants and they represent the core traits in the leaf spectrum

Plant Economics Spectrum [3]

Is there an integrated axis of nutrient concentrations across the whole plant?

Wood Economics Spectrum [2]

Efficiency *vs.* safety

Trade-off between mechanical support and hydraulic safety

Low WD
Fast growth
Low hydraulic safety

High WD
Slow growth
High hydraulic safety

Woody tissues are the main nutrient storage in tropical forests however their position along the wood spectrum is poorly known

1 STUDY AREA

2 SAMPLING

Measurements of equivalent traits in leaf and branch

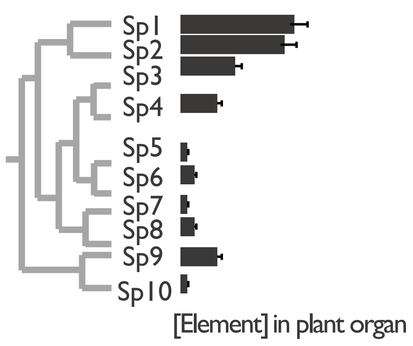
LMA, C, Ca, K, Mg, N, Na, P, WD,

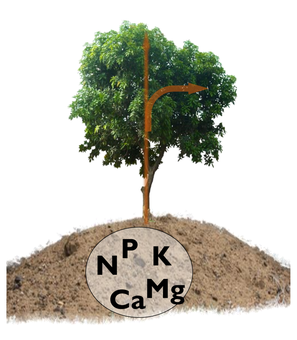
3 ANALYSIS

Multilevel models for variance partitioning

Species effect *(SE)*

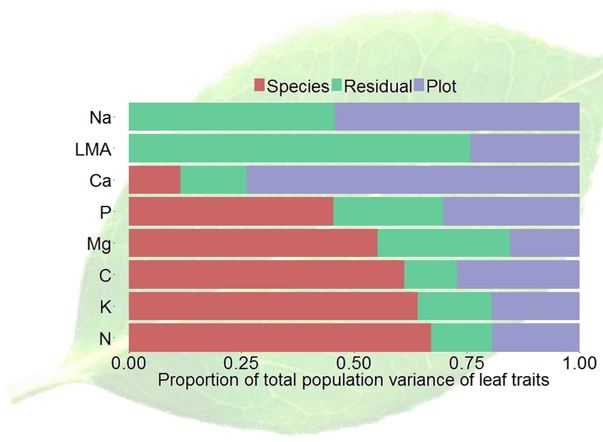
Environment effect *(EE)*





4 VARIANCE PARTITIONING

Leaf traits are mainly driven by variation among species



Most wood traits are mediated by local environmental properties (e.g. soil cation status)

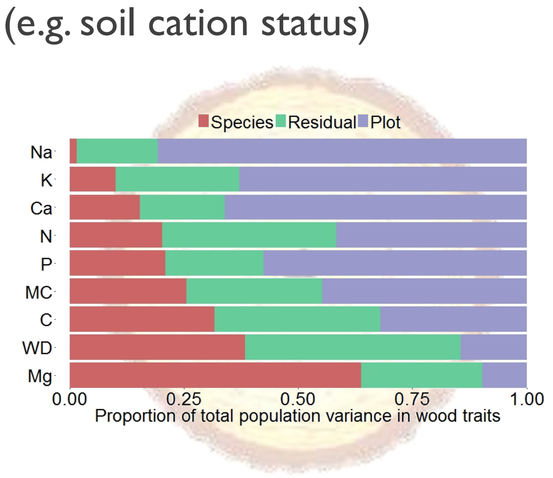


Fig.1. Variance partitioning of (left) leaf and (right) wood traits. Traits are arranged by weaker to stronger Species effect (*SE, red*). Environment effect (*EE, violet*) are shown in violet and residual (intraspecific variation + error) in green.

5 TRAIT COORDINATION

Partial coordination across organs depends on site environmental conditions

Inter-organ trade-offs seem to operate independently across species

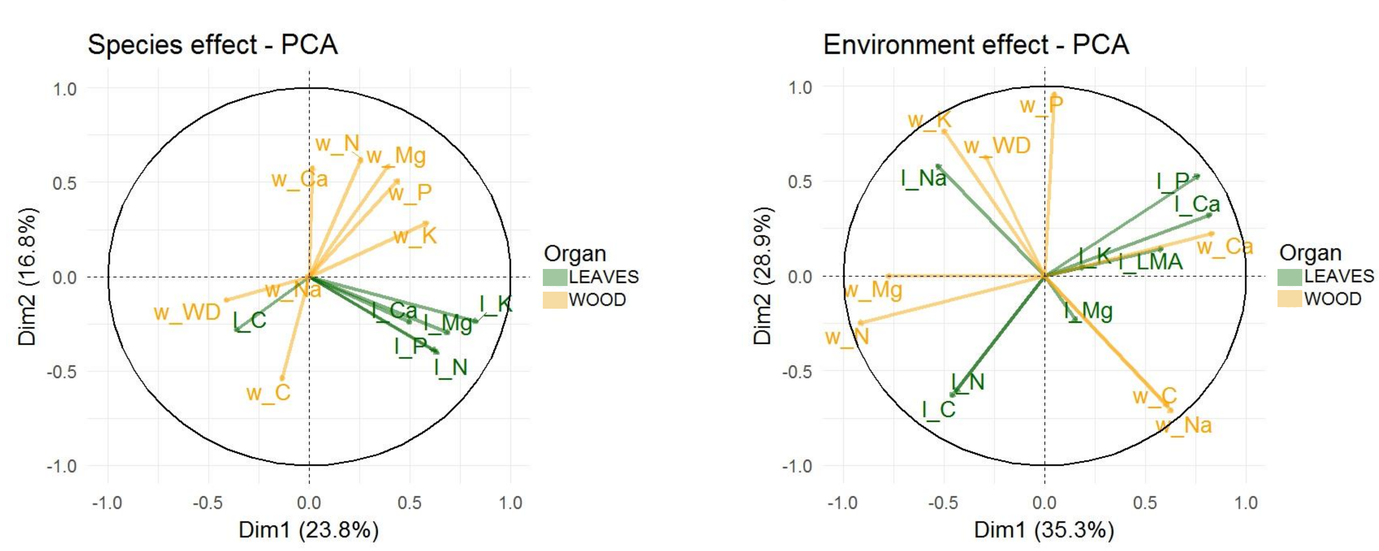


Fig 2. Coordination between leaf and wood traits explained by species variation (left) and by environmental variation (right). Traits depicting "l_" and "w_" refer to leaf and wood respectively. Arrows closer to the circle present higher variation explained by the two PCA dimensions.

References

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3. Reich, P.B. *Journal of Ecology, 102, 275-301 (2014).*
4. Patiño, S. *et al. Biogeosciences* 6, 545-5681 (20

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