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The predictive power of wood traits on species mortality change during tree development

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One foundational assumption of trait-based ecology is that functional traits can predict species demography. Yet, in general, the links between traits and demographic rates are not as strong as usually assumed. These weak associations may be due to two main reasons: the use of easy-to-measure traits as proxies of tree species performance, and the lack of consideration of size-related variations in both traits and demographic rates.

Here, we examined the associations between wood functional traits and mortality rates of 19 tree species from Eastern Amazonia. We measured eleven wood traits (i.e., structural, anatomical and chemical) in sapling, juvenile and adult wood, and related them to corresponding mortality rates.

Both sapling and juvenile mortality rates were best explained by wood specific gravity (WSG) and vessel lumen area (V_a), while adult mortality was predicted only by V_a . On the other hand, we found that the predictive power of wood trait on mortality rates decreased from saplings to adults.

These results indicate that the associations between traits and mortality rates can change during tree development, and also that hard-to-measure traits, such as wood chemical or anatomical traits, may be better predictors mortality rates than WSG. Our findings are important to expand our knowledge on tree life-history variations and community dynamics in tropical forests.