Summary

Introduction

Functional Ecology → Functional Traits

From Hutchinson definition of niche (Hutchinson, 1957), Violle and Jiang (2009) extended the definition to a multi-dimensional volume, called the "functional space" ; it is an n-dimensional space defined by measures on n traits. In such a space an individual is defined by all the values of its traits, each one on a distinct axis; a species niche would then be the average of trait values of all individuals of the species. In three dimensions, the species niche would be the volume encompassing all its individuals; the center of gravity of the cloud would be the species average trait values, defining niche position, while the shape of the general "cloud" would define niche breadth, as suggested by Violle and Jiang (2009).

The concept of functional niche helps understand community ecology and assemblage. In this view, two species would coexist if their functional volumes would not intersect. The high number of dimensions, i.e. traits, of the functional "hypervolume" as called by **?** makes it difficult to apprehend: the volume may have "holes" where some trait combinations are impossible. An individual is located by its own trait values or relatively to its species average. The distance from species average translates the intra-specific variability in the species.

Species functional niche reflects their ecological strategies. For plants, four traits have been identified to underline distinct strategies: the classical Leaf Area - Height - Seed mass triangle, suggested by **?**.

Diameter Growth & Tropical Forests → French Guiana Context

We assume that species niche do not evolve dramatically over time, otherwise we would expect species to change their traits continuously. As there is no such thing as "darwinian demon" that would be perfectly fit to its environment **?**. Resource and energy trade-offs limit the capacity of species to evolve **?**.

Several growth models created, used → estimate growth using measured traits

In tree growth model, intra-specific variability is rarely considered, i.e. all individuals of the same species share the average species trait value.

However, there is trait variability, intra-specific variability. What importance does it have? To what extent is it important to consider it?

Being different from mean species trait → importance?

Materials and Methods

Data Provenance

Growth Data

The nine plots used through this article, Guyafor network, plots, French Guiana, map. Several sites Longitudinal data.

Followed over tens of years. Diameters were measured at breast height (1.3m), during the following period we had Diameter at Breast Height (DBH) values for each tree.

Due to various inconsistency of followed year. Choose a common time period between plots. To estimate Annual Growth Rate (AGR), we regressed DBH over years, taking the slope of the regression as the AGR.

Trait Data

Bridge database, traits measured in Baraloto, (Baraloto et al., 2010a,b). Selected traits from wood and leaf spectrum economics.

Growth model

Linear mixed-model explaining annual growth rate. With plot and species random effect.

Extracted residuals from above model.

Data analysis

All data analyses were made using R Core Team (2015), plots were made with Wickham (2009). We fit mixed-models with "lme4" R package (Bates et al., 2014) and computed adapted R-squared for mixed-models (Nakagawa and Schielzeth, 2013) implemented in "MuMIn" R package (Bartoń, 2015).

Results

Discussion

Authors Contributions and Acknowledgments

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