

Inherent and environmental patterns in biomass allocation and allometry among higher plants

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It is well-known that plants may adjust the distribution of biomass over leaves, stems and roots depending on environmental conditions. It is also clear that size is an important factor as well. However, good quantitative insights are lacking. In this talk I analyse biomass allocation patterns to leaves, stems and roots of herbs and woody species. A database was compiled with ~11.000 records of leaf, stem and root biomass for ~1200 species. First, I'll derive general dose-response curves that describe the relationship between biomass allocation and the 12 most important a-biotic environmental factors and compare them with the changes in leaf, stem and root morphology. Second, I'll focus on allometric relationships between the various organs and test to what extent they comply with models like that for Metabolic Scaling Theory, where the slope of the log-log relationship between leaf and root biomass is expected to have a value of $\frac{3}{4}$. Third, I analyse how leaf, stem and root mass fractions change as a function of total plant size. This offers a great opportunity to test to what extent there are systematic differences in allocation patterns related to phylogeny (e.g. Gymnosperms vs. Angiosperms, grasses vs. herbaceous dicots) and functional group (e.g. deciduous vs. evergreens).

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