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Trait covariation: Structural and functional relationships in plant ecology

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P62 Root traits across environmental gradients in Mediterranean woody communities: are they aligned along a single acquisition-conservation axis?

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Root traits play a critical role in plant resource-use strategies and ecosystem functioning, but there is great controversy regarding their identity and functionality in different dimensions of belowground functional variation. Here, we explored the level of covariation among a suite of key root traits as well as between them and two aboveground parameters related with plant function (leaf nutrients and growth rate). We also evaluated whether these patterns of trait covariation were consistent at different spatial scales and organisational levels. We collected fine roots traits of 534 individuals (of 80 woody species), sampled along a wide regional range of environmental conditions in southern Spain. In general, strong correlations among the root morphological traits (except root mean diameter) were found, as well as between them and the aboveground parameters, supporting the existence of a 'root economics spectrum'. This syndrome of root trait covariation was consistent at the different spatial scales and organisational levels. Soil nutrients and water availability were the main drivers of this root trait variation. Our results indicate that root trait variation is primarily aligned along a leading dimension related to resource economics. However, the distinct pattern of root diameter may indicate a multidimensionality of belowground traits that needs to be explored in greater depth.

P63 An influential couple: The relationship of J_{max} and V_{cmax} in photosynthetic responses to elevated CO_2

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Predictive understanding of the future terrestrial carbon sink remains elusive and is manifest in the wide variability in projections from earth system models of CO_2 fertilisation. While many biogeochemical and ecological processes contribute to this wide variability in model projections, models are highly sensitive to chloroplast-scale photosynthetic traits. For this reason, it is hypothesised that chloroplast-scale photosynthesis is an important driver of variability in model projections and that identifying drivers of variability in leaf-scale photosynthesis modelling is a needed endeavor. To investigate drivers of variability we present a novel modelling framework—the multi-assumption architecture and testbed (MAAT)—that can explicitly evaluate both parameter variability and multiple hypotheses for each process represented by the model. Commonly used by models are the different electron transport functions and limiting rate function posed by Farquhar et al., (1980) and Collatz et al., (1991). We use process and trait sensitivity analysis to show that the covariance between J_{max} and V_{cmax} is the most influential trait in simulating the response of photosynthetic carbon assimilation to CO_2. However, the covariance between J_{max} and V_{cmax} was not the most influential variable in earth-system models suggesting that a key trait covariance is being overlooked.