

Seeing the canopy for the leaves – foliar functional traits covary with leaf angle distribution



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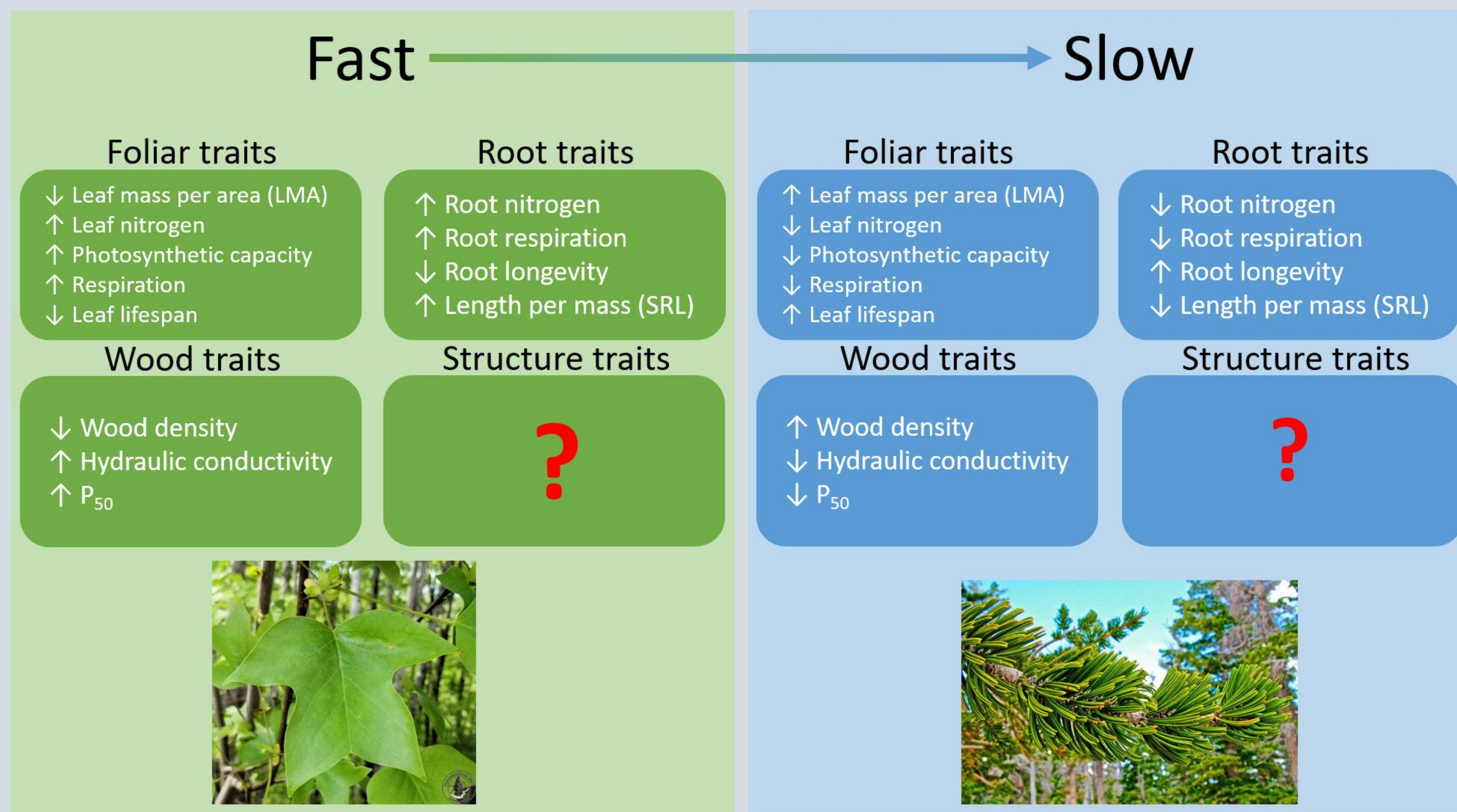
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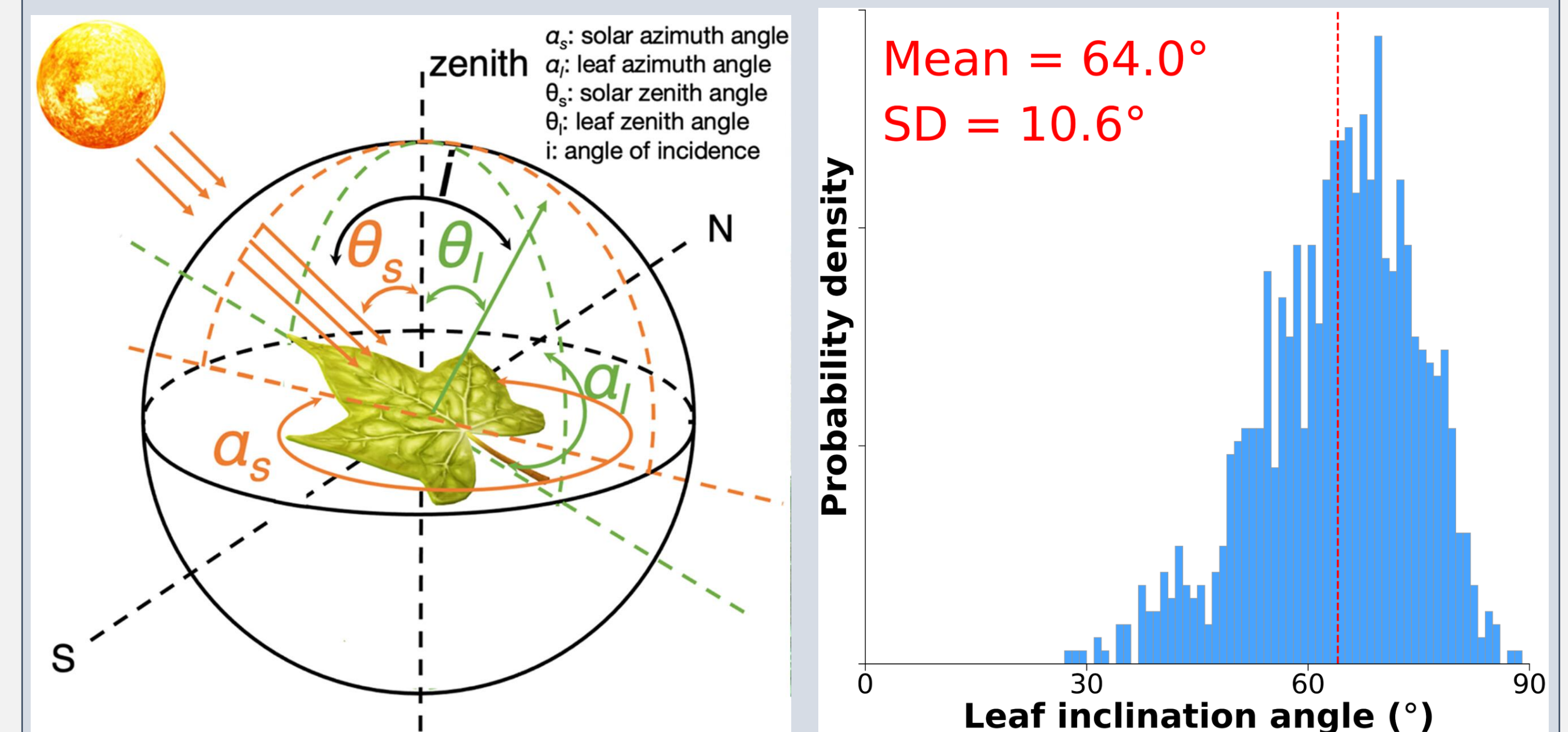
Do plants coordinate **structure** and **function**?

An integrative perspective of **canopy structure** and **canopy function**



1. Plant functional traits are any morpho-physio-phenological traits which impact fitness indirectly via their effects on growth, survival, and reproduction (Violle *et al.*, 2007).
2. Trait assemblages reflect evolutionary strategies that fall along a “fast-slow” spectrum, where light competition and growth is prioritized on one end, while survival and defense is prioritized on the other.
3. Aspects of canopy structure and leaf arrangement have not been considered in this paradigm.
4. We investigated how components of canopy structure, specifically leaf angle distribution, might be related to foliar functional trait assemblages.
5. We made 3D reconstructions of individual tree canopies using TLS, and collected top-of-canopy foliar traits for each tree, at two sites in Virginia (Milton Airfield, SCBI ForestGEO).

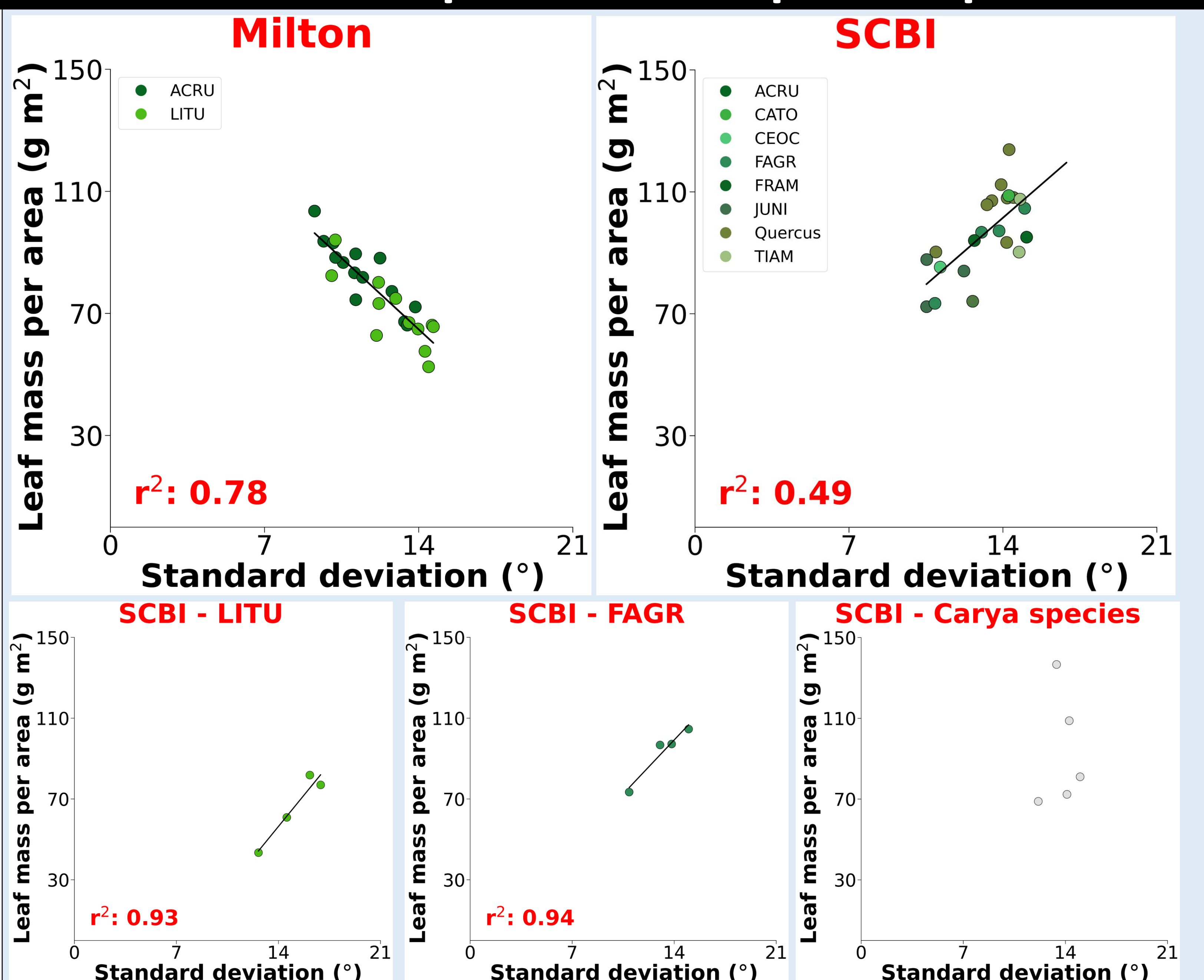
Leaf angle distribution (LAD) – a novel metric of **canopy structure**.



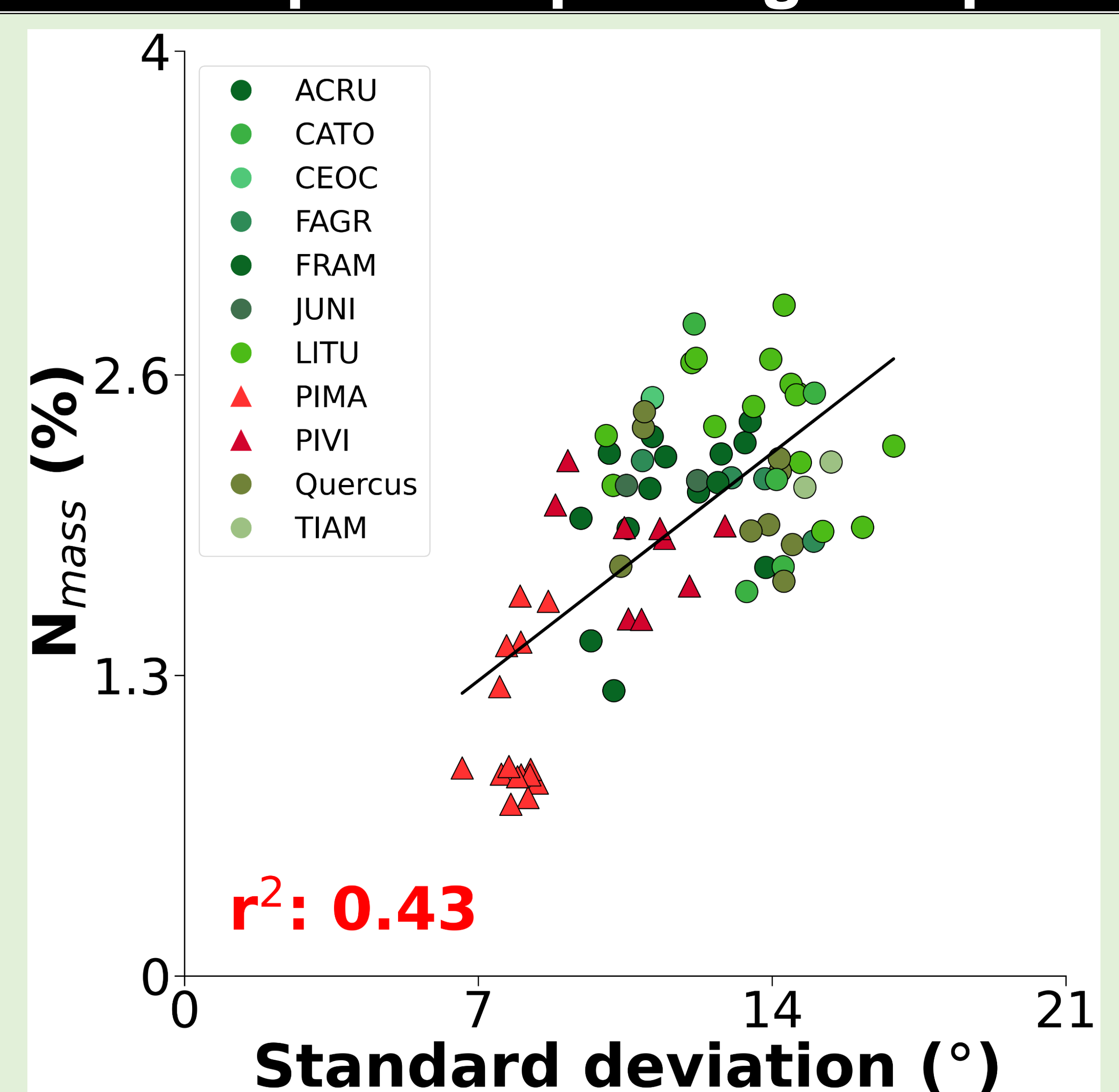
1. Leaf inclination angle is the angle between the leaf normal and zenith.
2. High-resolution point cloud data from terrestrial laser scanning (TLS) can be used to estimate LAD.
3. LAD can be summarized using the mean and standard deviation of all leaves in a canopy.



LAD tracks with intraspecific variability in **LMA** – this relationship is site and species specific



LAD affects **foliar nitrogen** – a generalized relationship when pooling all species.



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