

Linking microbial communities to soil carbon cycling under anthropogenic change using a trait-based framework

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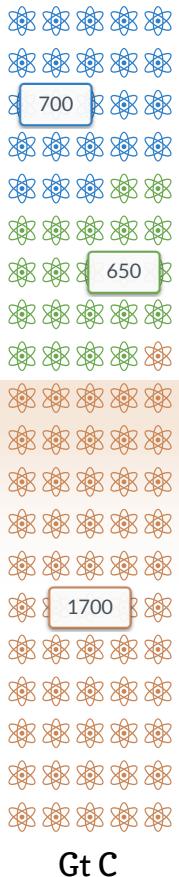
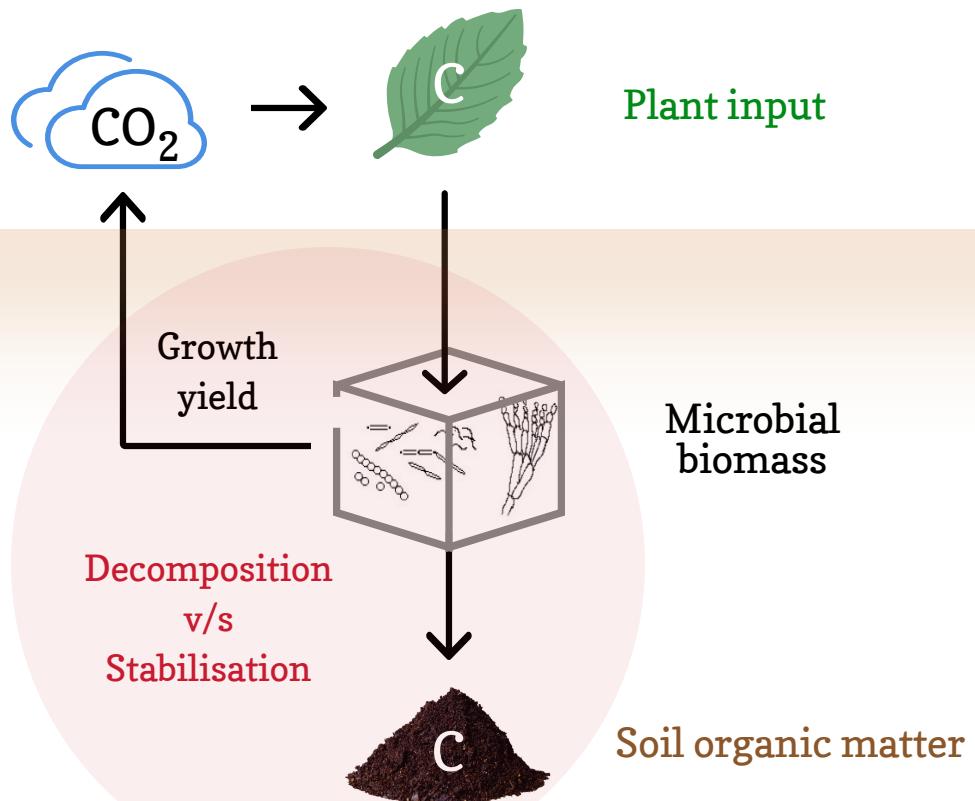


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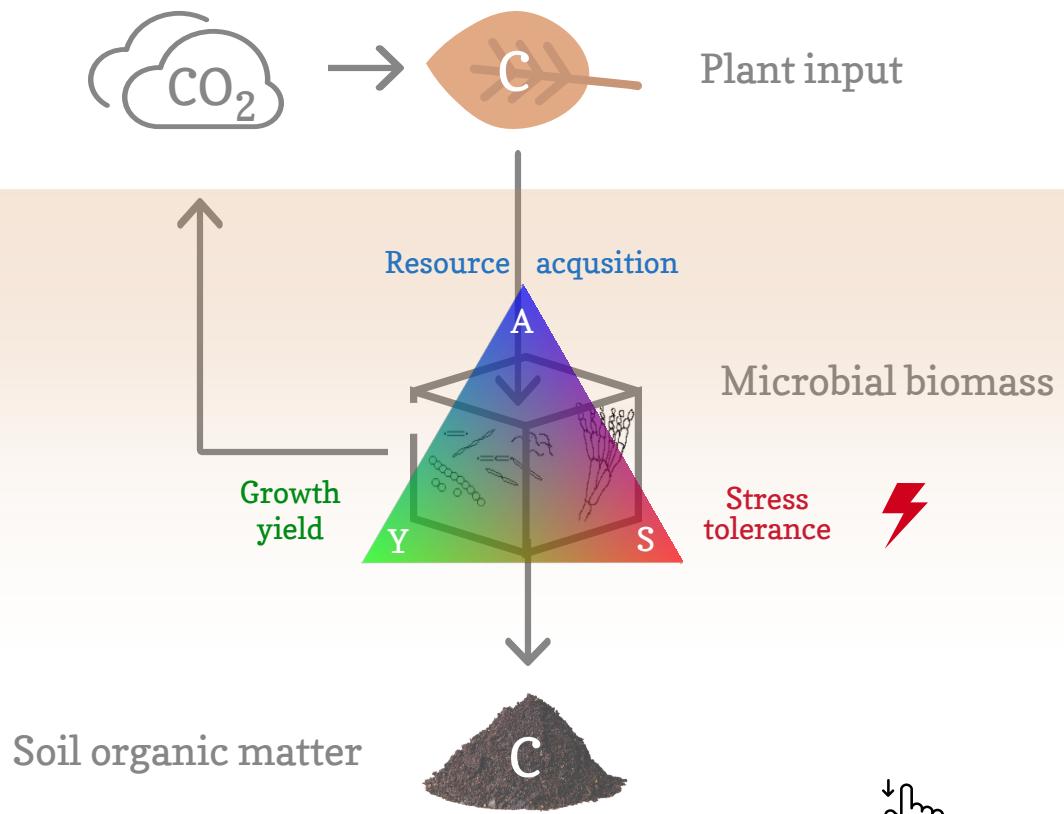


Microbial
Biogeochemistry
Lab

Microbes are key players in terrestrial carbon cycle

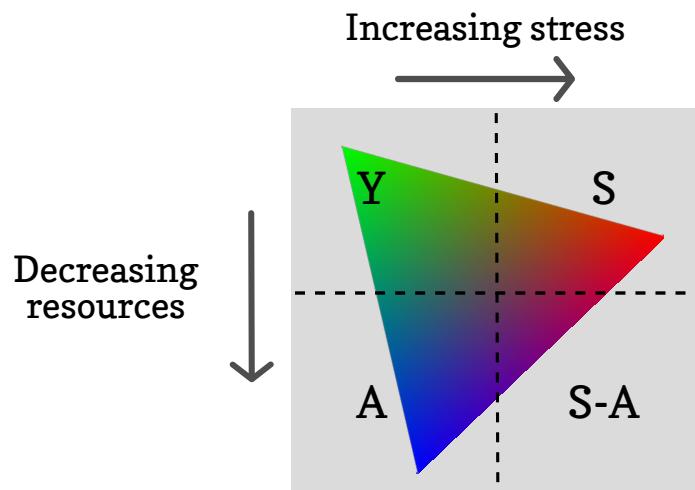
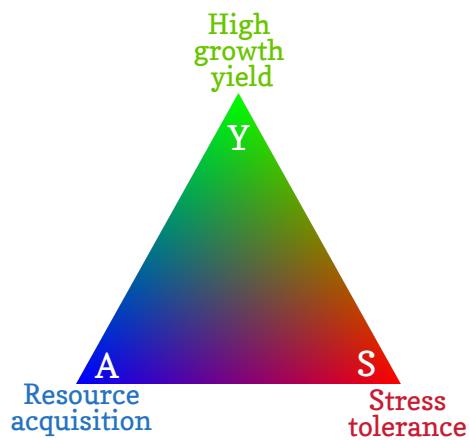


Microbial framework to infer life history strategies



↓ Click for link

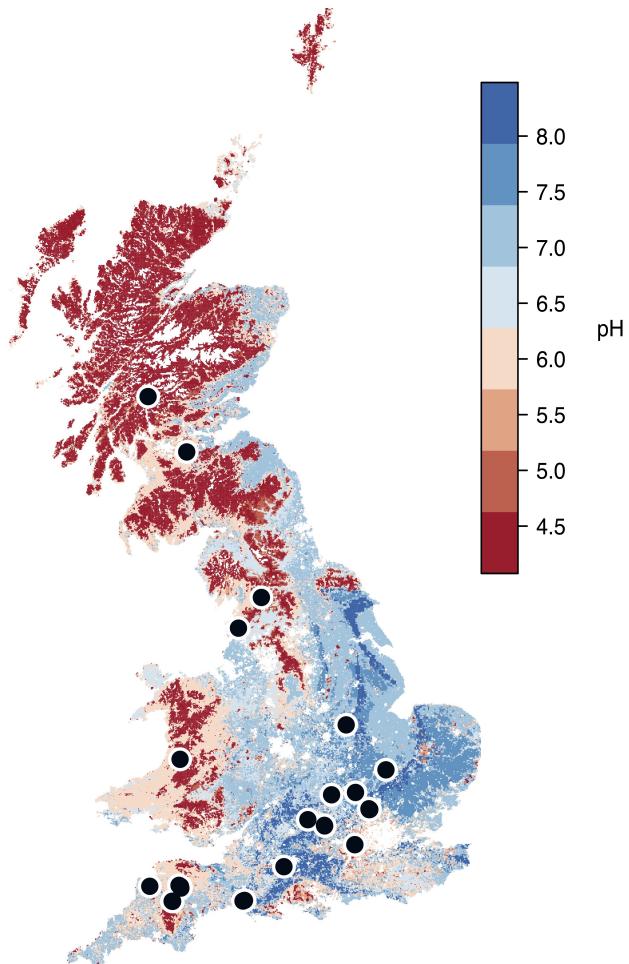
Y-A-S framework to infer life history strategies



Microbial traits across land use gradients

56 sites with varying land use

3 replicates at each site



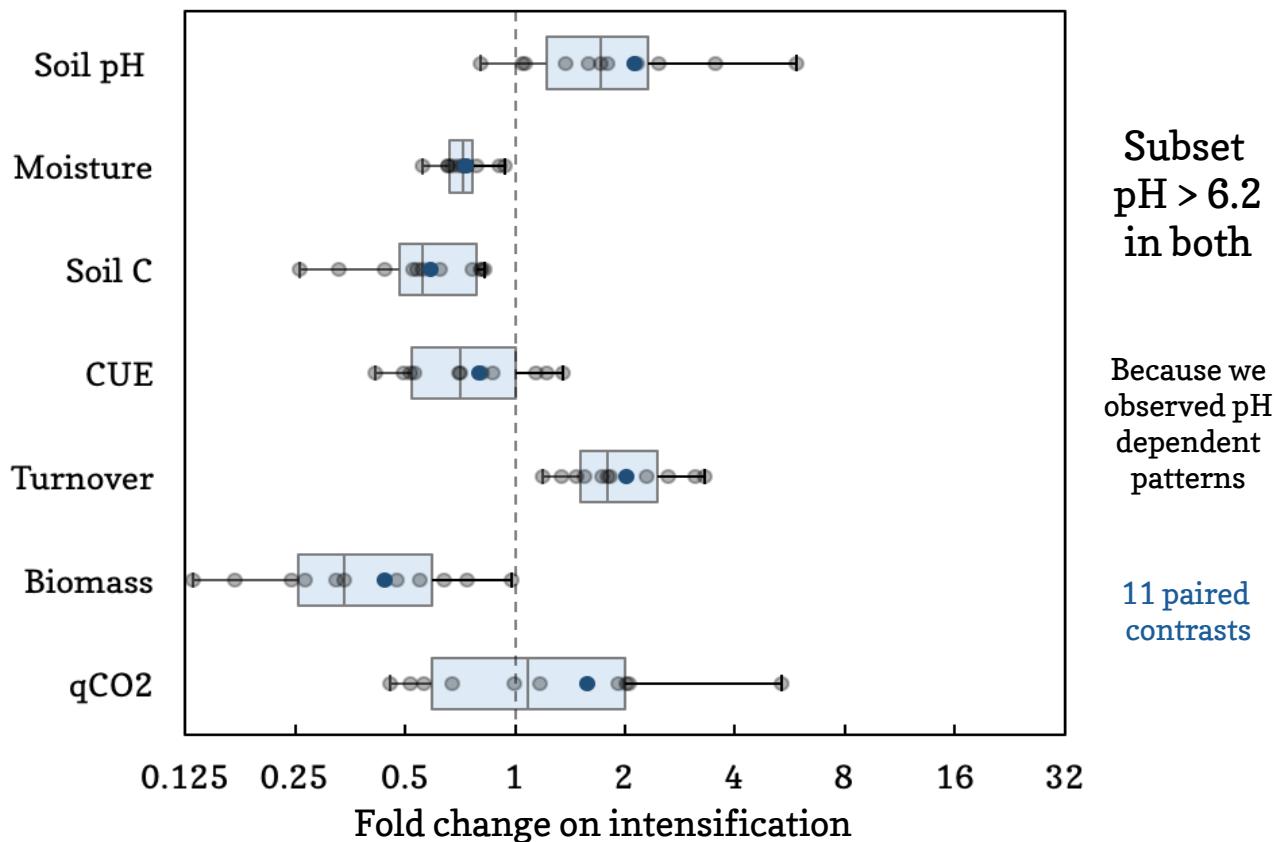
Centre for
Ecology & Hydrology
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Malik et al., 2018, Nature Communications

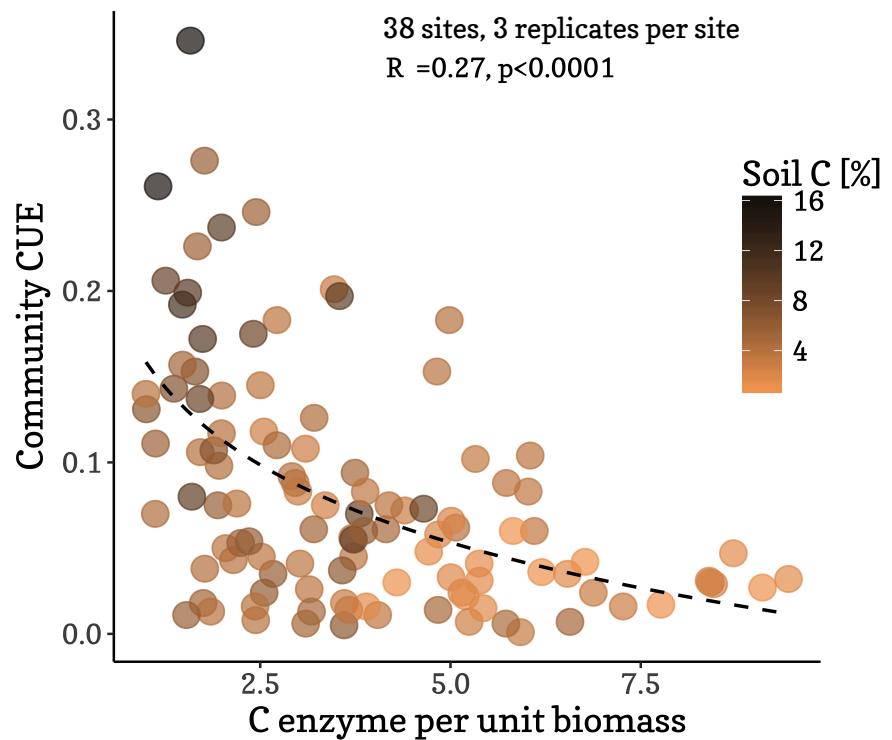
Microbial physiological response to land use intensification



Microbial ecophysiology can be linked to soil C



Increased enzyme investment was linked to reduced yield



Strategies:

High growth yield

Resource acquisition

Stress tolerance

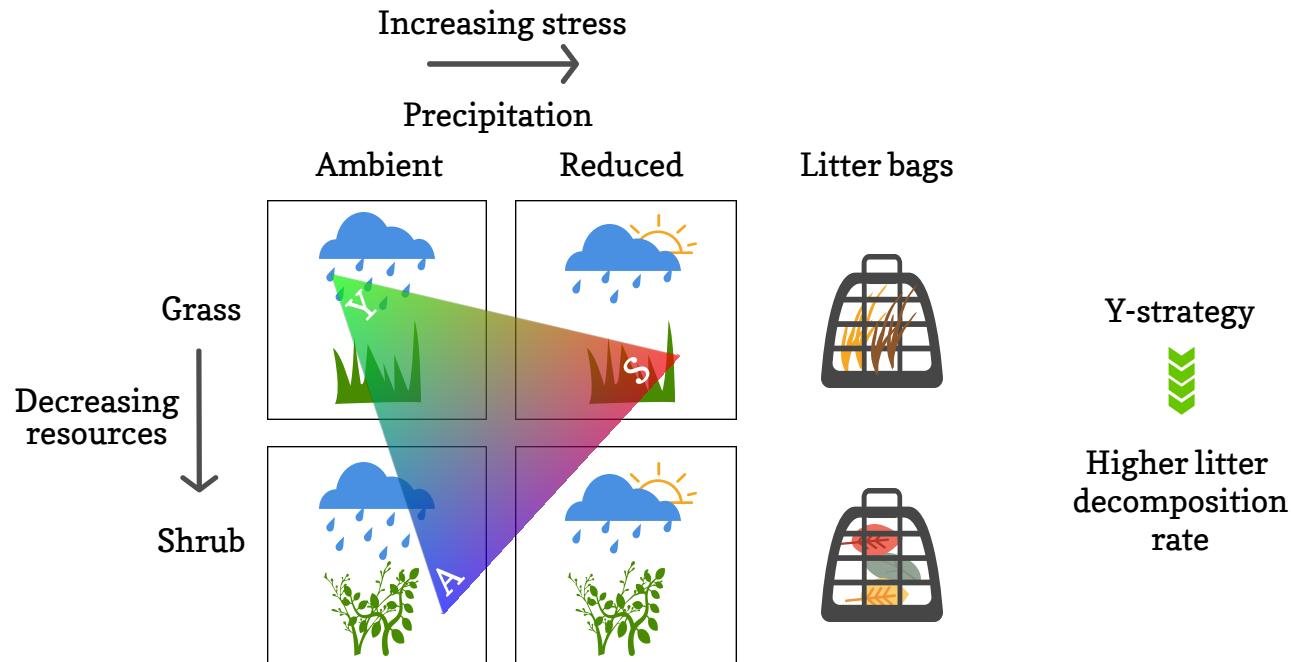


Microbial traits across a precipitation gradient



Loma Ridge Global Change Experiment, Southern California

Impact of drought on microbial traits and decomposition



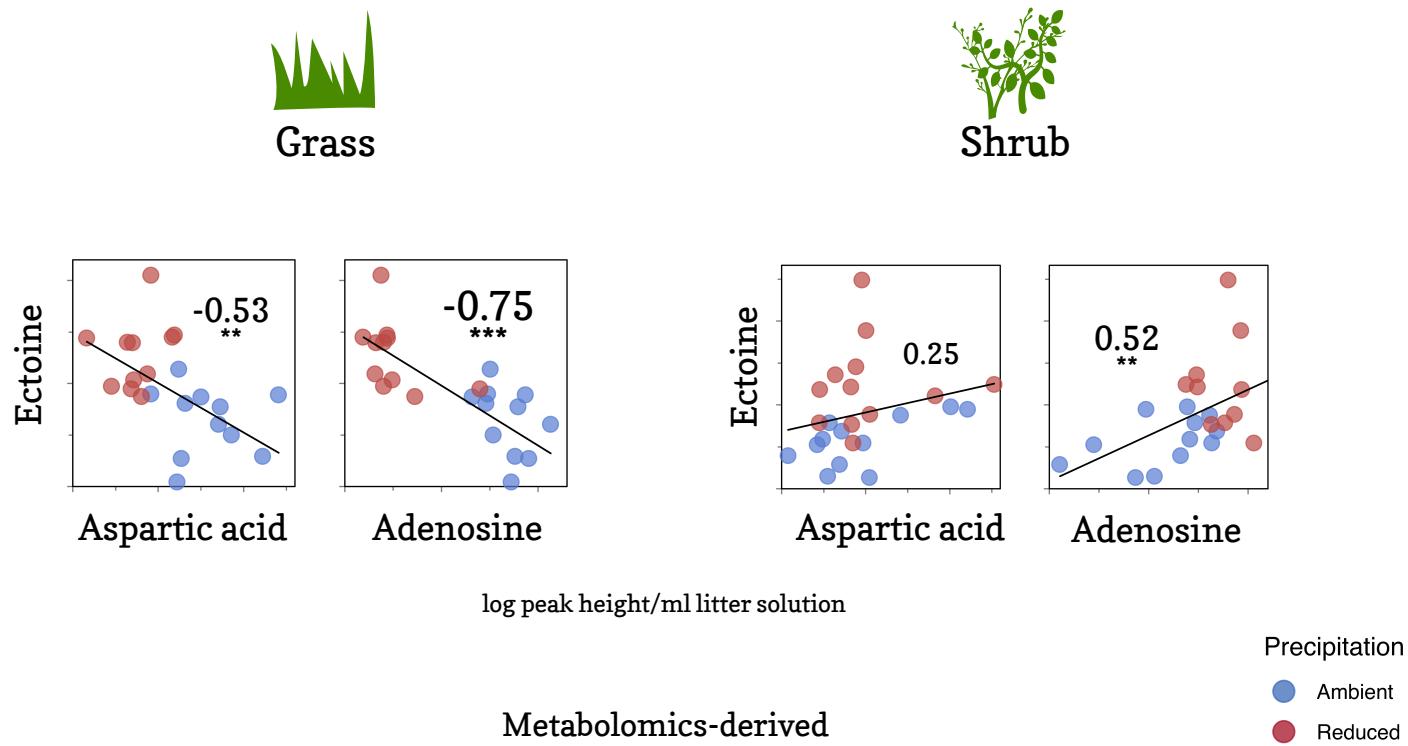
Strategies:

High growth yield

Resource acquisition

Stress tolerance

Microbial strategies for drought response



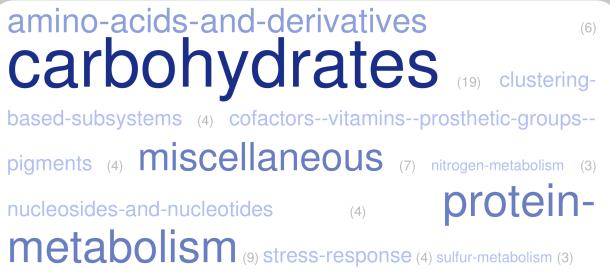
Lawrence Berkeley
National Laboratory



Grass



Ambient
▼



Malik et al., BioRxiv, 2019
(accepted, ISME Journal)

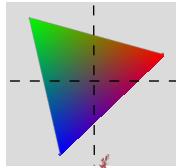
Trascriptomics-derived
Word size represents the frequency of
transcripts enriched in either treatments

amino-acids-and-derivatives
carbohydrates
wall-and-capsule
clustering-based-subsystems
cofactors
vitamins--prosthetic-groups--
pigments (12) dna-metabolism (10) fatty-acids--lipids--and-isoprenoids (10) iron-acquisition-and-metabolism (15)
membrane-transport (35)
metabolism-of-aromatic-compounds (5)
miscellaneous (28) motility-and-chemotaxis (5) nucleosides-and-nucleotides (4) phosphorus-metabolism (3) potassium-metabolism (3)
protein-metabolism (9) regulation-and-cell-signaling (8) rna-respiration (10) stress-virulence--
metabolism (16) disease-and-defense (10)
response (23) sulfur-metabolism (3)

Keep-home message



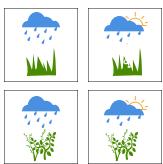
We define key microbial trait-based life history strategies



We empirically validated the Y-A-S framework



Carbon storage through increased microbial growth yield



Trade-offs between drought stress tolerance & growth yield

#natureonourdoorstep



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