Technical University of Munich

Arbuscular mycorrhiza understory alters AM fungal community composition with little effect on other soil fungi in an ectomycorrhizal-dominated forest

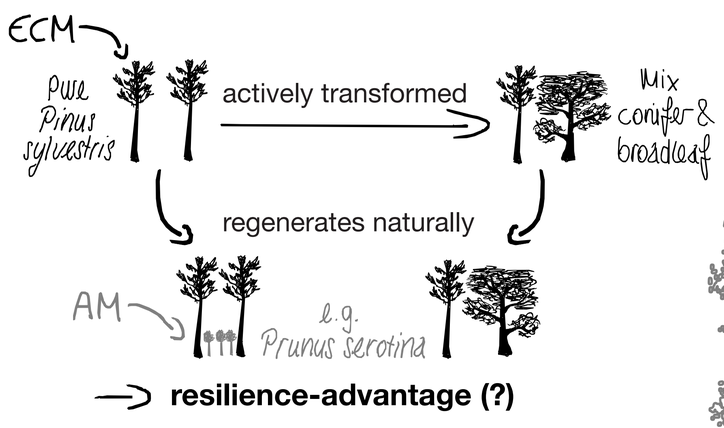
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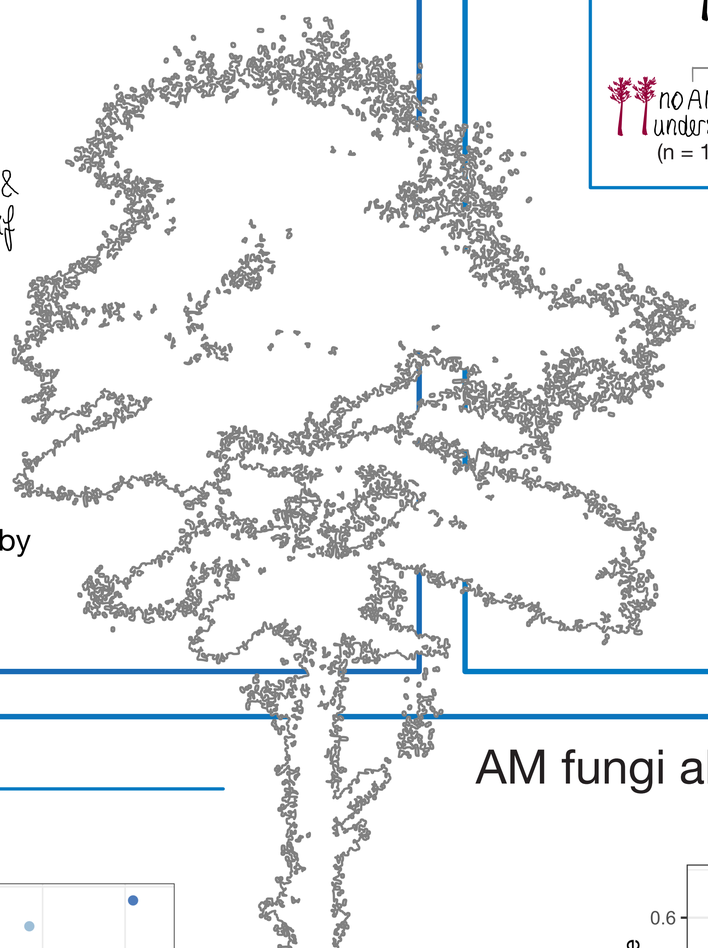
[1]Technical University of Munich (Germany), [2]Senckenberg Museum of Natural History Görlitz (Germany), [3]McGill University (Canada), [4]University of Göttingen (Germany)

INTRODUCTION:

In European forests:
- ECM dominant, AM less prevalent
- Climate change shifts forest structure and composition

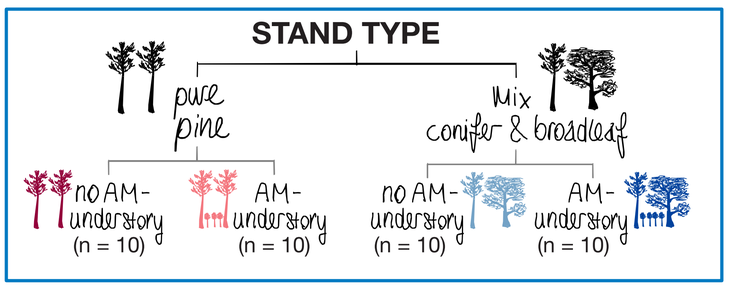
In northern Germany:





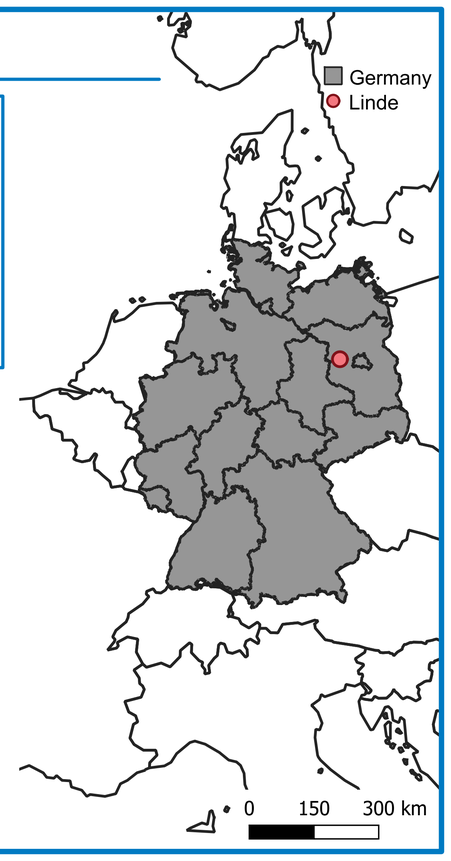
BUT: How are (AM) fungal communities influenced by
(1) AM understory
(2) Forest structure (and microclimate)

METHODS:



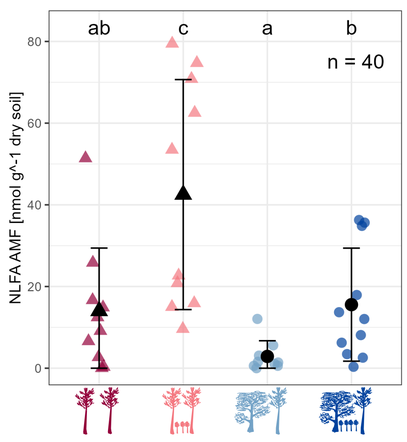
Explanatory variables:
- Forest structure from mobile laser scanning and imaging
- Microclimate (temperature, moisture)
- Soil parameters (carbon, nitrogen, pH)

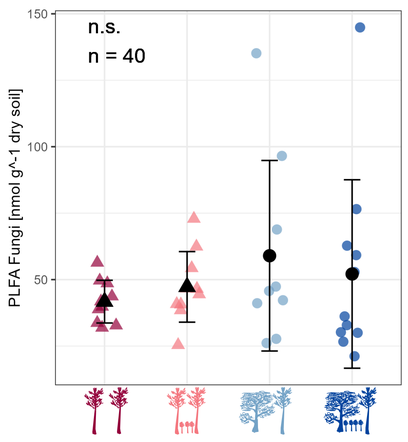
Microbial community:
- DNA metabarcoding (ITS2, 16S and AM fungi-specific 18S rRNA region)
- neutral and phospholipid fatty acid analysis (NLFA, PLFA)



RESULTS:

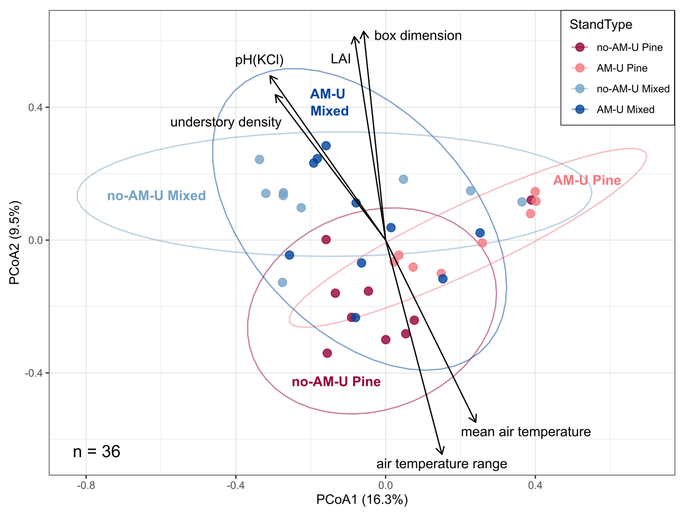
Fungal biomass:





With AM trees:
- higher AM fungal NLFA concentrations
- no change in total fungal PLFA

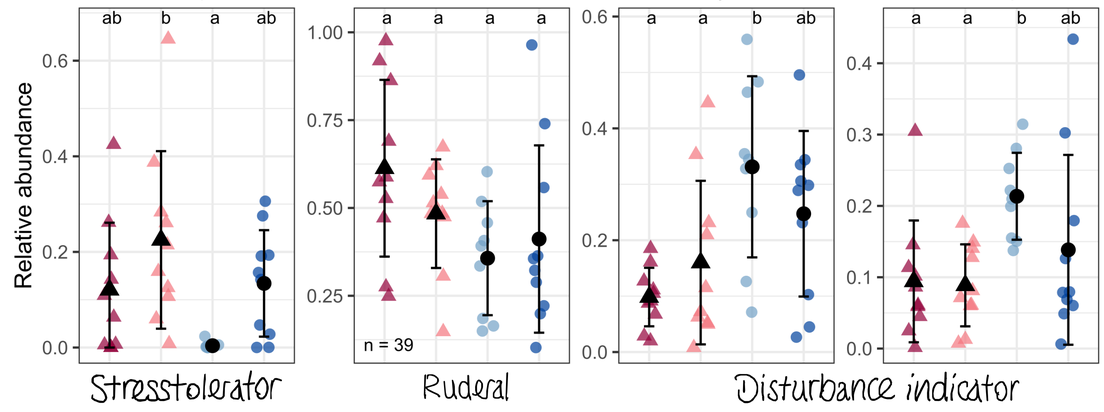
Fungi composition:



With AM trees:
- no significant changes (PERMANOVA > 0.05)
- α-Div gain, β-Div loss (Hill numbers)

→ Community composition is influenced by **forest structure**, air temperature and pH

AM fungi abundances:



In trees: α-Div gain (Hill q2, rare species)

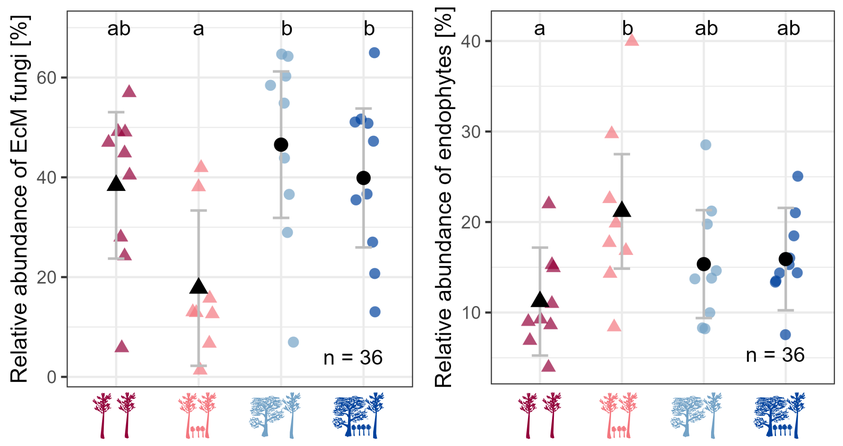
With AM trees:
- Overall α-& β-Div loss (Hill q0, q1)
- Trend to more stress tolerators, less ruderals and disturbance indicators

Other symbiotic fungi abundances:

With AM trees:

Trend:
- less ECM fungi
- more root endophytes

Effect stronger in trees than trees



CONCLUSION:

With AM trees:
- higher AM fungal biomass
- AM fungal succession: Ruderal → Stress tolerator
- functional diversification could enhance forest resilience

→ Total fungal community is not restructured, **but shaped by forest structure**, microclimate and soil parameters

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