

Long-term irrigation affects root growth and decomposition in a drought stressed Alpine Scots pine forest

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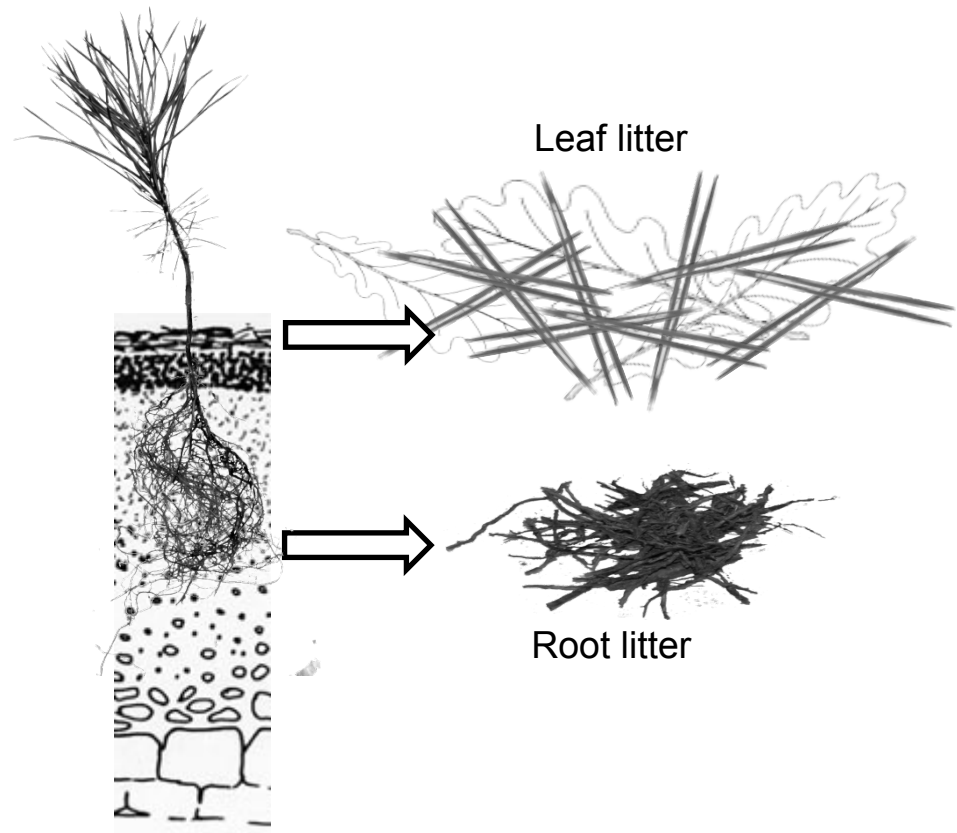
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Is soil carbon mostly root carbon? (Rasse *et al.*, 2005)

Differences leaf litter vs. root litter:

- Lignin amount
- Cutin / Suberin
- Position / exposure



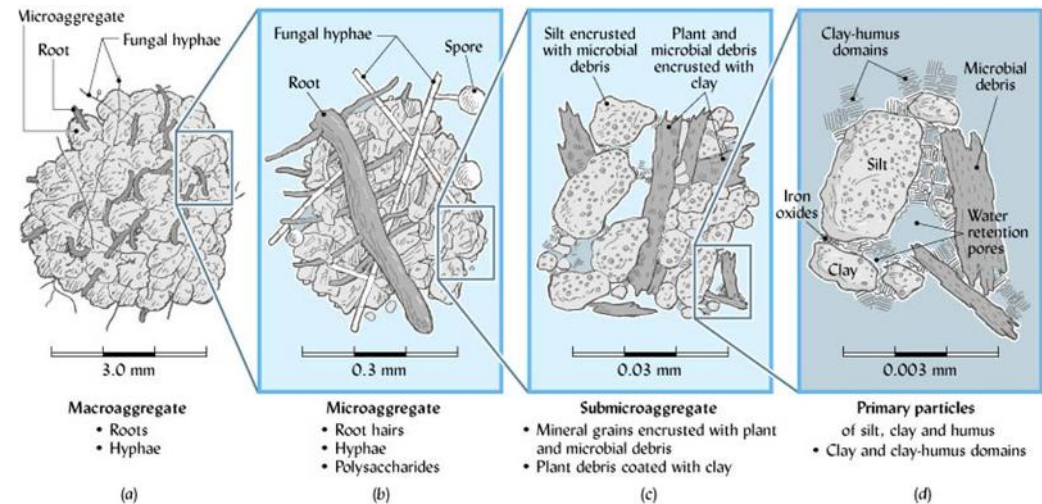
What determines the decomposition in soil (Prescott, 2010)

Abiotic factors

- Water availability
- Exposure / Connectivity
- Temperature
- Composition of Litter (Lignin/Nitrogen)

Biotic factors

- Microbial decomposer community



Brady & Weil (2010) Elements of the nature and properties of soils

Research questions

How do roots acclimate to shifts in water availability?

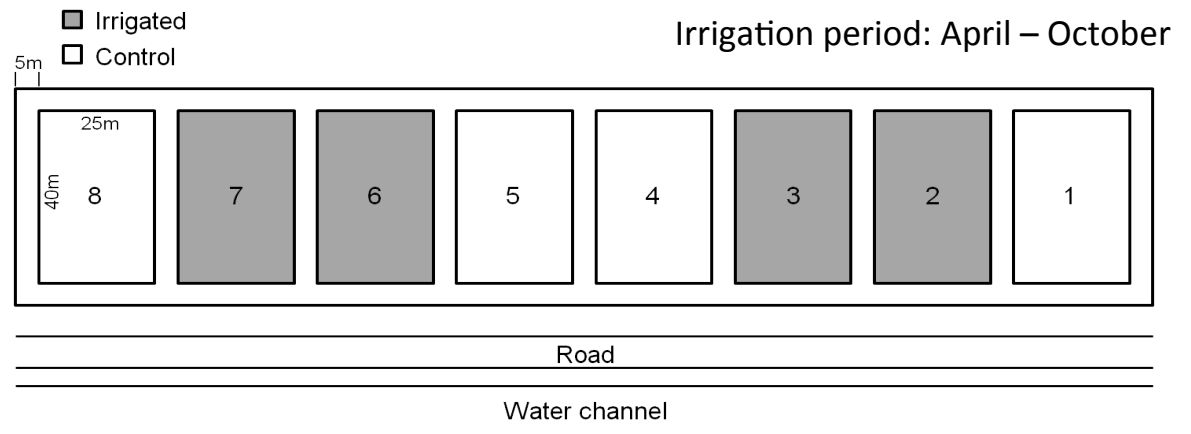
Effects of litter quality (Lignin content) on decomposition

Change in microbial community and identification of root decomposers

Study design

Field experiment:

- Root assessment
- Litterbag study



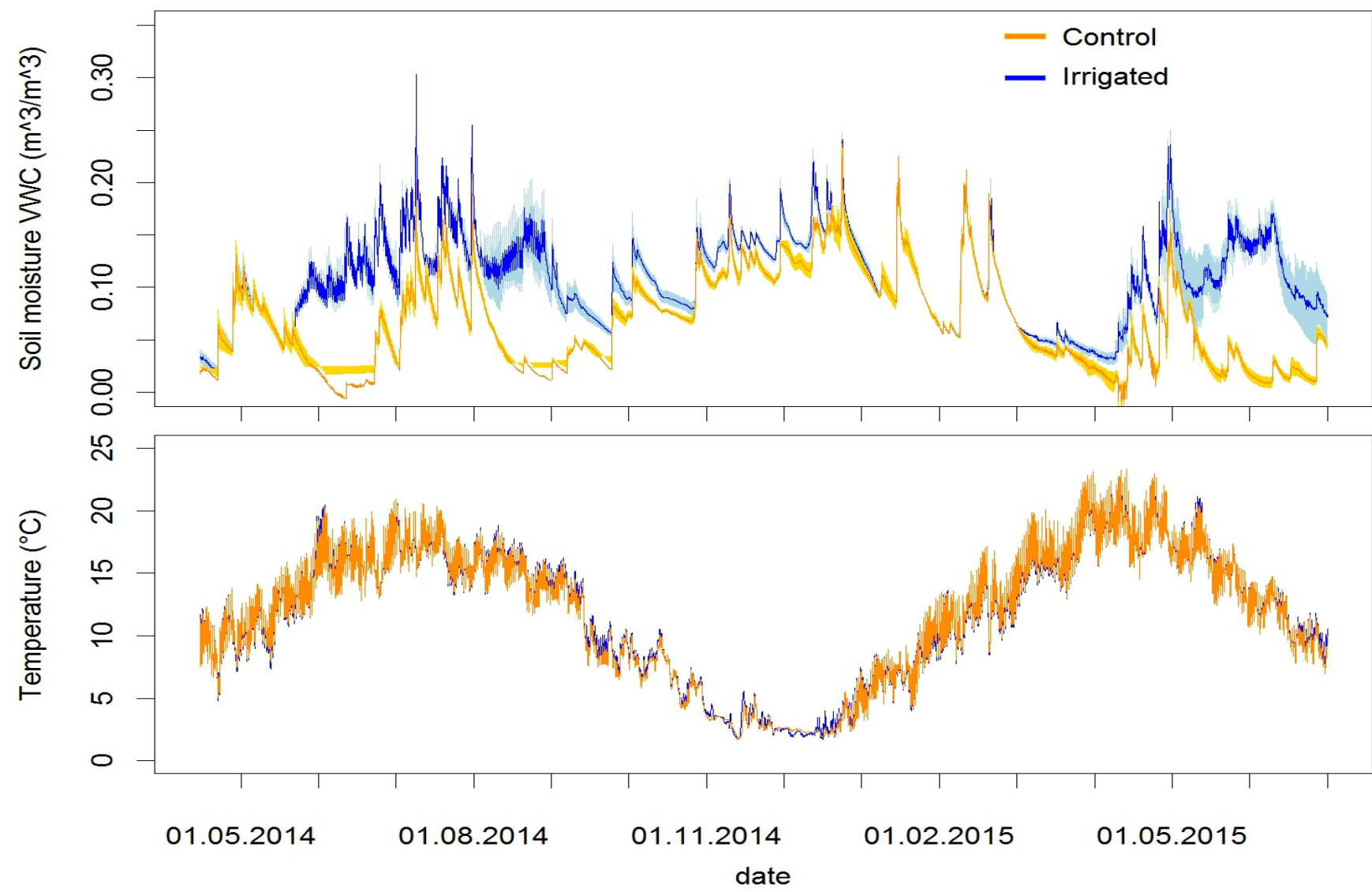
Study design

Field experiment:

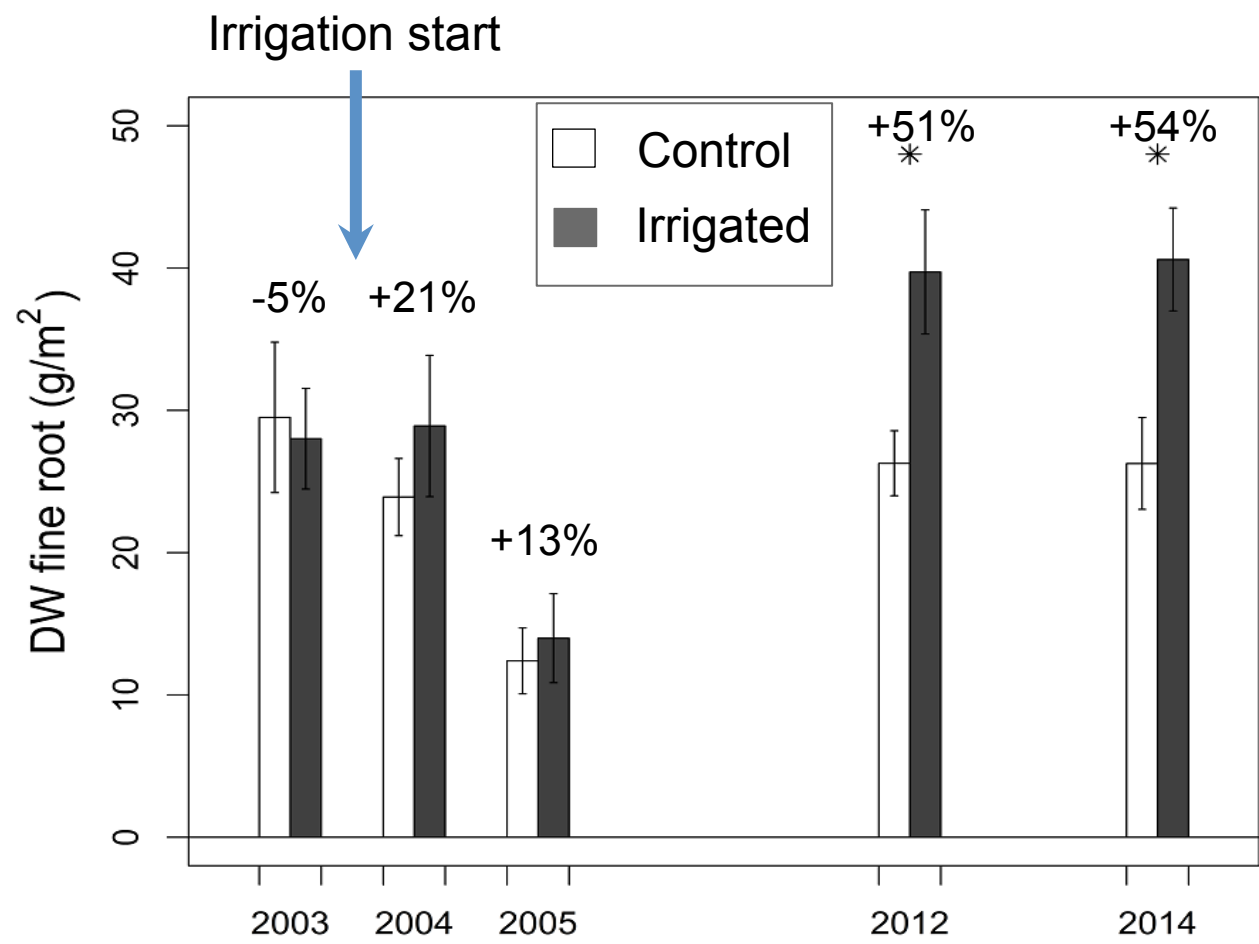
- Root ass
- Litterbag



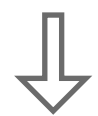
Soil moisture + Temperature measured at litterbag zone (5cm depth)



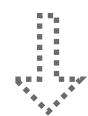
Root assessment - Pine fine root dry weight



Strong increase in
carbon uptake

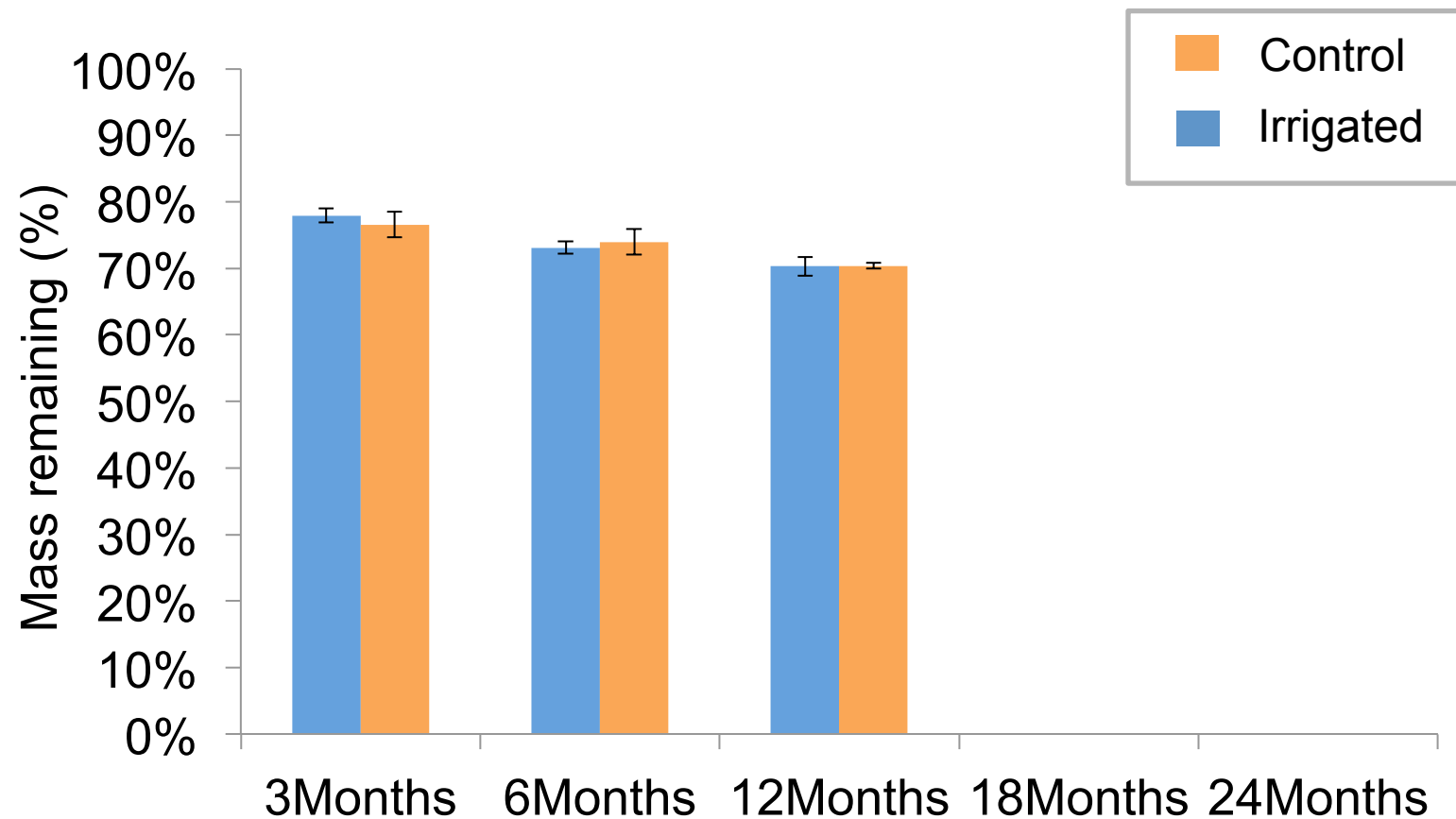


Dilution of Nitrogen
in bulk root material



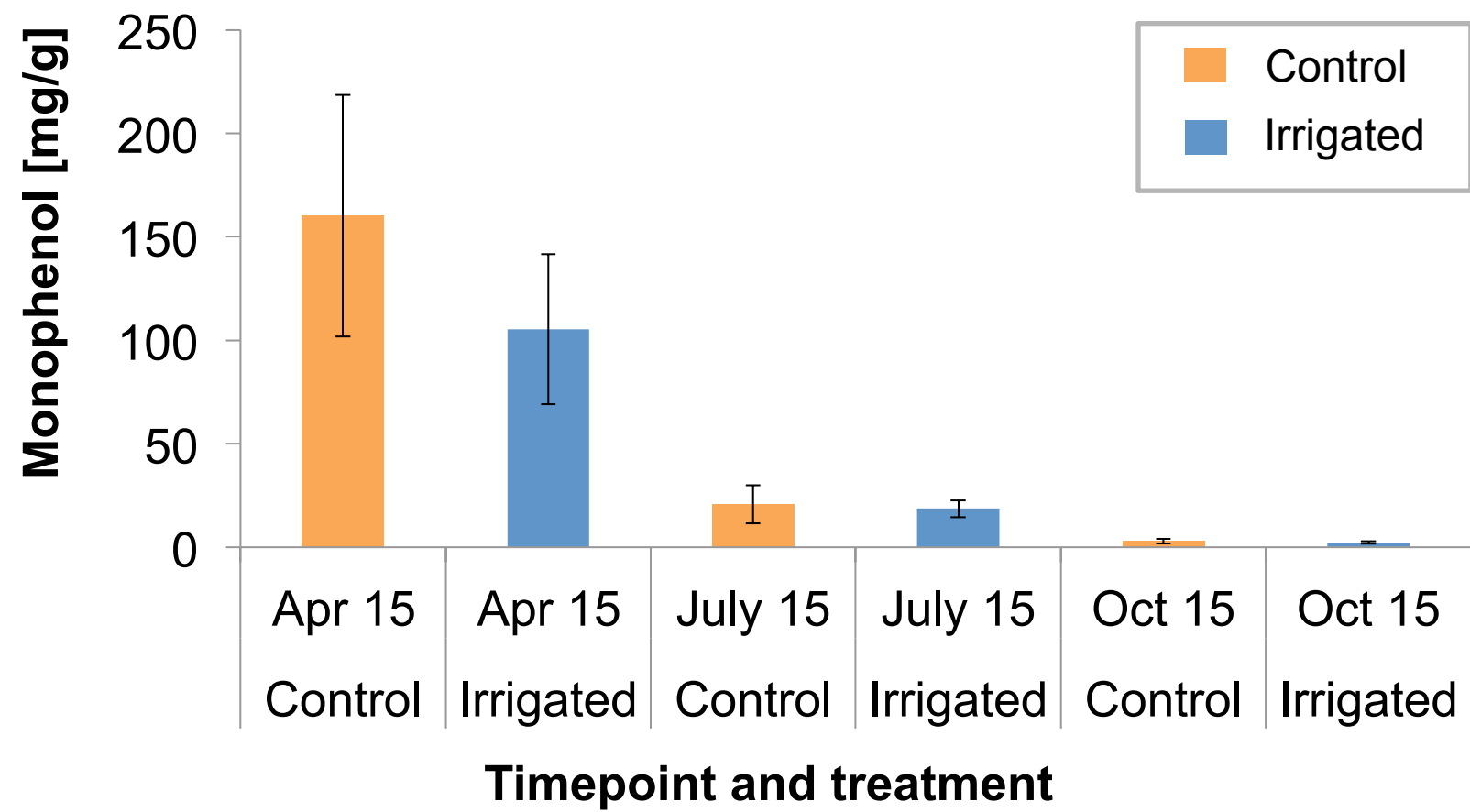
Nitrogen limiting
conditions possible

Litter decomposition

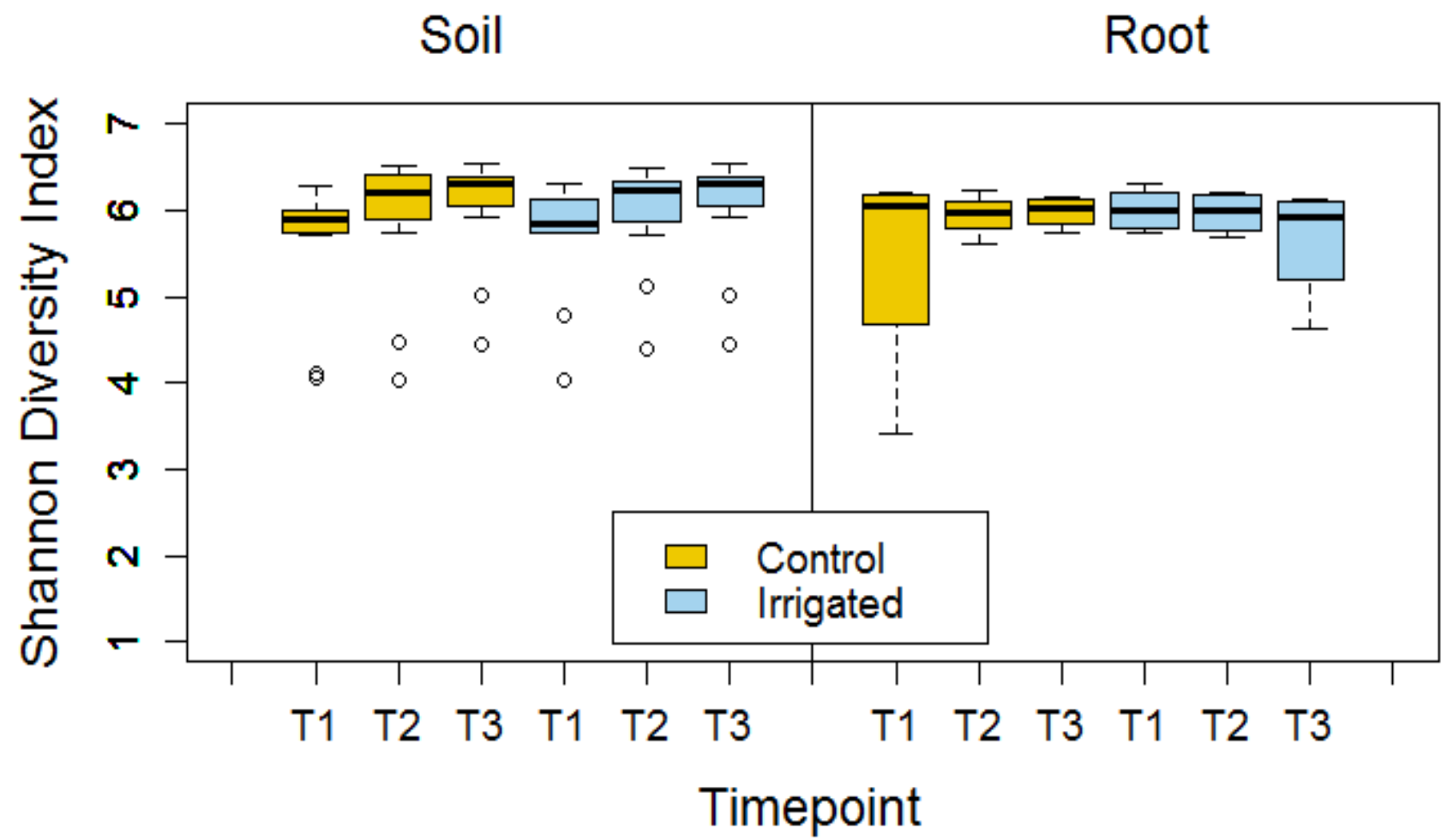


Lignin Fingerprinting using CuO-extraction and measured by GC/MS

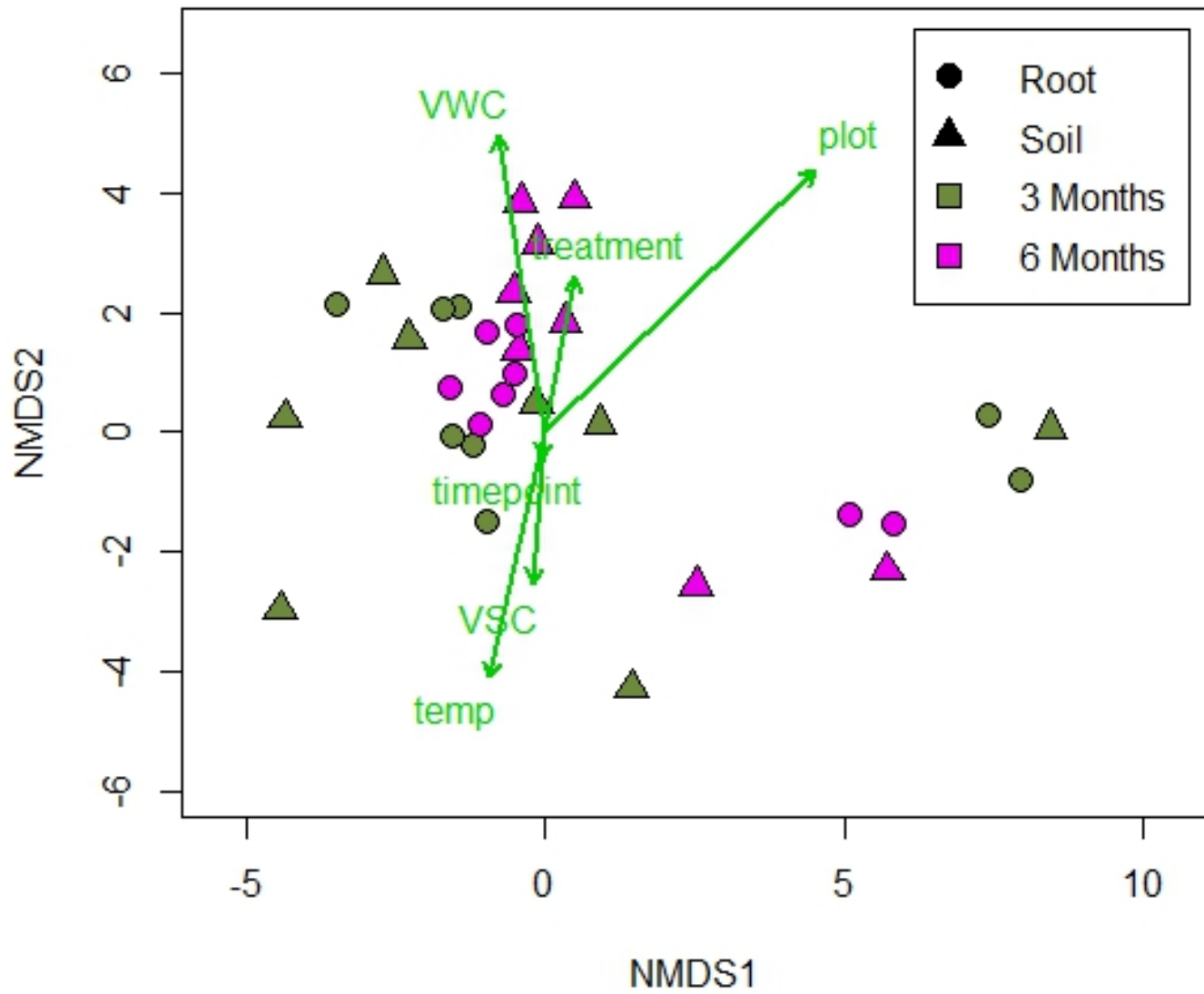
Sum of Vanillic +Syringic +Cinnamic (VSC)



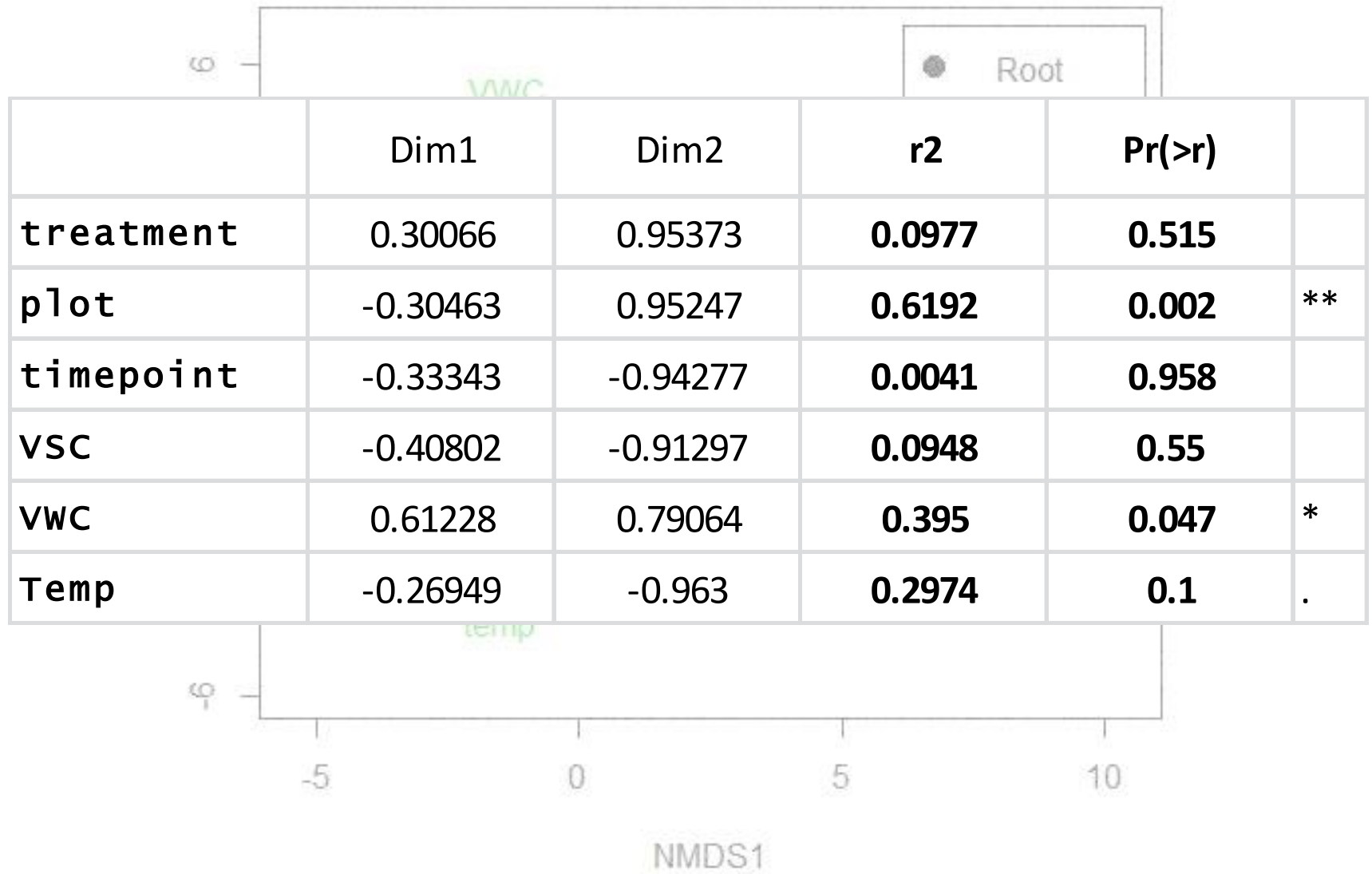
Alpha diversity Soil vs Root from Illumina® MiSeq Amplicon Sequencing data



NMDS of Illumina® MiSeq ITS Amplicon Sequencing (Fungi) results



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Discussion

How do roots acclimate to irrigation/drought?

They don't!

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Change in Lignin (amount/quality)

Lignin 'monophenols' change with decomposition

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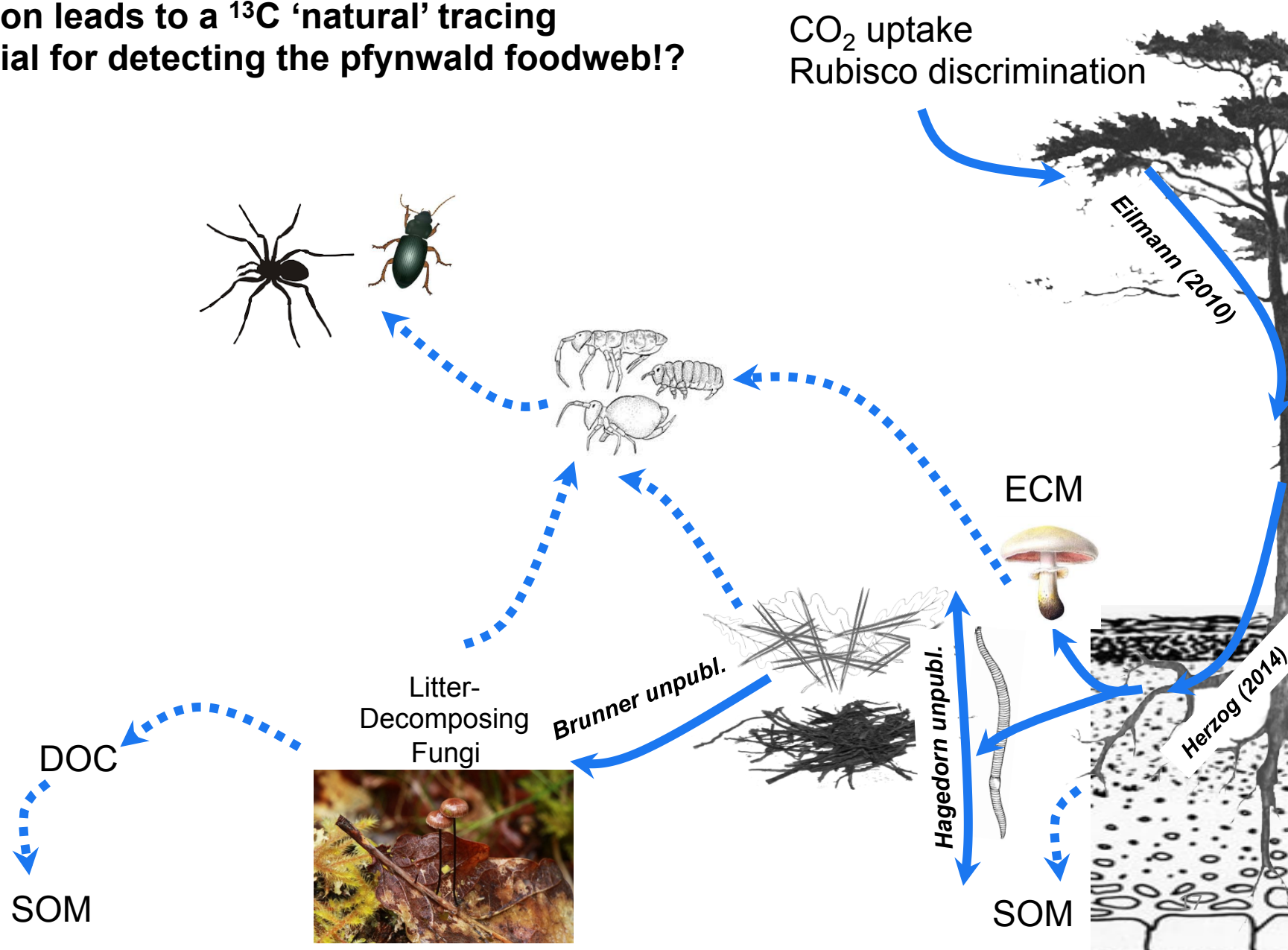
Change in microbial community

No treatment effect on community

VWC important factor for microbial community composition

small scale vs large scale

Irrigation leads to a ^{13}C 'natural' tracing Potential for detecting the pfynwald foodweb!?



Acknowledgements



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Cornelia Rumpel + Marie-France Dignac