

Long-term irrigation shifts the below-ground diversity „The Pfynwald-Experiment“

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A decade of irrigation changed the soil microbiome

We found:

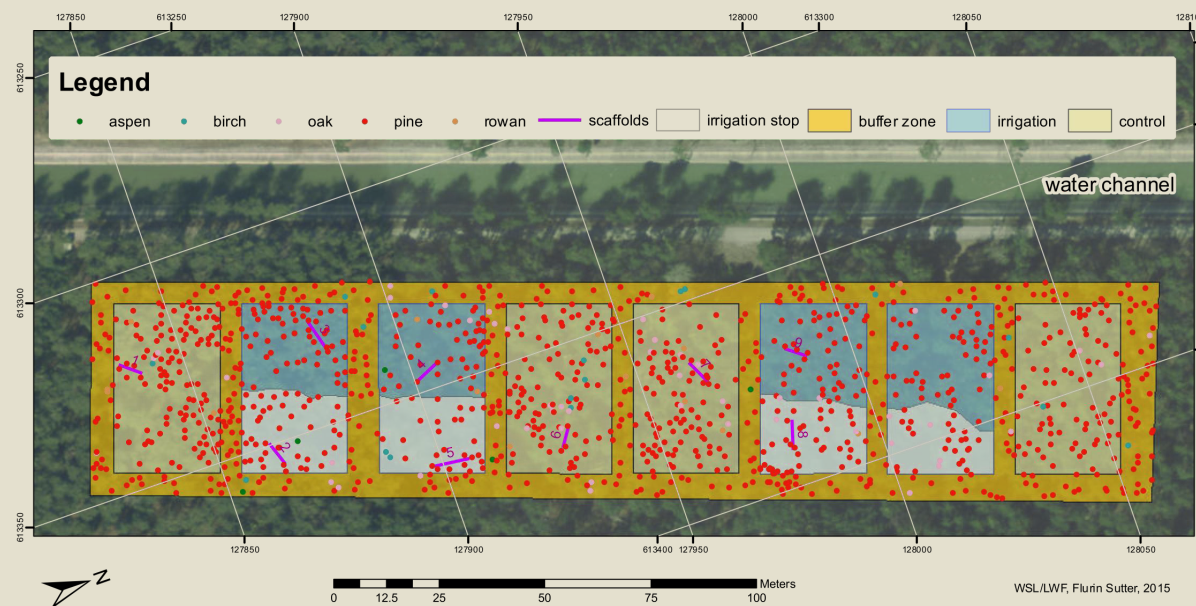
- more **active** and faster growing microorganisms
- **appearance of specialized taxa** induced by more moist and resultant nutrient-rich soil conditions
- the newly adapted microbial community has a **higher activity per unit biomass**

Rupflin 2013, Master thesis, ETH Zurich
Hartmann et al. 2017, Herzog et al. 2019

Aims: Impact of irrigation on micro-/mesofauna

- to assess **multiorganismal patterns** after long-term irrigation (14 years) by using **DNA-metabarcoding**
- to compare the diversity and composition of soil biota by different extraction methods (**extraction of the animals versus direct extraction of DNA from soils**)

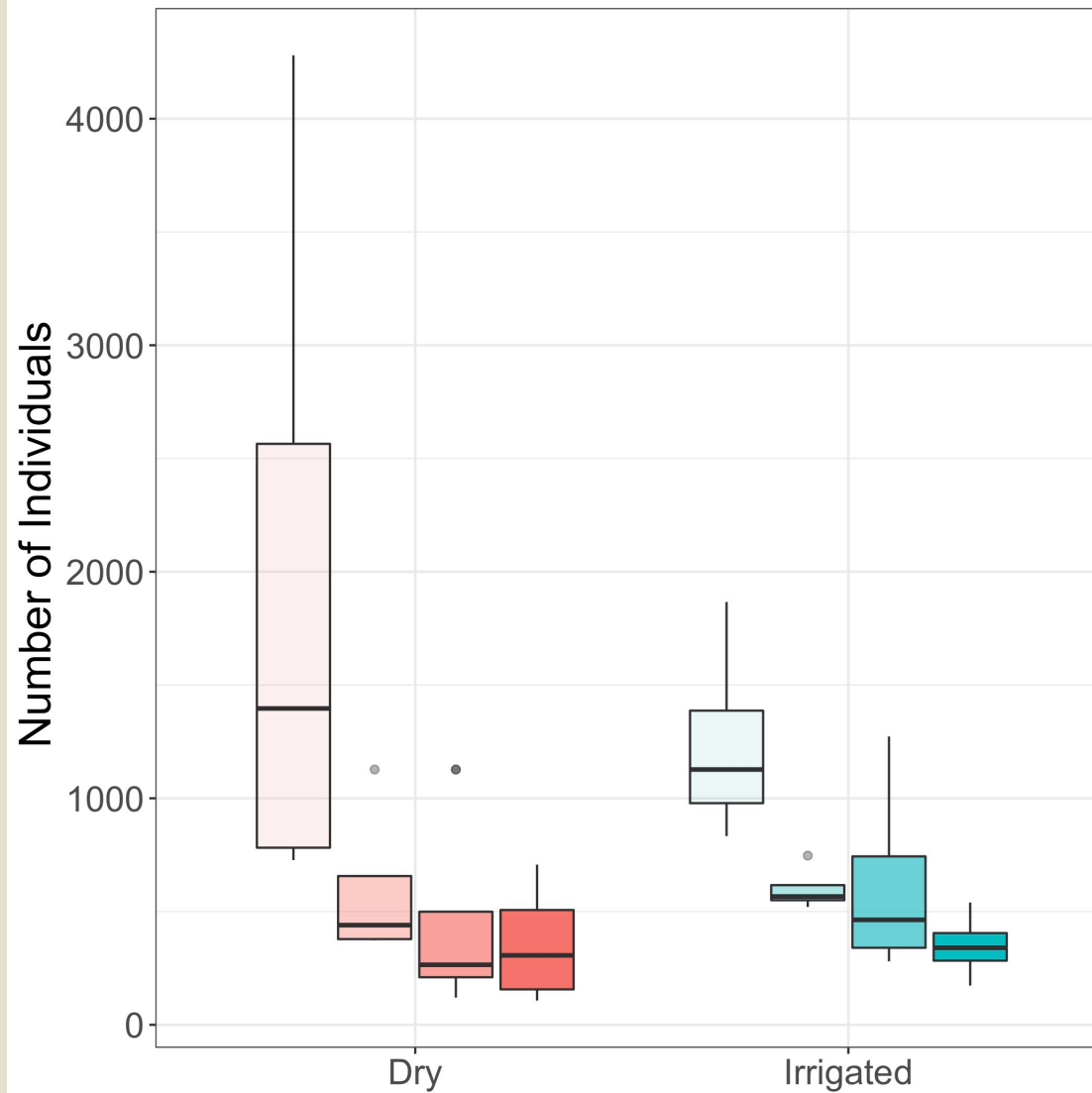
Sampling



Soil cores

Volume: 5 cm diameter; 10 cm long; 300 – 400 g soil
n = 8 per plot

Nematodes: Abundance



Nematodes are **more abundant in drier soils**

Feeding groups

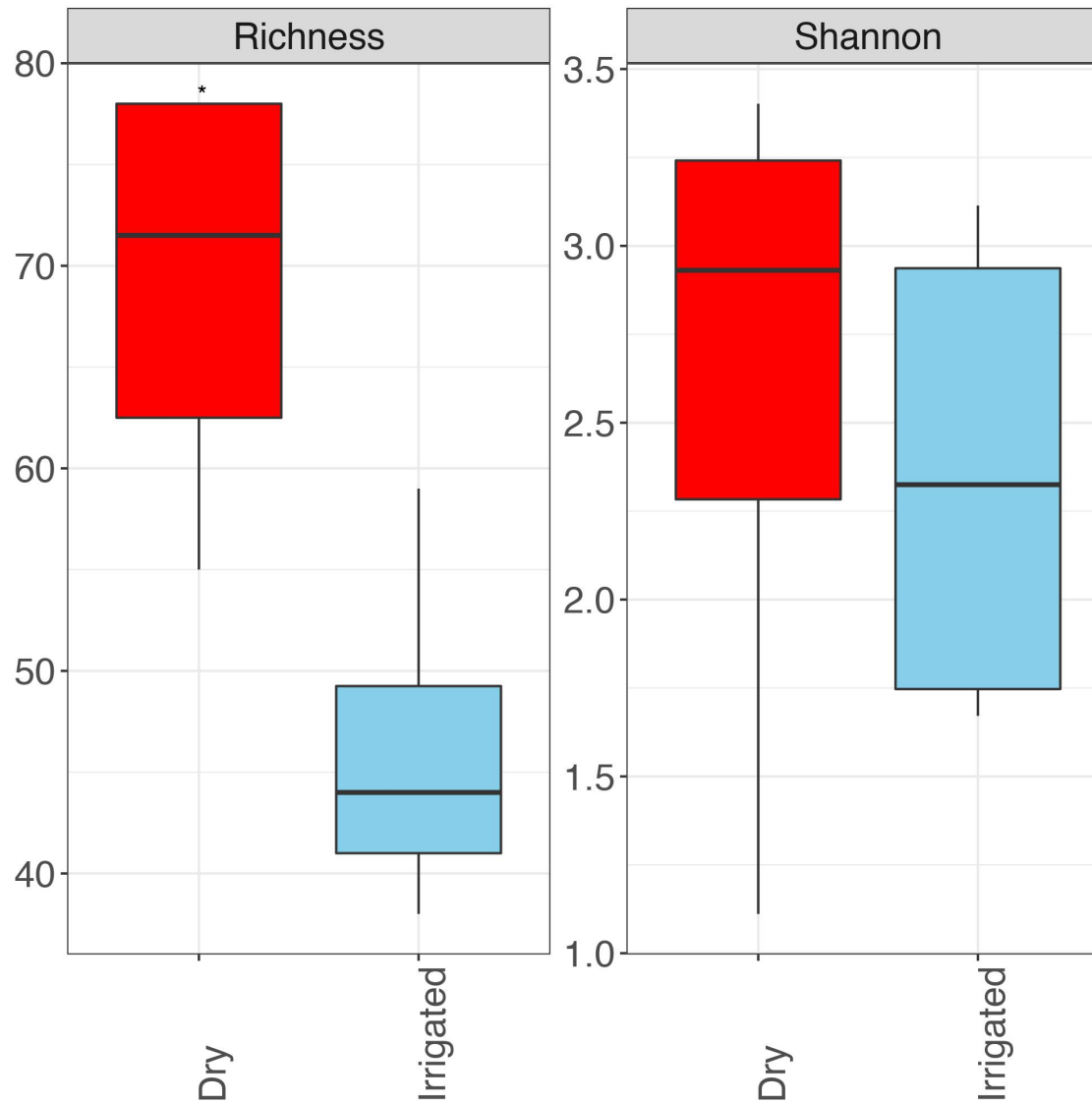
Bacterial

Fungal

Plant

Omnivore

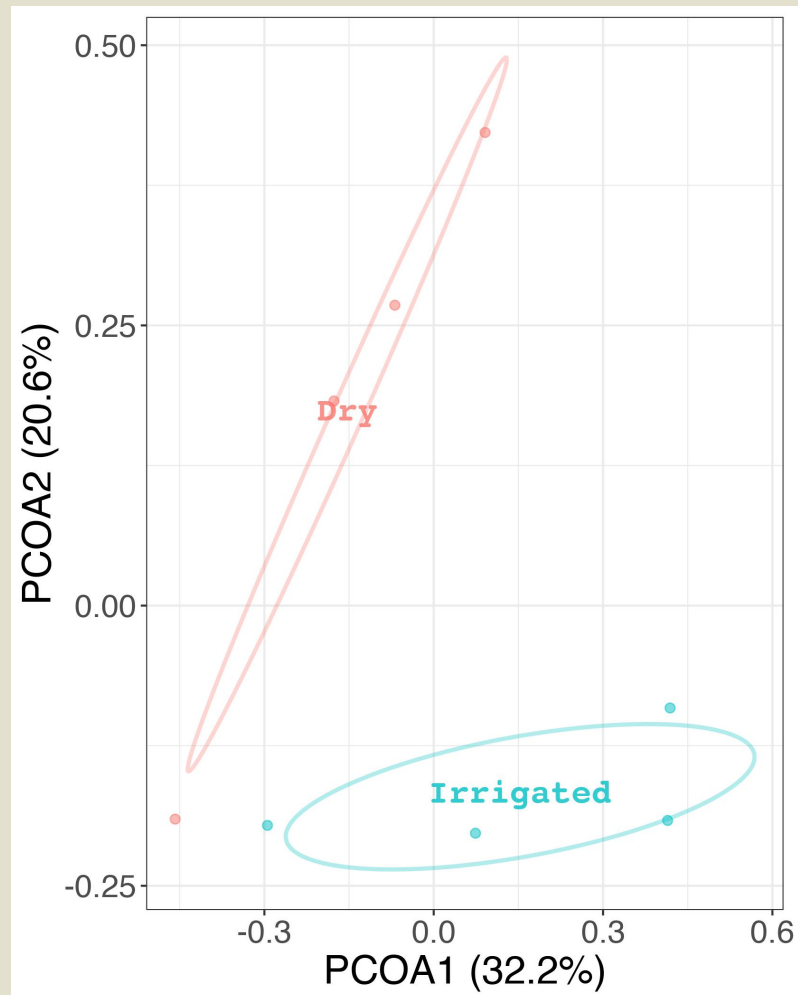
Nematodes: Alpha-Diversity



Drier soils are more diverse

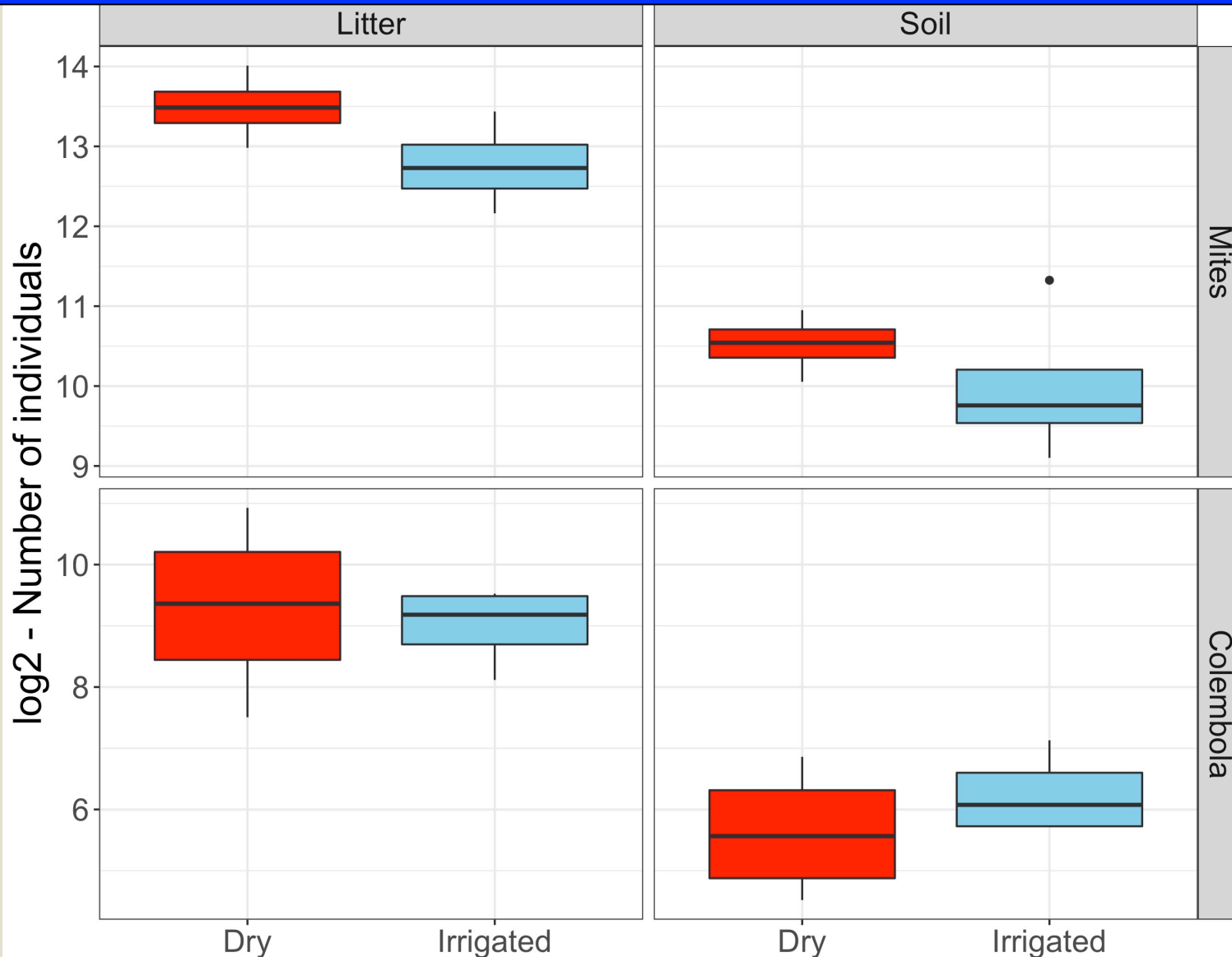
Nematodes: Community structure

Nematodes elutriated – DNA metabarcoding



PERMANOVA
 $P < 0.0001$

Microarthropods: Abundance

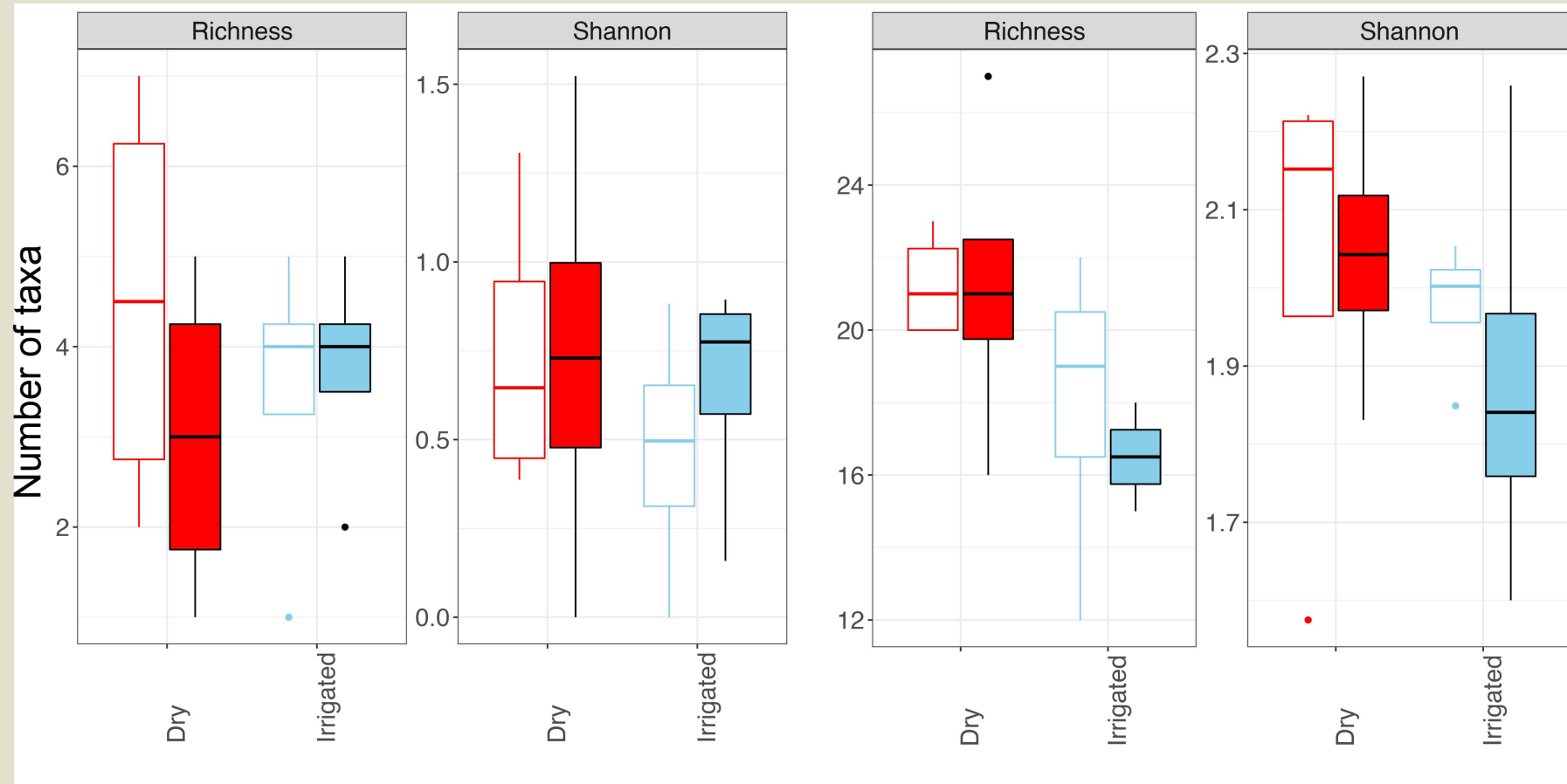


- **More mites** than springtails

- **More animals** in **litter** than soils

- And **more animals** in dry controls (**litter**)

Microarthropods: Alpha-Diversity



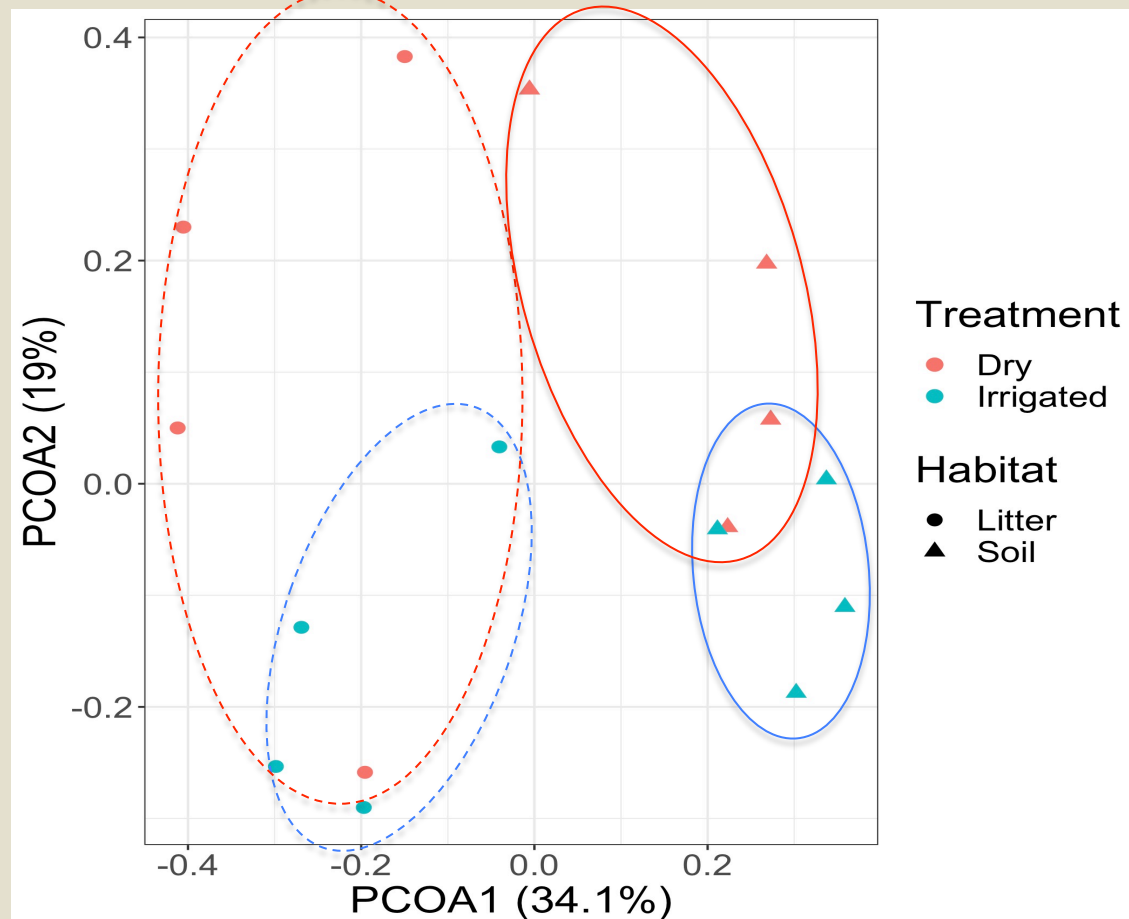
Springtails

- **Higher mites diversity** in dry controls (both in litter and soil)

Mites

Microarthropods: Community structure

Mites



Conclusions

- DNA metabarcoding** allowed to give interesting insights
- into the complex soil-food webs
 - useful ecological information on soil faunal taxa

Long-term Irrigation affects:

Micro- and mesofauna:

- reduces the abundance and the diversity (not always significantly)
- shifts the community structure