EFFECTS OF SIMULATED DROUGHT AND WARMING ON MICROBIAL RESPONSES TO DRYING AND REWETTING IN CONTRASTING LAND USES

Ainara Leizeaga, Lettice C. Hicks, Albert C. Brangarí, Menale Wondie, Hans Sandén and Johannes Rousk

ainara.leizeaga@biol.lu.se

@RouskLab

The Crafoord Foundation
ESTABLISHED BY HOLGER CRAFOORD IN 1980

Vetenskapsrådet

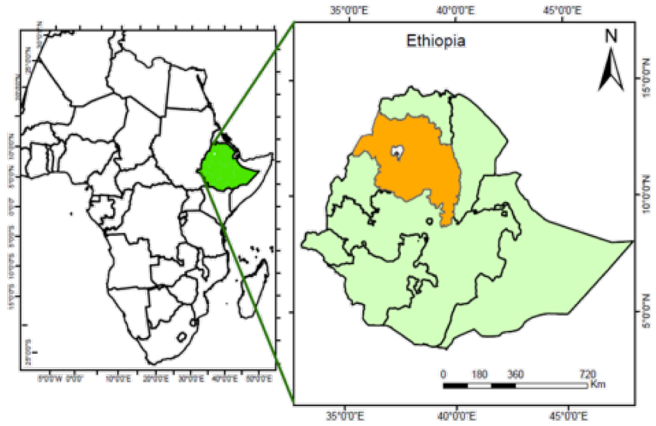
LUND UNIVERSITY

formas
The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning

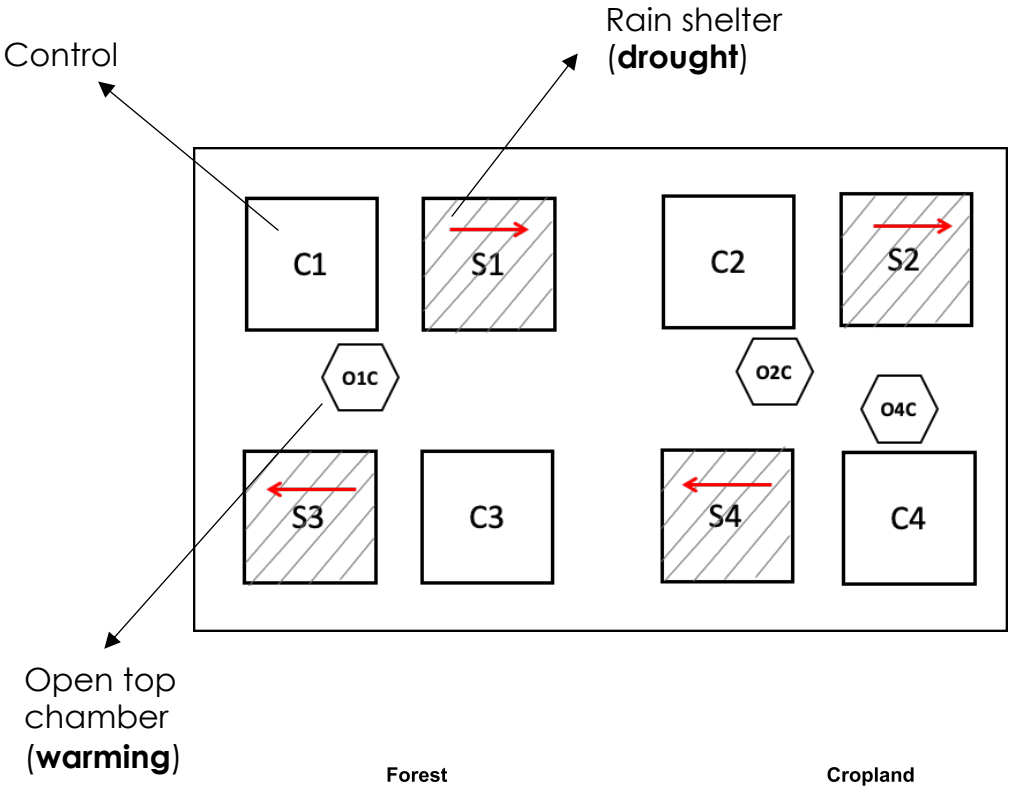
Sida

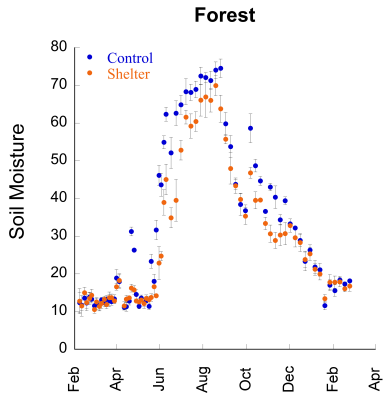
DROUGHT AND WARMING TREATMENTS IN CONTRASTING LAND USES

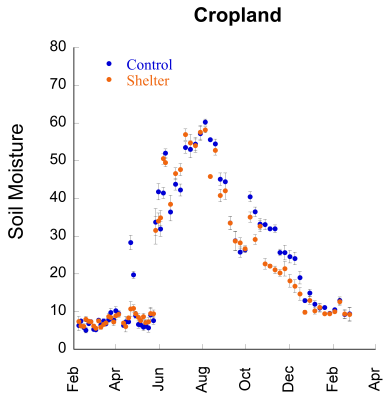
ETHIOPIA



AMHARA REGION







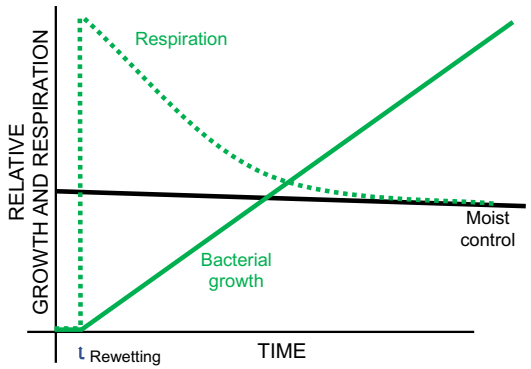
FOREST

CROPLAND

DROUGHT AND WARMING TREATMENTS IN CONTRASTING LAND USES

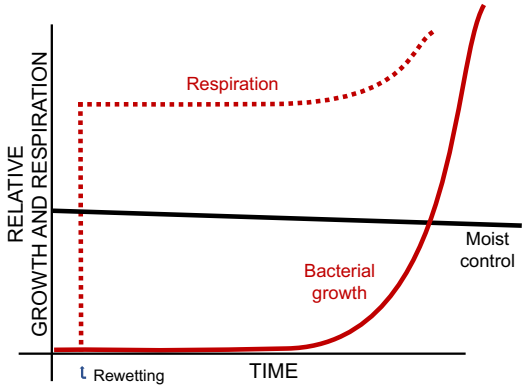
After rewetting soil microbes can have **2 responses**:

Type 1



- Higher resilience (faster recovery to moist control)
- Higher efficiency (higher growth per total C use)

Type 2



- Lower resilience
- Lower efficiency

We expected:

1. **Drought** → more resilient & efficient microbes
2. **Warming** → no response in microbial moisture related traits
3. **Land-use –>** higher microbial resilience and efficiency in cropland than forest

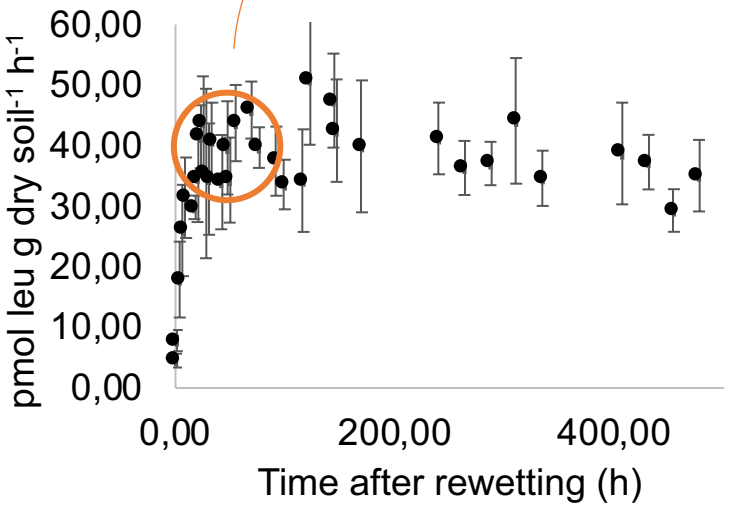
DRYING-REWETTING RESPONSES OF MICROBIAL PROCESSES WERE MEASURED IN THE LABORATORY

Microbial responses universally showed a highly resilient type of response to DRW

EXAMPLES:

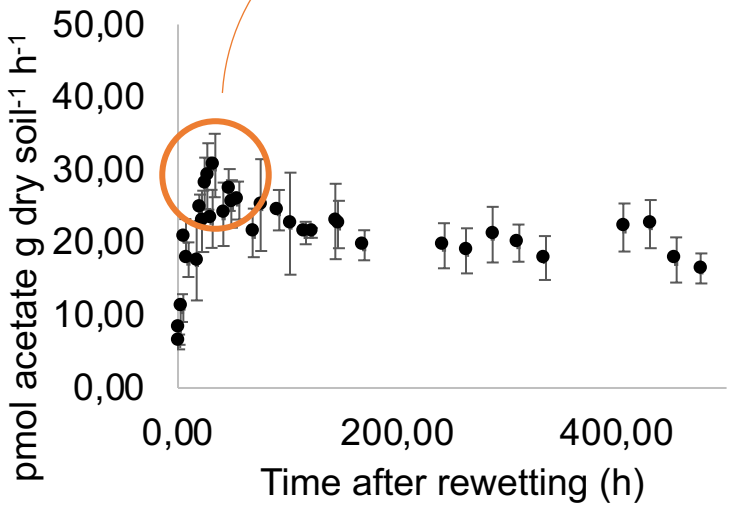
Peak at c. 20h after rewetting

Bacterial growth

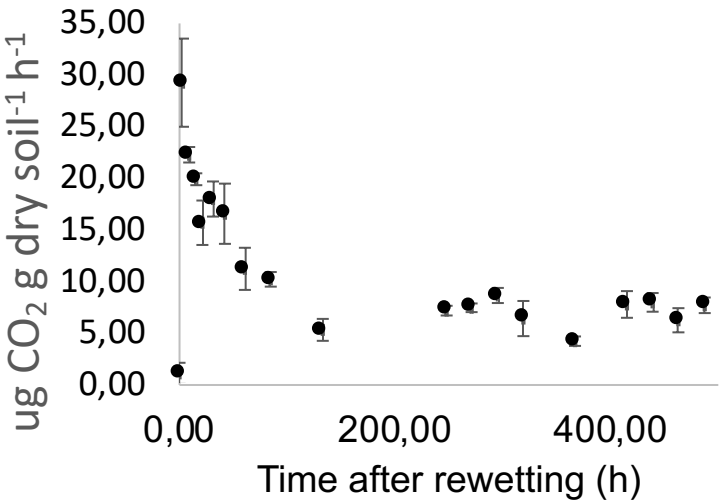


Peak at c. 15h after rewetting

Fungal growth



Respiration



Bacterial and fungal growth started increasing immediately after rewetting

Respiration picked immediately after rewetting and quickly stabilized

DIFFERENCES IN LAND-USE, AS WELL AS DROUGHT AND WARMING TREATMENTS RESULTED IN DIFFERENCES IN CUE UPON REWETTING

$$CUE = \frac{Bacterial\ growth + Fungal\ growth}{Bacterial\ growth + Fungal\ growth + Respiration}$$

Soares & Rousk (2019) SBB

PRELIMINARY TRENDS: (Schematic)