Elevated CO2 enhances short-term recovery after extreme drought and heat in a temperate grassland.


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Under warmer and drier climatic conditions, increase of atmospheric CO$_2$ concentration is expected to limit the negative effects of stress on grassland production. The capacity to recover after drought could also be favored by elevated CO$_2$, as it may improve plant growth through its primary effects on both leaf photosynthesis and stomatal conductance.

The aim of this study was to evaluate a possible mitigation effect of elevated CO$_2$ on canopy C and water fluxes, and its consequences on forage production and quality, during and after an extreme event (soil drought x heat).

### RESULTS

#### Gross primary production (GPP, gCO$_2$ m$^{-2}$ d$^{-1}$)

![GPP Graph]

#### Water-use efficiency (WUE, mgCO$_2$ g$^{-1}$H$_2$O)

![WUE Graph]

#### Green biomass (g DM m$^{-2}$)

![Green Biomass Graph]

#### Root biomass (g DM m$^{-2}$)

![Root Biomass Graph]

### CONCLUSIONS

Under future climatic conditions (warmer and drier) forecasted for 2040-2060

- **Elevated CO$_2$ mitigated the negative effect of drought x heat** by increasing GPP and WUE, and **promoted recovery** of this permanent grassland
- These changes led to **higher root biomass** with no effect on above-ground production
- **Forage quality** was affected: more digestible forage but containing less N
- This study confirmed the **short-term recovery capacity of permanent grassland** after severe drought and heat

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