

Water holding capacity of bryophytes is less dependent on precipitation in alpine grasslands compared to boreal.

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Why should we care about bryophytes?

Bryophytes (mosses, liverworts and hornworts) have various morphological traits that enable them to hold water. They regulate soil moisture and play an important role in ecosystem hydrology¹. The ability to hold water is called **water holding capacity (WHC)**.

Many bryophyte species thrive in low temperatures and are vulnerable to desiccation³. Changes in temperature- and precipitation patterns in the future will alter the distribution of plant functional groups², and loss of bryophyte diversity is expected⁴. WHC may then also be climate dependent. Gaining more knowledge about how climate affect bryophyte properties, as WHC, can make us one step closer to predicting future alpine ecosystem.

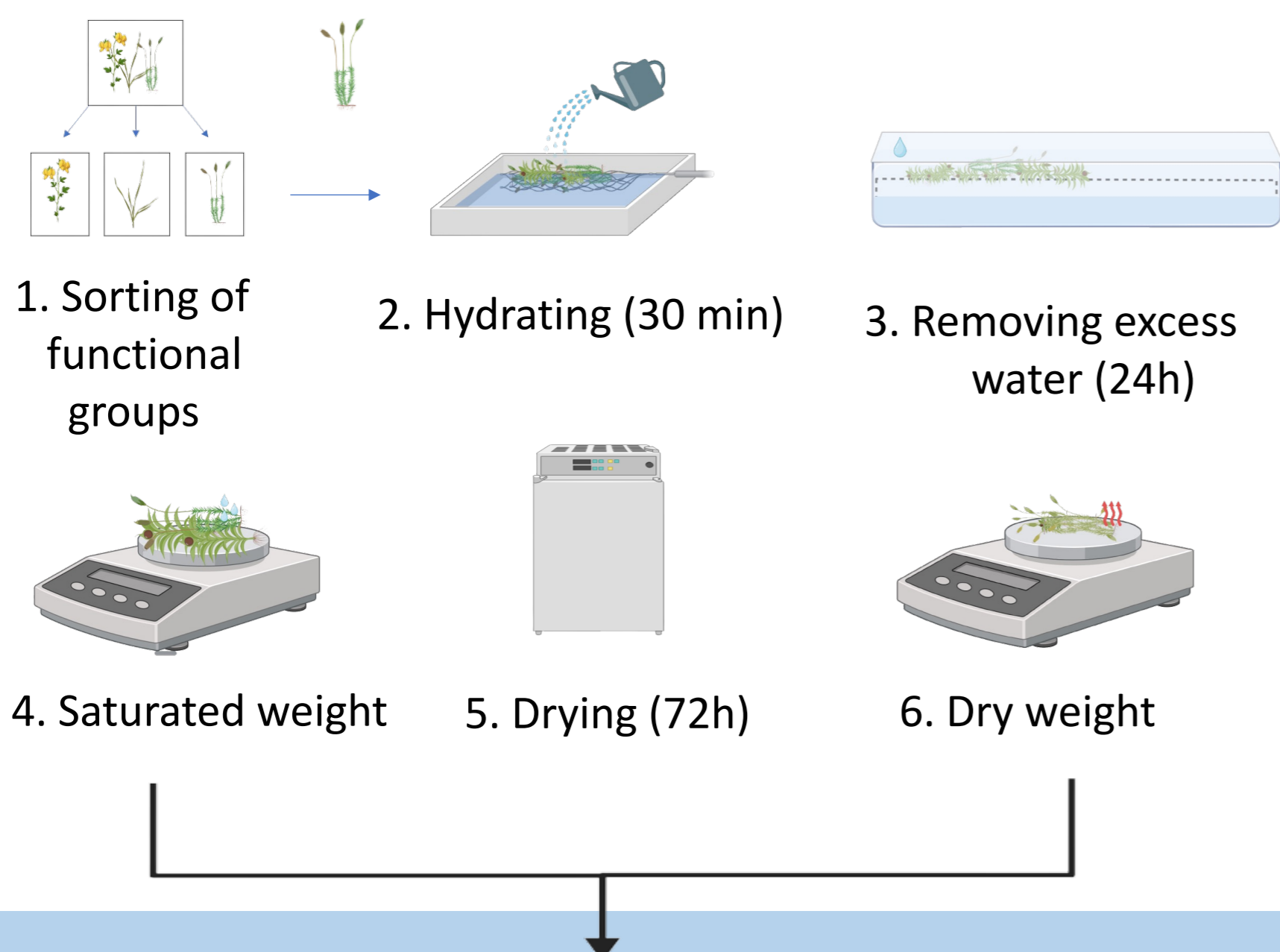
Research question

Does water holding capacity of alpine bryophyte communities change with temperature and precipitation?

3

Measuring water holding capacity

Bryophyte was sorted out of the biomass collected from each plot, and the following was done to measure WHC:



$$\text{Water holding capacity} = \frac{\text{saturated weight} - \text{dry weight}}{\text{dry weight}}$$

2

Collecting bryophytes

Bryophytes were collected from 12 grassland sites in western Norway along a precipitation- and temperature gradient. We are using plots where grasses and forbs have been removed annually since 2015, which make us look at bryophytes in isolation from other groups.

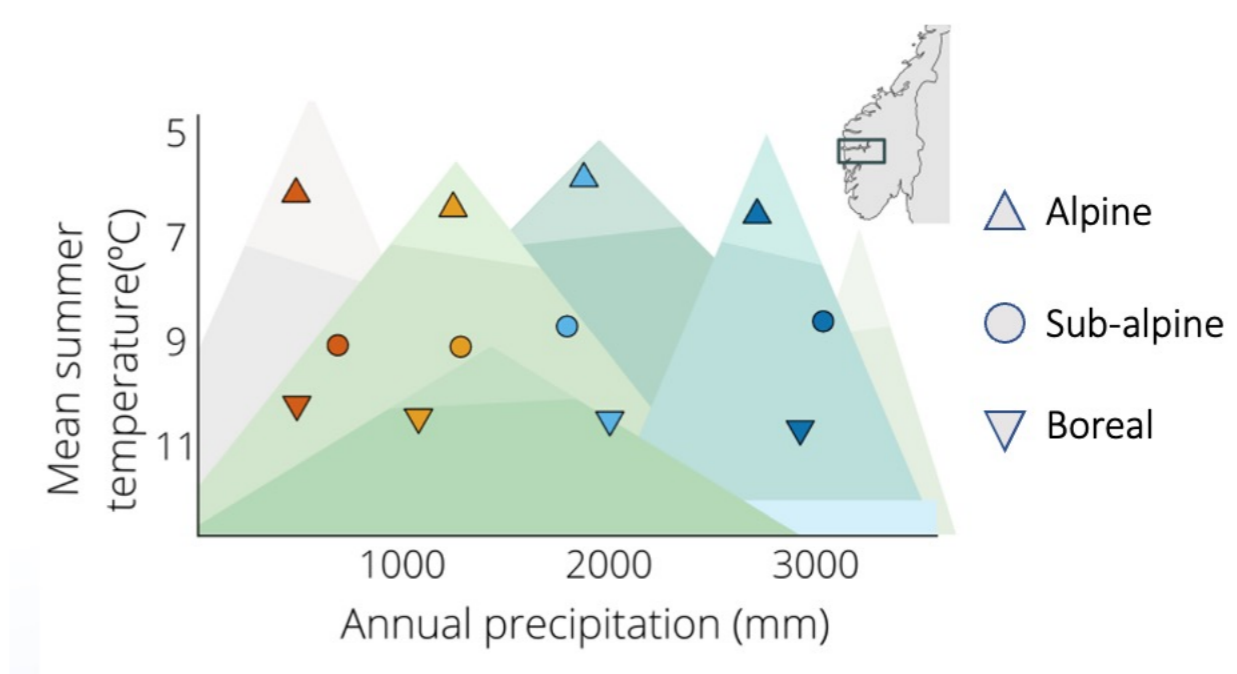


Figure 1 Climate grid of twelve alpine study sites in Norway varying in precipitation and temperature. The sites are all grasslands further categorized into three groups based on temperature: boreal, sub-alpine and alpine grasslands².

4

Results

Precipitation seems to play a bigger role in the bryophytes WHC in the boreal grasslands than in the sub-alpine and alpine grasslands.

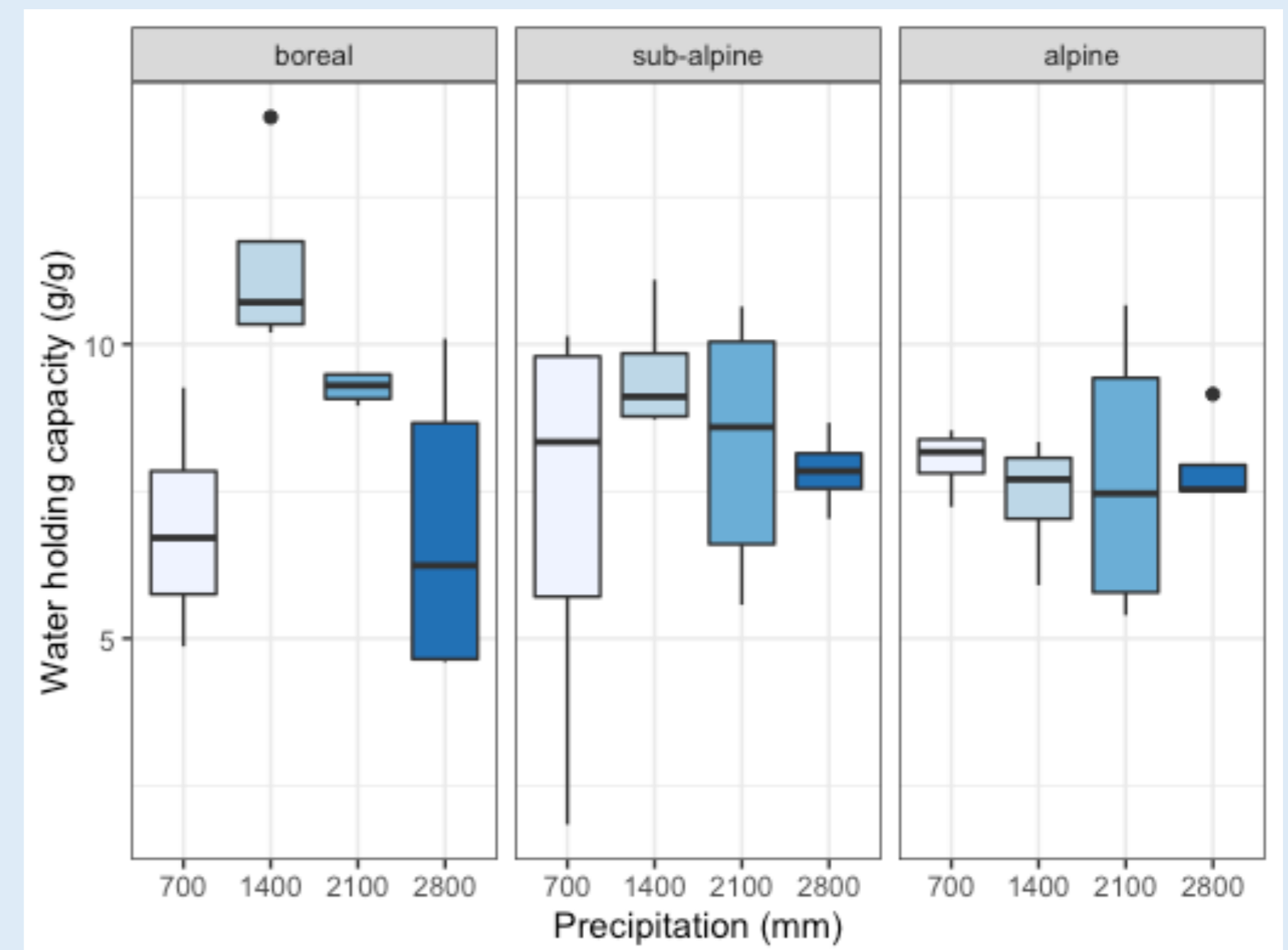


Figure 2 Water holding capacity of each site in the three elevation categories along the precipitation gradient. Temperature is decreasing with elevation, from left to right.

More evaporation in the lower grasslands - caused by higher temperatures, makes the amount of precipitation more significant to the ecosystem. This can be one reason why the variation between sites with different precipitation is bigger at lower - and warmer - grasslands. The WHC is more consistent along the precipitation gradient in the alpine ecosystems, which suggests that WHC is more influenced by other factors at higher elevations.

