

How resilient is *Calluna vulgaris* to drought during germination and its seedling stage?

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Abstract

The coastal heathlands of North-west Europe are valuable cultural landscapes, created and maintained over millennia by a land-use regime involving burning and grazing. These heathlands are now critically threatened throughout their range by land-use change and, increasingly, climatic changes. The climatic change impacts are complex, as the coastal heathland regions are experiencing increased temperature and precipitation, but also increased frequency and severity of extreme events, such as drought. Previous studies reveal that established heathland vegetation, including *Calluna*, are vulnerable to drought, but also that these vulnerabilities vary throughout the range, and with successional stage after fire. Recruitment from seed is an important regeneration strategy for *Calluna* heathland vegetation after burning, and our study is the first to assess how the seed germination and early seedling growth of *Calluna* respond to drought. We will do this in a lab germination experiment, where we will expose *Calluna* seeds to five different drought treatments, from -0.25 MPa to -1.7 MPa, and measure germination, and record germination percentage, germination rates, and seedling growth, below-ground allocation, and functional traits (Specific Leaf Area, Specific Root Length). To allow assessment of variation in drought responses due to geographic origin, successional stage, and the maternal plants' drought exposure, we will conduct this experiment on seeds from 540 *Calluna* plants sampled from across three drought treatments (control, 50%, and 90% coverage), in three successional stages after fire (pioneer, building, mature), in two regions (60N, 65N), using a factorial design.

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