

## ***Sphagnum* moss as an early drought indicator**

*Sphagnum* mosses are key ecosystem engineers in peatlands as well as other high humidity ecosystems such as the Celtic rainforest. In these ecosystems they hold large amounts of water in their specialised hyaline-cells which enables them to create an environment in which higher plants are starved of oxygen in the soil due to waterlogging. This also promotes peat formation as the breakdown of organic matter comes to a halt, causing the waterlogged peatland to function as a carbon sink. Access to water is therefore one of the limiting factors for *Sphagnum* ecosystems, and desiccation quickly results in cellular damage and the release of large amounts of greenhouse gases as access to oxygen allows microorganisms to break down the organic matter.

Much like rainforest canopies, *Sphagnum* canopies intercept and trap evaporated water from below. The canopy in this case is made up of the 'head' or capitulum (plural = capitula) of the plants. The shape is slightly similar to a flowerhead and can be flat topped to spherical 'pom-pom' shaped, and it is the main point of growth for the plants.

Despite its water holding adaptations, *Sphagnum* lacks the direct control over its water content that higher plants have. Therefore it shows signs of drought much earlier, something that is usually referred to as '*Sphagnum* bleaching'.



This research aims to quantify this colour change, from green to pale green to white, and relate it to the ecological variables at play. To do this, researchers take regular colour photos of patches of *Sphagnum* but with a colour card to equalise for different light environments. Several capitula from the patch are then collected which are weighed when they are fresh and weighed when they are dry, allowing the water content at the time of imaging to be calculated. The distance between the capitula and the water table of the bog, and the relative humidity at various depths in the canopy are also measured as environmental variables. The

goal is to determine which variable has the strongest relation to *Sphagnum* bleaching, and ultimately to provide a tool that can help conservationists monitor *Sphagnum* by simply taking an image.

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