

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

Sphagnum mosses are key ecosystem engineers in peatlands. They hold large amounts of water in their specialised 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 of the plants. The shape is similar to a flowerhead and can vary from flat topped to spherical 'pom-pom' shaped, and this 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 aimed 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 took regular colour photos of patches of *Sphagnum* with a colour card to equalise for different light environments. Several

capitula from the patch were then collected and water content at the time of imaging calculated. The distance between the capitula and the water table of the bog, and the relative humidity at various depths in the canopy were also measured. The goal was to determine which variable most strongly influenced *Sphagnum* bleaching, and ultimately to provide a tool that can help conservationists monitor *Sphagnum* by simply taking an image.

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Related papers:

van de Koot, WQM, Msonda, J, Olver, OP, Doonan, JH & Nibau, C (2024), Variation in water-holding capacity in *Sphagnum* species depends on both plant and colony structure', *Plants*, vol. 13, no. 8, 1061. [10.3390/plants13081061](https://doi.org/10.3390/plants13081061)

van de Koot, W, van Vliet, L, Chen, W, Doonan, J & Nibau, C (2021), Development of an image analysis pipeline to estimate *Sphagnum* colony density in the field', *Plants*, vol. 10, no. 5, 840. [10.3390/plants10050840](https://doi.org/10.3390/plants10050840)