



PHYSIOLOGICAL CHARACTERISTICS AND METABOLIC PROFILE OF *PORELLA PLATYPHYLLA* UNDER DIFFERENT LIGHT SPECTRA AND ILLUMINATION REGIMES COMBINED WITH OTHER ABIOTIC STRESSES

A *Porella platyphylla* életteni jellemzői és metabolikus profilja különböző fényspektrumok, folyamatos vagy ciklikus megvilágítás és egyéb abiotikus stresszek hatására

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Porella platyphylla (L.) Pfeiff. was collected from the Bükk Mountains, Hungary, and subjected to deacclimation and subsequent hardening treatments (cold acclimation or desiccation hardening) before the experiments. The experiments were conducted for one week in climate chambers at a constant temperature of 18°C and a photosynthetic photon flux density (PPFD) of 200 $\mu\text{mol m}^{-2} \text{s}^{-1}$.

Six light treatments were applied: (1) full-spectrum light (3050 K) under a 14-h light/10-h dark photoperiod; (2) warm light (2950 K) under a 14-h light/10-h dark photoperiod; (3) cold light (6550 K) under a 14-h light/10-h dark photoperiod; (4) continuous warm light (2950 K); (5) continuous cold light (6550 K); and (6) continuous darkness. The continuous-light treatments were used to investigate the physiological effects of the absence of a regular dark period, whereas the continuous-darkness treatment was included to assess plant responses to prolonged light deprivation. Physiological parameters were measured at the beginning of the experiments and after one week of treatment. Three biological replicates were used in each of three independent experimental runs. Photosynthetic pigments were quantified after extraction with 96% (v/v) ethanol. Absorbance was measured at 470, 649, and 665 nm using a spectrophotometer. Antioxidant capacity was determined in 96% (v/v) ethanolic extracts using the DPPH assay. Total soluble sugars and fructans in *P. platyphylla* were quantified from 80% (v/v) ethanolic extracts. Metabolic profiles of the plant extracts were determined by GC-MS analysis. Overall, the effects observed on the physiological parameters measured in this study demonstrate that both the light regime and spectral composition, particularly the dominance of the red or blue spectral range, influence physiological responses in *P. platyphylla*. Continuous illumination, representing an extreme disruption of the natural dark period, either alone or in interaction with cellular water deficit, as well as differences in spectral composition, altered photosynthetic pigment composition, the qualitative and quantitative profiles of storage carbohydrates, metabolic profiles, and antioxidant capacity. These findings highlight the complex and interacting effects of light spectral composition, altered light-dark regimes, and water deficit on plant physiology, while emphasizing the importance of species-specific responses when assessing the biological effects of artificial lighting.