

The effects of dehydration and co-acting photoinhibition on primary photosynthetic processes in *Bryum pseudotriquetrum* monitored by OJIPs

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INTRODUCTION

Mosses are frequent components of Antarctic vegetation oasis especially in coastal regions of maritime Antarctica. They are resistant to repetitive drying/rehydration cycles during vegetation season as well as photoinhibition (Orekhova et al. 2021). However, combined effects of dehydration and co-acting photoinhibition due to excess light have been studied rather sporadically. In this study, the co-effect on *B. pseudotriquetrum* are evaluated by OJIP-derived chlorophyll fluorescence parameters.

MATERIAL AND METHODS

Moss samples were collected at the James Ross Island (Antarctica) and transported to the Czech Republic in dry state. In order to evaluate the effects of thallus desiccation and photoinhibition, *B. pseudotriquetrum* was exposed to the below-specified treatments.

EXPERIMENTAL DESIGN

Measurements of OJIPs and OJIP-derived parameters in Antarctic moss *Bryum pseudotriquetrum* in four treatments: *A*) Desiccation in dark, *B*) Desiccation on light, *C*) Desiccation combined with 'constant' photoinhibition, *D*) Strong photoinhibition in wet state. During the exposition to the above treatments, fast chlorophyll fluorescence transients (OJIPs) were measured and the OJIP-derived parameters expressed as dependent on relative water content (RWC) and/or duration of the treatment. Special attention was devoted to the identification of K, and L steps which are distinguishable in OJIPs of heavily stressed Antarctic poikilohydric organisms (Bednaříková et al. 2020).

RESULTS AND DISCUSSION

In *A* treatment, the parameters started to decline (F_v/F_M) and increase (DI_0/RC , TR_0/RC) at the RWC of 16% comparably to *B* treatment in which only F_v/F_M started earlier, *i.e.* at the RWC of about 23%. Desiccation combined with photoinhibition (*C* treatment) led to severe inhibition of primary photosynthesis even during initial phase of desiccation (RWC decline from 100 to 40%) and the parameters DI_0/RC , TR_0/RC , and ET_0/RC showed biphasic response: an increase at the RWC declining from 100 to 25% followed by a decrease at the RWCs below 25%. The K-step was found ON OJIPs at about 0.3 ms for strongly desiccated thalli at the RWCs 13 and 5%.

REFERENCES

- BEDNAŘÍKOVÁ, M. et al. (2020): *Photosynthetica*, 58: 646-656.
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