



## *Encontros Scientia*

# *Desiccation tolerance in bryophytes: Evidence towards a common desiccation tolerance mechanism*

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### **Abstract**

In the Mediterranean region, the aquatic bryophyte *Fontinalis antipyretica* is periodically exposed to desiccation, in streams that lose their water during the dry season. Field observations suggest desiccation tolerance (DT) mechanisms in this bryophyte. The examination of recovery of photosynthesis, showed that, both under field and laboratory conditions, it is consistent with a DT pattern. However, dehydration must proceed slowly to regain its pre-desiccation state following rehydration. Since it was determined that dehydration rate is fundamental for surviving DT, we investigated whether this response included production of reactive oxygen species (ROS) sensitive to dehydration rate using an innovative approach combining ROS-specific probes and confocal microscopy. The response was a very high ROS production under fast dehydration whereas under slow dehydration was almost absent. The current theory for DT was based in a constitutive protection mechanism, coupled with a repair-based mechanism upon rehydration. However, recent studies of proteomes in bryophytes in response to dehydration suggests another approach. We investigated the effect of fast and slow drying rates on the protein profiles, during dehydration and rehydration. After fast dehydration, the proteome profiles are very similar to control. However, rehydration following fast dehydration leads to loss of almost all proteins, providing evidence that there is not enough time to prepare for desiccation under this dehydration regime. Nevertheless, under slow dehydration there are substantial changes in the proteome profile, both during dehydration and rehydration which might indicate an induction of DT mechanisms under these circumstances. This work suggests that DT at the cellular level, namely at the molecular mechanisms level, is similar among bryophytes independently of their preferred habitat. Furthermore, it states that DT is induced by slow dehydration rate being eventually controlled to some point by the morphology, being the determinant factor in the adaptation of bryophytes to each habitat and desiccation conditions.

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