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TOLERANCE OF A SEMI-DESERT MOSS-DOMINATED CRYPTOBIOTIC CRUST TO A VARIETY OF NATURAL AND ARTIFICIAL STRESSES

Egy félsivatagi, mohák dominálta kriptobiotikus kéreg toleranciája különféle természetes és mesterséges stressztényezőkkel szemben

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Many cryptogamic plants can survive and grow effectively in stressful environments. Several cyanobacterial crusts and cyanolichens are known as extremophiles. However, this is rarer in the case of moss-dominated crusts. To achieve an acceptable dry matter production, an efficient photosynthetic functioning is necessary even under such unfavorable conditions: the combined effects of many stress factors need to be tolerated at the same time. Accordingly, the photosynthetic responses were examined under different natural (desiccation, salt, heat) and artificial (hydrogen peroxide, methyl viologen, perchloric acid) stress factors in mosses (*Didymodon luridus* Hornsch., *Didymodon nicholsonii* Culm.) dominated intact semi-desert cryptobiotic crusts.

Crusts were collected from a lime-sandstone rock with semi-desert vegetation 17 km of Tataouine, between old and new Chenini, Tunisia. Before the measurements the samples were rehydrated and transferred to a growth chamber for two days. All stress treatments were performed on original crusts together with their substrate. The responses of the *in vivo* chlorophyll *a* fluorescence to different stress factors were measured in dark-adapted green segments with a pulse amplitude modulation fluorometer (Imaging PAM M-series, Walz, Effeltrich, Germany). For determination of the breakpoints (T_c) of F_0 *vs.* T or F_s *vs.* T curves the method of heat induction of fluorescence was applied.

Our results show that the photosynthetic apparatus of the moss components of the crusts has extreme stress tolerance. Their photosynthetic apparatus operated at a promising level both during stress conditions and recovery time. Furthermore, they also tolerate some very extreme Mars-like conditions in several cases. All this confirms that cryptobiotic crusts dominated by mosses can also have extreme stress tolerance and suggest that the long- and short-term acclimation/acclimatization processes, which protect against the single and simultaneous environmental factors have a pronounced ecological significance and explain the survival of the examined crusts even under extreme conditions.