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The physiology mechanisms on drought tolerance and adaptation of biological soil crust moss Bryum argenteum and Didymodon vinealis in Tenger Desert

X. Zhao. (1), Y. Shi. (1), C. Chen. (1), R. Jia. (2), and X. Li. (2)

(1) Laboratory of Plant Stress Ecophysiology and Biotechnology,Cold and Arid Regions Environmental and Engineering Research Institute, China (zhaox@lzb.ac.cn), (2) Shapotou Desert Research and Experiment Station, Cold and Arid Regions Environmental & Engineering Research Institute, Chinese Academy of Sciences

Bryum argenteum Hedw. and Didymodon vinealis Brid are two dominant moss species in the restored vegetation area in Tenger Desert, which sampled from biological soil crusts and where is an extreme drought regions. We found that they resorted to different osmotic adjustment strategies to mitigate osmotic stress. Under the gradual drought stress, both Bryum argenteum and Didymodon vinealis accumulated K+ and soluble sugar such as sucrose and trehalose. Their glycine betaine contents both decreased, while their proline content had no significant change. With enhanced drought stress, Bryum argenteum’s Na+ content was low and decreased significantly, whereas Didymodon vinealis’s Na+ content increased sharply and reached to a high level. We found the different of the mechanism of between active oxygen scavenging on Enzymatic and non - enzymatic system in two species moss of Bryum argenteum Hedw and Didymodon vinealis Brid under extreme drought stress. The result showed that two species of Moss of SOD activity gradually enhanced, and they have the material basis for effectively eliminates in vivo of Superoxide free radical. POD in Didymodon nigrescen and CAT in Bryum argeneum are major resistance o oxidative stress effects. The content of GSH rise with the stress also enhanced. The mechanism of finding Bryum argenteum Hedw and Didymodon vinealis Brid tolerance of dehydration ability were focus on different direction, but they are all given positive response to stress and enhance resistance. We investigated the responses of signal transduction substances to gradual drought stress in Didymodon vinealis and Bryum argenteum. The results suggested that: under gradual drought stress, the activities of TP H+-ATPase and PM H+-ATPase of Didymodon vinealis and Bryum argenteum both increased, resulting in their increase of K+ contents and turgor pressures, and triggered biosynthesis of signal transduction substances. ABA had no obvious effect in signal transduction of Bryum argenteum and Didymodon vinealis. NO involved in the signal transduction mechanisms of Bryum argenteum but not in Didymodon vinealis. Ca2+ played an important role in the signal transduction of Didymodon vinealis while it was not important in Bryum argenteum.