

## **Abstract:**

Plants are exposed to the stress of the environment throughout their entire life. They therefore had to develop sophisticated mechanisms to avoid or tolerate stress. In some plants, repeated exposure to stress increases tolerance, which is known as stress memory. The aim of this study is to assess stress memory in terms of oxidative stress level. Content of malondialdehyde (MDA), reactive oxygen species (ROS) and the electrolyte leakage were chosen as markers of oxidative stress. Fresh weight, plant height and water content were also evaluated. The level of oxidative stress was assessed in several genotypes of *Solanum tuberosum* subspecies, Andigena and Tuberosum. *In vitro* culture did not work well for the evaluation of stress memory, *ex vitro* partially did. The content of MDA in 66B was significantly lower than in cv. Lada (Tuberosum) in root (*in vitro*) and shoot (*ex vitro*) in control groups as well as during water shortage. Treatment of acclimation-inducing cold before the stress-inducing cold had a variable effect on growth and electrolyte leakage according to the culture conditions. *In vitro*, the effect on electrolyte leakage in roots of cv. Lada was positive, in leaves of 66B (Andigena) it was negative. In *ex vitro*, a positive effect was found on electrolyte leakage in 66B leaves, but at the same time it negatively affected the shoot height. The effect of repeated water shortage was positive on the height of plants of both genotypes and, in the case of cv. Lada, also on the water content and electrolyte leakage in leaves. MDA and ROS levels were not significantly affected by the drought. The results suggest that electrolyte leakage could be a suitable marker of stress memory.

**Key words:** abiotic stress, *in vitro* cultivation, *Solanum tuberosum*, oxidative stress, acclimation, stress memory