Paper ID: 29989
poster

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Biology in Space (8)

Author: Dr. Jadko Sergiy
Institute of Botany by M.G.Kholodny of NASU, Ukraine

ROS SIGNALING AND ANTIOXIDANT RESPONSE OF PLANTS UNDER DEVELOPMENT OF GRAVITY AND OXIDATIVE STRESSES

Abstract

Reactive oxygen species (ROS), in particular H2O2, as second messengers can induce stress response of plants under different impacts. It is suggested that such processes can occur during the development of hypergravity stress in plants. Pea roots (15 mm length) of 3-5 days old seedlings and 12-14 days old tissue culture of Arabidopsis thaliana have been investigated. For pea roots hypergravity stress was induced by centrifugation at 10 and 15 g during 15, 30 and 90 min and than intensity of spontaneous chemiluminescence (ROS content) was measured. In the tissue culture oxidative stress was induced by 50 mM H2O2 and after 3 hours ascorbate peroxidase (APX), catalase (Cat), peroxiredoxin (Prx) and thioredoxin (Trx) activities were determined. All experiments were repeated from 3 to 5 times and the obtained data were statistically treated. Under hypergravity stress in pea roots occurred early increase in ROS content to 30 minutes and decrease to 90 minutes, which correspond to the effect of stress oxidative "flash". Under development of the oxidative stress in the tissue culture there were an increase in APX, Cat, Prx and Trx activities. Thus, under development of hipergravity and oxidative stresses in the plants occurre early increase of the ROS content followed by ROS-induced increase in the APX, Cat, Prx and Trx activities. Increase in the activity of these antioxidant enzymes, primarily aimed at increasing of the total antioxidant activity of the cells, to prevent development in their oxidative degradation during the stress accumulation of ROS. In addition, the Prx and Trx may also participate in the formation of stress response as acceptors and transducers of ROS redox signals.