

Due to abiotic stress factors, such as excess of electromagnetic radiation, high and low temperature, drought, moisture or salinity, the reactive oxygen species (ROS) in living organisms which have a negative impact on the proper functioning of vital organs, metabolic pathways and ultimately, existence, are formed. In the case of a plant, this is in particular a limited activity of the photosynthetic apparatus which can lead to the death of the plant.

All of analysis were preceded by the collection of *Festuca rubra* L. samples from different locations in the south-western part of Norway. The locations were different in their temperature (6,5; 9,5 and 10,5°C) and moisture (600, 1200, 2000 and 2700 mm). Then all samples were cultivated in four climaboxes where combinations of four „extreme“ temperatures and moistures (moist/cold, moist/warm, dry/cold and dry/warm) were set.

Experimentally this work was focused on the extraction of ascorbate peroxidase as an antioxidant enzyme, phenolic substances and plant pigments present in Red Fescue (*Festuca rubra* L.) as a model organism. The activity of ascorbate peroxidase was quantitatively determined by spectrophotometric reduction of nitrobluetetrazolium, the phenolic content was evaluated spectrophotometrically by the Folin-Ciocalteu reagent and the plant pigments (chlorophyll *a*, chlorophyll *b*, β -carotene, neoxanthine, lutein, violaxanthin, antheraxanthin and zeaxanthin) were separated and evaluated by HPLC.

The results of analyzes showed that *Festuca rubra* L. was the most stressful in the situation with reduced water intake as confirmed by a decrease in the content of both chlorophyll, β -carotene, neoxanthine and lutein. The amount of violaxanthin was also reduced, demonstrating the ability of the plant to activate its xanthophyll cycle. This activation also involved a considerable increase in antheraxanthin and zeaxanthin. Elevated levels of ascorbate peroxidase and phenolic substances showed how the plant can cope with the forming content of reactive oxygen species. The results also indicated that the temperature change had no significant effect on the plant.