

Description for the general public

Winter stresses are among the major environmental factors with a negative impact on plants' productivity. The objective of the project is to recognize the key components of plant reaction to low temperature in forage grasses. In this proposal, the tetraploid introgression forms of Italian ryegrass with genes of tall fescue, distinct in their levels of frost tolerance, will be used as the plant materials. Italian ryegrass is a forage grass species with a high forage quality and productivity but also with a low level of winter-hardiness and frost tolerance. Otherwise, tall fescue is a grass species with the capacity to cold acclimate and is characterized by relatively high levels of winter-hardiness and frost tolerance. Both species can be crossed with each other and this gives the opportunity to transfer the beneficial traits from one species to another during the process of crossing. The aim of the studies will be to analyze **(1)** photosynthetic apparatus activity; **(2)** accumulation of reactive oxygen species (superoxide anion, hydrogen peroxide, and hydroxyl radical); **(3)** potential of cellular antioxidant system (catalase, ascorbate peroxidase, glutathione peroxidase, glutathione reductase, and superoxide dismutase); and **(4)** biological membranes' integrity. All the analyses will be conducted at the different time-points of cold acclimation (hardening to frost) and in the control conditions (optimal growth conditions).

We assume that realization of the proposal will help to create a model of grass reaction to low temperature stress and will be a good reference for the similar research on other species.