Description for the general public

There has been a significant decline in biodiversity during the past few decades compared with previous geological epochs, mainly due to human activity and climate change. Conservation and sustainable utilization of forest genetic resources, in view of the climate changes and rapidly changing environment that are taking place on Earth are becoming increasingly important issues. Preventing the genetic impoverishment of ecosystems, including forest ecosystems, is a fundamental task in times of a dramatic environmental change. One approach to the successful protection of plant species from the effects posed by climate change is the storage of genetic resources in local gene banks. Preservation of genetic resources can ensure the availability of the widest possible gene pool of a species and represent a variety of provenances. Cryostorage is one of the most important methods of long term storage (more than 10 years) of plant material. Currently, plant cryopreservation is used to safeguard biodiversity.

Cryopreservation is the storage of viable cells, tissues, organs and organism at ultra-low temperature of liquid nitrogen (–196°C, LN) or in its vapor phase (-135 °C). The method prolongs storage life however, subsequent steps of cryopreservation protocol (desiccation of tissue, cryoprotection, cooling in LN and thawing) may cause instabilities on genetic and epigenetic levels. Therefore, prior to any application of the cryopreservation protocol, it should be investigated thoroughly, in order to check whether it causes any changes in the stored material. One of the reasons of cellular component damages, including DNA, are reactive oxygen species (ROS e.g. hydrogen peroxide). Stress conditions influence on accumulation of ROS which are considered as main reason of degenerative processes as mutagenesis, pathogenesis and aging. The aim of the project is to investigate whether particular stages of plant cryopreservation protocol cause oxidative damages to DNA observed as oxidized nucleobases (8-oxoguanine and 5-hydroxymethylcytosine) and strand breaks. In order to investigate how ROS affect viability of plant tissue (embryonic axes excised from seeds) *in vitro* regeneration will be applied. Embryonic axes will be isolated from seeds of two *Acer* species (*Acer platanoides* L. and *Acer pseudoplatanus* L.) of ecological and economical importance that are common in Polish forests and municipal parks. Both species are frequently used in biochemical analyses related to seed sciences and desiccation sensitivity that strongly affects their storability.