

PLANT PHYSIOLOGY

Effect of induced polyploidy in ecophysiological processes in plants.

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study form: full time

Annotation: Polyploidization, the multiplication of the nuclear genome of all cells of an organism, is one of the most significant evolutionary mechanisms in plants that affects their adaptation ability to environment changes. Our knowledge on direct effects of polyploidisation on ecophysiological processes is very limited. Most of studies was performed on natural diploids and polyploids, which are not necessarily genetically identical, which complicates interpretation of experimental studies. An advantage represents plant systems, which includes diploids and synthesized polyploids. The aim of student during PhD period will be to induce polyploids in selected model plant group, characterise them and used to study the role of polyploidy in ecophysiology of plants. The aims of the work are: 1. to clarify the relationship between the level of endopolyploidy and selected stress factors (e.g. water deficit, salinity, UV radiation, biotic stress), while the level of stress response of plants will be monitored by measuring standard stress parameters (ROS, plant photosynthetic activity, secondary metabolites production...) and 2. to elucidate the effect of polyploidy on expression of selected genes, which are exprimed during induced stress reaction of plants.

Study of heavy metal detoxification mechanisms in aquatic bryophytes.

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study form: full time

Annotation: Aquatic habitats are very frequently polluted with different kinds of xenobiotics, including heavy metals. For biomonitoring studies of aquatic pollution algae are frequently used, as they do not contain protective cuticle on the surface of their thalli and can accumulate pollutants over the whole surface of thalli. Similarly to algae, aquatic mosses don't contain a cuticle either. For this reason we will evaluate sensitivity of aquatic moss *Taxiphyllum barbieri* to heavy metal excess in a short-term, as well as long-term studies. Moss *Taxiphyllum barbieri* (java moss) belongs to the common aquatic plants originating from Southeast Asia.

Study of synergism of lichen secondary metabolites with the intension of biological activities

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study form: full time

Annotation: Lichens produce intracellular (primary) and extracellular (secondary) metabolites, which are of considerable benefit to this type of symbiosis. The production of secondary metabolites depends on various biotic and abiotic factors and the content of these substances in lichen thalli varies. Secondary metabolites are produced by mycobiont (fungus) and represent a rich source of phenolic compounds whose activity has been described in several studies. Synergism in the broader sense is a kind of interaction of active substances that can stimulate or inhibit biological effects. The aim of this study will be interaction of secondary metabolites on living systems and stimulation or inhibition of biological activities.