**The citrate transport and drought responses in legumes – the MATE case**

Drought is a major abiotic stressor that limits plant growth and leads to a more annual loss in crop yield than all pathogens combined. As sessile organisms, plants have evolved complex strategies to escape, avoid, or tolerate drought. Sensing and responding to water-deficiency signals is crucial for plants' survival and determines their evolutionary success. However, from an agrobiotechnology perspective, drought avoidance and tolerance are the most promising mechanisms to engineer and improve. One of the strategies for surviving while maintaining plant growth might be the accumulation or exudation of citrate – an organic acid anion.

The multidrug and toxic compound extrusion (MATE) family members are among the active transport systems that may contribute to drought avoidance and tolerance mechanisms through citrate transport.

**The proposed research aims to investigate the role of citrate and its translocation in the drought response of the model legume plant, *Lotus japonicus*.** This scenario is expected, but it has never been experimentally verified.

The experimental work will be organised as follows: *(i)* determination of organic acids profile in different plant parts and root exudates upon drought and control conditions, *(ii)* defining the impact of citric acid application on drought tolerance in *L. japonicus* and regulation of this process at molecular and physiological level; *(iii)* further selection and spatiotemporal evaluation of LjMATEs putatively involved in citrate translocation and drought responses, *(iv)* performing phenotypic analyses on mutant lines (LORE1) and alternatively CRISPR-Cas9 modified plants, *(v)* subcellular localisation and transport assay of selected proteins in a heterologous system.

The proposed project will answer whether organic acids, especially citrate, enhance drought avoidance/tolerance in legumes and if active transport systems might join drought resistance and citrate translocation. In the future, understanding the molecular mechanisms underlining drought tolerance will allow us to identify candidates for engineering approaches or breeding programs. It thus might have a positive impact on the development of sustainable agriculture.