

## **The role of tRNA expression and modification in chloroplast translation during stress**

Translation is one of the gene expression steps that results in the production of new proteins. In plant cells, translation takes place at three places: the cytosol, mitochondria, and chloroplasts. The translation that takes place in chloroplasts is very efficient because it produces almost 50% of proteins found in plant leaves, including the key components responsible for light absorption and CO<sub>2</sub> assimilation. Moreover, efficient translation is necessary when plants are exposed to unfavourable environmental conditions (e.g. high light intensity and too low or too high temperature), because it allows the plant to adapt to such conditions more easily.

An essential element in the translation process are transfer RNAs (tRNAs), which provide the basic building blocks (amino acids) to the newly synthesised protein. Interestingly, tRNAs have a lot of chemical markers (so-called post-transcriptional modifications) that are necessary for their proper functioning. However, the role of tRNAs and their modifications in the translation in chloroplasts is poorly understood. Therefore, the main goal of the SONATA BIS project funded by the Polish National Science Centre is to understand how tRNAs and their modifications affect translation in chloroplasts under adverse environmental conditions such as high light intensity, low and high temperature.

To achieve this goal we will use state-of-the-art techniques such as next generation sequencing and mass spectrometry to characterise tRNAs and their modifications in a model plant *Arabidopsis thaliana*. Moreover, targeted reverse genetics approach will be utilized to discover proteins required for incorporation of modifications into chloroplast tRNAs. In parallel, we will test the physiological role of chloroplast tRNA modifications by analysing the performance of mutant lines under conditions promoting chloroplast stress.

Applications derived from this research program may profit plant-breeding companies and society as a whole. Obtained results will be communicated by publication in the top journals as well as oral and poster presentations on international conferences.