## ABSTRACT

Plants are continuously exposed to unfavourable environmental conditions such as drought, extreme temperatures or exposure to pollutants. For the effective response to stress conditions plants need to adjust the expression of their genes leading to the re-direction of the metabolism and activation of defence mechanisms. The genes expression is regulated by various elements impacting the process of transcription, splicing of RNA and translation (protein biosynthesis) or the stability of transcripts and proteins. In recent years a new gene regulatory mechanism has been discovered – chemical modifications of RNA.

Over 170 modified nucleotides have been described. However, majority of the studies is focused on the most widespread modification – methylation of adenosine at N6 position (m6A). It has been shown that m6A modulates transcript stability and that its adequate levels in transcripts are crucial for plant developmental processes. Alterations in m6A methylation/demethylation machinery results in significant disturbances in plant development. On the other hand, proper modulation of m6A level also resulted in 50% increase in potato yield. The described facts indicate that RNA chemical modifications play important role in plant functioning. However, beside m6A little is known about the levels and functions of other modifications.

The aim of present project is elucidation of the role of three less studied modifications:

- 5-methylcytosine ($m^5C$),
- 1-methyladeonisne ($m^1A$) and
- 8-nitorguanosine (8-$NO_2$-G),

In the response of soybean seedling to metals. The planned experiments include detection of these modifications in plant tissues, assessment of the changes in their level in response to cadmium (Cd), copper (Cu) and lead (Pb), identification of transcript enriched in the modifications by the means of RNA sequencing and estimation of their impact on the translation process.

The results obtained within the project will give a comprehensive view on the involvement of epitranscriptomic changes in the response of soybean seedlings to metals. The results obtained and method elaborated within the project will also facilitate further studies on the role of RNA modifications in plants stress response.