

Bread wheat is one of the most important cereal crop in the world. In Poland is cultivated on almost 2.4 mln hectares, which is about 22% of all agricultural crops. Moreover, in many countries wheat is one of the basic source for food production. During growth and development, plants are exposed to all kinds of biotic and abiotic stresses. Of all these stresses, the most important from the agronomical point of view is drought. What is very important, the drought stress causes great losses of quantity and quality of grain yield. Water deficiency causes the number of changes at every organizational level of the plant, starting from changes in the plant phenotype, length of vegetation, metabolism, as well as changes at the level of gene expression. On the other hand, it was estimated that from 1950 to 2008, the global temperature grew by 0.13 ° C per a decade, and in the next two - three decades the temperature would rise by an average of 0.2° C, which will result in smaller and smaller availability of water for plants.

The main goal of the project is to identify genes and microRNAs involved in plant response to medium long-term drought stress in developing grains of two bread wheat (*Triticum aestivum* L.) cultivars - drought sensitive and drought tolerant. This kind of stress, which will be applied in the experiment is closer to the conditions encountered in the natural environment. Moreover, the difference between the stress reaction paths dependent on and independent of abscisic acid will be determined by spraying wheat plants with this stress phytohormone.

For the most comprehensive examination of the research problem, apart from gene expression analysis by next-generation RNA sequencing, a series of biochemical analyzes and phenotypic observations will be conducted to understand all aspects of wheat response to drought stress. The choice of wheat cultivars and stages of kernel development will allow to learn more about the mechanisms of plant adaptation to the drought stress. The important aspect of the proposed project is the fact that transcriptomic experiments will be carried out for the first time in two developmental stages that are relevant to wheat productivity in long-term medium drought stress. So far, most of the work described in the scientific literature focuses on the impact of a very intensive and at the same time short drought or on a plant regeneration after the above-described conditions. The knowledge about drought stress related genes, which will be acquired in the proposed project may be utilized in the future in breeding programs to develop new wheat cultivars with improved drought tolerance.