

Nowadays among the society so called „functional food” gained the major popularity, especially food rich in the antioxidants, such as flavonoids. Identification of factors that control their biosynthesis in crops enables the improvement of commercially available variants. Analysis of genes involved in the flavonoids synthesis showed to be crucial in the grapevine cultivation. In those plants the synthesis of flavonoids depends on three chalcone synthase gene isoforms (CHS). Many papers are describing the regulations of those isoforms by various environmental factors.

Since flax has been acknowledged by American National Cancer Institute as one out of six the most important sources of nutraceuticals, the research concerning its flavonoid synthesis pathway deserves the special attention as well.

In this project the main aim is the identification of genes encoding all chalcone synthase gene isoforms along with their promoter sequences in flax *Linum usitatissimum* L. Chalcone synthase is a key enzyme in the biosynthesis of flavonoids. The activity of the CHS gene is essential for regulation of many living functions in plant and it depends on the tissue-specificity, developmental stage and environmental stress factors. So far the CHS genes family was not identified thoroughly in flax. The recognition and characteristic of all CHS gene isoforms will significantly enlarge the existing knowledge about flavonoid compounds synthesis. Moreover the defining of the specificity of particular isoforms will provide information about their function and activity regulation, which will support the characteristic of flax genome and physiology. Additionally the experiments planned in this project will serve in the future for generation of new usable types of flax with improved properties.

Performing of planned experiments will allow to enrichment of the knowledge about mechanisms that control the flavonoids biosynthesis. In the further perspective the continuation of the study described in the project will allow to the significant research improvement, according to the effective manipulation of the flavonoids content in flax and limitation of the risk of negative effects of this modulation. It is very significant aspect in the context of practical application of plants not only due to the increased level of flavonoids, but possibly due to the perspective of precise control of the flavonoids biosynthesis pathway and obtaining plants with characteristic profile of metabolites.