

The goal of the project is the determination of the role of metabolic, morphological and genetic properties of *Neosartorya* spp. fungi in shaping their resistance to preservatives, chemicals and natural plant extracts.

The specific objectives of the project include:

- the evaluation of the sensitivity of *Neosartorya* spp. isolates on preservatives and plant extracts;
- the determination of chemical sensitivity, metabolic properties and morphological features of selected *Neosartorya* spp. isolates with various susceptibility to preservatives and plant extracts;
- the determination of plant extracts influence on phenotype, including metabolic profile and morphological features of fungi.
- the performing genome and transcripts analysis of selected *Neosartorya* spp. with various susceptibility to preservatives and plant extracts.

The project is interdisciplinary and includes several research fields: agronomy, microbiology, mycology, biochemistry, molecular biology and bioinformatics.

Neosartorya spp. is a mould that forms structural elements such ascospores, which are resistant to high temperature. They are able to survive temperatures of 75°C, 80°C, 95°C and even 100°C for a few minutes, grow after exposure to 60-65°C. These fungi are able to survive the pasteurization process, and can therefore contaminate fruit products. In the natural environment, this organism occurs in soil and plant debris, but can also cause the contamination of fruit, mainly strawberries, grapes and apples, as well as fruit juices, vegetables, production lines and packaging.

The soft fruit sector, particularly the production of strawberries, play a very important role in global agricultural and horticultural production. Poland is one of the largest strawberry producers in Europe, that is why the production of high quality raw materials is critical to both national and international food processing. Therefore, the study of heat resistant mould, which can be found in the crop, should be one of the key areas in the context of the safety and quality of raw materials and processed fruit. **The research proposed for the project is related to the search for chemical compounds and natural plant extracts that could be used in agriculture as active substances which control the occurrence of these organisms in plant crops, which is very important in the context of the latest European Union Strategies such as The European Green Deal and The Biodiversity Strategy for 2030, which assume an increase in organic farming production and a reduction in the chemicalisation of agriculture.**

In the literature only fragmentary information is available concerning the chemical sensitivity (including preservatives and plant extracts) of *Neosartorya* spp., however, there is a lack of any study referring to the data describing the metabolic and genetic changes of this fungus under the influence of chemicals, preservatives and plant extracts. This indicates the necessity of basic research in this field in order to determine the spectrum of compounds that cause growth inhibition or the death of this fungus. Using phenotype microarrays it is possible to analyze hundreds or even thousands of phenotypes based on the use of various chemicals and dye oxidation/reduction. This method provides a wide spectrum of possibilities in the characterization of microorganisms, including heat resistant fungi. As part of the project, the analysis of differential gene expression will be carried out, and the collected data will be subject to comprehensive bioinformatics analysis.