

The interest in insects as the sources of edible tissue and their consumption results from their interesting chemical composition, e.g. high protein content, fat content rich in mono- and polyunsaturated fatty acids, chitin, as well as the presence of minerals and vitamins. Additionally, breeding insects has a much lower negative impact on the environment than traditional animal livestock farming. However, in addition to the benefits mentioned, there are unfortunately some risks. Among the most important are microbiological hazards, i.e. the presence of bacteria, yeasts, moulds, and allergens. However, knowledge about the nutritional value of many insect species is still limited. There are also no studies that tested the impact and explain the mechanism of applying various treatment methods on the microbiological quality and chemical composition of insects. For this reason, new solutions are being sought to enable insects to be used more extensively in food technology. Research in this field therefore seems to be fully justified.

The justification for this research project is the increasing world population which, according to FAO (Food and Agriculture Organization of the United Nations) estimates, will approach 10 billion people in 2050, an increase of 34%. With the global population growth, the demand for food is also growing, especially protein-rich products. The increasing demand for food leads to intensification of agricultural production and livestock farming, which has an unfavourable impact on the environment. One promising solution to this problem seems to be the rearing of edible insects as a new source of food.

The aim of the project is to determine the basic chemical composition and the count of microorganisms in edible insects, taking yellow mealworm *Tenebrio molitor* L. as an example, and to explain the mechanism of the impact of non-thermal pretreatment methods and to determine their impact, as well as the drying process, on the microbiological quality and physical and chemical properties of edible and insects. ingredients derived from them (e.g. fat). In addition, the research aims to identify changes in the properties of insect tissue, resulting from the use of pre-treatment methods and the drying process. The project will investigate the effect of blanching (BL) as a reference sample, as well as innovative, non-thermal processing methods, i.e. pulsed electric field (PEF), ultrasounds (US), high hydrostatic pressure (HHP), and combined methods on the properties of the treated material, the convective drying process and the properties of the dried materials and fat.

The results of the project will allow to understand the mechanism of impact of new non-thermal pretreatment methods on the structure of edible insects, taking yellow mealworm *Tenebrio molitor* L. as an example, and to compare their effectiveness, in particular on microbiological quality and selected quality characteristics, such as protein and fat content, with its characteristics. The knowledge gained during the project will allow a better understanding of the phenomena occurring during pretreatment, as well as the prediction of their effects. The research conducted can provide reliable, scientifically documented information on the nutritional value of insects as an alternative food source. Such data can help decision-makers make more informed choices about sustainable food production and the promotion of new protein sources. The results of this project can therefore support the development of nutritional, social and environmental policies and contribute to the creation of more sustainable and balanced food systems.

The obtained results will be used as a starting point for further research on ensuring the appropriate microbiological quality of edible insects, as well as modifying the physical properties of their tissue, which could result in shorter drying times and lower electricity consumption, reducing the negative impact which could result in shortening the drying time and lowering electricity consumption, limiting the negative impact on the surrounding natural environment. The research results will also contribute to broadening the knowledge on the chemical composition of edible insects and encourage potential consumers to include them in their daily diet. Importantly, the results obtained can be used in the food production sector in the future. Insects prepared in the manner proposed in the project could be an interesting ingredient for potential use to enrich commonly known food products as a source of protein or other ingredients, bioactive or mineral.