Chitosan is a natural compound with remarkable properties, such as biodegradability, non-toxicity, and antimicrobial activity. It is increasingly used in medicine, agriculture, and environmental protection. Traditionally, chitosan is obtained from marine crustaceans like shrimp or crabs, but this process is costly and requires harsh chemicals. An emerging and more sustainable alternative is to extract chitin from insects.

The aim of this project is to develop a method for synthesizing chitosan using dead forest insects, which are already collected in sanitary pest control operations. These insects are considered harmful to forest ecosystems due to their mass outbreaks. By using them as a raw material, we can add value to what is currently treated as biological waste. This approach fits within the principles of circular economy and sustainable natural resource management.

The study will examine a few different insect species. The insects will first be cleaned, dried, and ground. Chitin will be extracted and then chemically converted to chitosan through a multi-step process (demineralization, deproteinization, deacetylation, and decolorization). The obtained chitosan will be analyzed using advanced techniques such as Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), X-ray diffraction (XRD), and thermogravimetric analysis (TGA).

The process will be optimized for one selected insect species—chosen based on its high chitin content and forest abundance. Finally, the project aims to test the process at a semi-technical scale, using 0.5 to 1 kg of insect biomass in a single synthesis batch.

The outcome of the project will be not only a developed method for producing insect-derived chitosan but also a better understanding of the potential of forest pests as a source of valuable biopolymers. This innovative approach highlights how even seemingly harmful or useless organisms can provide real value when studied from a scientific perspective.