

Flax is one of the oldest cultivated plants. Two valuable products are obtained from it - seeds and fiber. In the old days it was described as more valuable than gold, as it provided clothing, food, animal feed, and medicine. Today, a big problem for flax crops are fungal infections, causing large yield losses. This is also related to the contamination of flax raw materials with mycotoxins.

Mycotoxins are secondary metabolites of filamentous fungi, commonly known as molds, which are toxic to humans, animals, plants and other microorganisms. They can be formed in many crop plants during fungal infections and in favorable climatic conditions, and then accumulate in plant materials. They can also arise during improper storage and transport of finished products. Their presence in food poses a threat to the consumer. They are invisible, they can be found in the product in which traces of mold are no longer detectable, in addition, they are extremely resistant to heat treatment, you cannot get rid of them by cooking or baking. Their harmful effects on living organisms can be revealed even at low concentrations. They can cause acute poisoning or chronic poisoning. Symptoms of chronic mycotoxin poisoning include weakened immunity, skin irritation, allergies, respiratory problems and metabolic disorders. These compounds can also lead to the development of cancer. Presence of mycotoxins in food is not routinely tested and their content is not clearly regulated, despite the fact that many studies indicate a potential risk to consumer safety from these substances.

Due to the fact that linen products are used in the food, cosmetic, pharmaceutical and medical industries, it is important that they are free from fungi and the mycotoxins. There are methods to combat fungal diseases of plants. The most popular is the use of chemically derived fungicides. However, this method has its drawbacks, it causes environmental pollution, pathogenic microorganisms may acquire resistance to the agents used, and there are also reports of potential harmfulness of fungicides to human and animal health. In addition, more and more consumers want to choose free from such chemicals products from organic farms. Another important method is to grow plants that are resistant to fungal infections. However, there is a risk of the so-called masked mycotoxins. Due to enzymatic reactions carried out by plants, mycotoxins are transformed into compounds that are not toxic to them, but are harmful to animals and humans. A good alternative to these methods may be the use of plant metabolites. It has been found that many of them inhibit the growth of fungi, which may translate into a lower content of mycotoxins in plant materials. There is also the possibility that these compounds directly reduce the production of mycotoxins by fungi.

So far, there is not much information on the quantitative and qualitative characterization of mycotoxins in flax. The effectiveness of plant metabolites in reducing the content of mycotoxins in flax was also not assessed. The aim of this project is to answer the question whether plant metabolites can play such a role? Based on the conducted preliminary research, we decided to select phenolic and carotenoid compounds that seem to be good candidates as compounds limiting the growth of fungi and production of mycotoxins.

In the first stage of the project, we will thoroughly analyze the impact of selected metabolites on the growth and development of fungi of the *Fusarium* and *Alternaria* genera, and the production of mycotoxins by them. We will also assess whether these compounds have a negative effect on the plant. Next, we will check whether the tested compounds protect the plant against fungal infection and the toxic effects of mycotoxins and in the next step, whether the raw materials obtained from plants are free of these dangerous compounds. The last step is the assessment of the safety of these compounds for human and animal health. The results of the research included in the project will allow to expand the knowledge about mycotoxins in flax, and may also contribute to the development of an effective method of flax protection based on minimizing their content in flax seeds and fibre. This will translate into the safe use of flax raw materials for food, cosmetic and medical purposes.