

Pathogenic strains of fungi and bacteria are the main factors limiting growth and development of crops, including flax. The most dangerous flax pathogen is *Fusarium oxysporum f.sp. lini*, the infection of which leads to *Fusarium* wilt of flax, thereby significantly reducing the yield. Therefore, the methods to increase plant resistance to pathogen are needed. One such method is the use of biocontrol agents, e.g., endophyte microorganisms. In flax, this is demonstrated by the non-pathogenic strain *Fusarium oxysporum (Fo47)* which may reduce the development of disease in plants. However there are no literature reports on whether the non-pathogenic strain of *F. oxysporum* can contribute to defense of a plant already infected with a pathogenic strain. This is an important aspect, as there is often a pathogen already in the field or even in the seed that develops before preventive measures can be taken. Development of an efficient strategy to mitigate disease symptoms in already infected plant would be of great agronomical importance. Before such strategies can be considered the occurrence of the horizontal gene transfer between pathogenic and non-pathogenic strain needs to be investigated. Now it is not known whether and to what extent such transfer between strains of non-pathogenic and pathogenic *F. oxysporum* occurs *in vitro* or in soil or flax. This is an important aspect, which should be taken into consideration for determination whether the use of a non-pathogenic strain in this case benefits the plant or supports its infection. The aim of this project is to investigate the occurrence of the horizontal transfer of pathogenicity genes and/or chromosomes between *Fusarium* strains. If the transfer is negligible, then there is a possibility that the non-pathogenic strain of *F. oxysporum* can be efficiently used to the protection of flax already infected by the pathogenic strain of *F. oxysporum*, and the project will explore by which mechanisms this protection occurs.

During the project, we will successively answer the following questions:

1. Does the non-pathogenic *Fusarium oxysporum* strain contribute to defense or immunity of flax already infected with a pathogenic strain? If so, by what mechanisms does it occur?
2. Does the horizontal gene transfer occur between non-pathogenic and pathogenic strains *in vitro* and *in planta*?
3. Does the horizontal gene or/and chromosome transfer influence the effect of a non-pathogenic strain in the plant?

Neither the effects of a non-pathogenic strain on already infected flax nor the presence of horizontal gene transfer and/or chromosomal transfer between these strains have been investigated. There are no literature studies on these aspects, which are of great importance for crop protection studies.

The innovative nature of the project includes obtaining knowledge about horizontal gene transfer or horizontal chromosome transfer between the non-pathogenic *F. oxysporum* and pathogenic *F. oxysporum f.sp. lini*, as well as obtaining new knowledge about the behavior of the non-pathogenic strain in the already infected flax, with emphasis on potential mechanisms occurring during the coinoculation with pathogen in the plant. Such studies have not been conducted before.