

The main objective of the project is to determine the role of arbuscular fungus *Rhizophagus irregularis* in colonization of potato (*Solanum tuberosum* L.) roots in the spreading of potato virus Y (PVY). Arbuscular mycorrhizal fungi (AMF) are potato symbionts which contribute to the improvement of the growth and development of the potato, e.g. through acquisition of minerals and increasing their tolerance to factors both abiotic (e.g. drought, salinity) and biotic (increased resistance to pathogens). The potato is a commonly cultivated vegetable in Poland and around the world. However, its production is often limited by pathogens, which include PVY. Previous studies have indicated that different species of aphids are responsible for spreading the PVY. Unfortunately, all efforts to eliminate this route of PVY transmission have not brought the desired effects.

Within the project we formulated the main **hypothesis** that arbuscular fungus *R. irregularis* can be the vector responsible for the spread of the PVY between plants. The proposed hypothesis has been supported by pilot studies. **The reason for taking this research subject** is the widespread use of biofertilizers (which often include AMF), what can indirectly contribute to the spread of viruses between crop plants. This fact obliges us to carry out detailed research in this direction and to clarify these important relationships, which may have an important influence on current technologies in potato cultivation.

The project envisages conducting comprehensive research both on *in vitro* cultures as well as in pot experiments. In the project we plan to use modern techniques for a detailed verification of the adopted research hypothesis. In the experiments we will use microbiological methods (culture of AMF), microscopic methods (TEM for assessment of plant infection level by PVY; LM to determine the level of colonization of plants by AMF), molecular methods (RT-qPCR for determining the presence and number of PVY copies; transcriptomic analysis for evaluation of changes in the expression of genes), ecological methods (cultivation, determination of plant parameters, soil analysis) and biochemical methods (ELISA for assessment of plant infection level by PVY and analysis of ROS level in plants). In our experiments we will investigate: (i) the correlation between the AMF potato root colonization and the number of PVY copies, (ii) the effect of PVY on the functioning of AMF, (iii) changes in the expression of plant and AMF genes in response to biotic stress. The study will significantly expand the actual knowledge about the interactions in a plant-AMF-PVY system.