

## Abstract

*Pythium oligandrum* is one of the unique microorganisms increasingly used in biological plant protection in sustainable agriculture. The search for new promising strains requires subsequent analysis in terms of their effect on plant metabolism.

In this work, the effect of tomato seed treatment (*Solanum lycopersicum* L. cv. Micro-Tom) by *Pythium oligandrum* isolates on plant metabolism after exposure to the fungal pathogen *Alternaria brassicicola* with emphasis on the antioxidant system was studied. *Alternaria brassicicola* is a necrotrophic fungal pathogen that causes black spots on agricultural crops, especially from the *Brassicaceae* family. Pathogen recognition is associated with a hypersensitivity reaction, which features formation of superoxide radicals. Reactive oxygen species function at low concentrations as signalling molecules, but at high concentrations they damage cellular components and lead to cell apoptosis. To maintain redox balance, the plant uses a system of antioxidant enzymes and antioxidants. The activity of selected antioxidant enzymes catalase and superoxide dismutase isoforms was increased after *Alternaria brassicicola* infection. On the other hand, the content of phenolic compounds, which are associated with antioxidant capacity, remained unchanged. The increase in activity of NADP-dependent malate dehydrogenase (decarboxylating) and glucose-6-phosphate dehydrogenase, which are involved in the delivery of NADPH for NADPH oxidase in the hypersensitivity reaction and for glutathione reductase, was also detected.

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