

Title of the project:

Metabolic and molecular characteristics of selected entomopathogenic fungi and their impact on plant and soil microbiome

Competition: OPUS 27

Supervisor: prof. dr hab. Magdalena Frąc

Assistant supervisor: dr inż. Dominika Siegieda

Entomopathogenic fungi are natural enemies of pests and belong to environmentally friendly microorganisms, used mainly in agriculture to protect crops and reduce the need for pesticides. Most commercially available biopreparations contain fungi of the genera *Metarhizium* and *Beauveria*; however, many other fungi are equally effective in pest control, but are not used to produce biopreparations. Such microorganisms include, e.g. fungi of the genera *Samsoniella*, *Akanthomyces* and *Hirsutella*, which have potentially valuable biological properties and could be used to control pests or as microorganisms improving plant growth. However, they remain unused due to the lack of sufficient research on the method and scope of their action.

The proposed research focuses on basic research covering identifying the metabolic profile and functional structure of the genomes of selected species of entomopathogenic fungi, not yet used in agricultural practice, and their impact on natural bacterial and fungal communities of soil and plant. By integrating metabolic, molecular and bioinformatic methods, the research aims to deepen knowledge on less frequently used species of entomopathogenic fungi with significant infectious potential, thus enabling the development of bioinsecticide preparations in the future.

The objectives include identifying the metabolic profile of selected entomopathogenic fungi using the Biolog system and determining the functional structure of genomes using advanced genomic and transcriptomic techniques. The proposed research aims to identify changes in the microbiome and mycobiome of soils and plants, based on metataxonomic analysis, under the influence of selected taxa of entomopathogenic fungi.

The proposed research is essential for understanding new ecological roles and adaptive capabilities of entomopathogenic fungi. It will increase microbial biodiversity and soil quality awareness, and identify genes and metabolic pathways crucial for their pathogenicity and host interactions. The proposed research will provide basic knowledge, essential for the development of biopreparations for agriculture in the future.

Additional requirements for the candidate:

Investigator should have experience and skills in work with classical microbiology methods and molecular biology techniques. The ability to elaborate results statistically and graphically. Bioinformatical skills are welcome. Master in biotechnology, biology, environmental protection or related education in life sciences.

Requirements:

1. Master's degree in agriculture, biology, biotechnology, chemistry or related sciences.
2. Ability to work with insects.
3. Knowledge of laboratory instrumental analysis techniques of feed, food, organic samples.
4. Communicative knowledge of English in speech and writing, allowing for comprehensive assistance in scientific research and development of results.
5. Availability, ability to work in a team and cope with stress.
6. Experience in working with insects is welcome.