

Bacteria belonging to the *Pectobacterium* genus are both saprophytes and pathogens of many plant species. They cause diseases such as blackleg or soft rot, contributing to significant losses in crops of potato and other vegetables, fruits as well as ornamental plants worldwide. The majority of species and subspecies of *Pectobacterium* can colonize different hosts, from potato to cacti.

The objective of this project is to reveal the factors promoting rapid spreading, changing the host plant and adaptation capacity to the environmental conditions of ubiquitous plant pathogens - bacteria of the genus *Pectobacterium*. Therefore we propose to perform a comprehensive genetic and phenotypic characterization of selected cosmopolitan strains of the genus *Pectobacterium* capable of infecting many species of plants (from potato to cacti). We plan to use genomic and transcriptomic analyses to select candidate genes and then we are going to construct the mutants of bacteria within chosen candidate genes, which will enable the further stages of research aimed at understanding the molecular factors relevant to the environmental adaptation and expansion of the genus *Pectobacterium*.

Bacteria belonging to *Pectobacterium* have been isolated on all continents except Antarctica ([www.faostat.fao.org](http://www.faostat.fao.org)). *P. carotovorum* is geographically widely distributed, whereas *P. atrosepticum* is largely confined to colder climate. *P. c.* subsp. *carotovorum* is the etiological agent of soft rot diseases of several crop plants, while *P. atrosepticum* is of particular importance in blackleg disease of potato in temperate regions. *Pectobacterium cacticidum* was observed only in desert areas, where the host plants grow. In the case of the subspecies *P. c.* subsp. *brasiliense* it was initially isolated in tropical regions (Brazil, Africa), but now it commonly occurs in the temperate climate, also in Poland and other European countries such as Belgium, the Netherlands, Norway Switzerland. Analogous way to spread the pathogen from tropical regions to temperate climate zones was observed in the case of a *Dickeya solani*. In Poland, *D. solani* appeared simultaneously with the opening of the borders after 1989. On the beginning strains were isolated from ornamental plants grown under the greenhouse conditions. The first strains infecting potato were isolated in 2005, after Polish accession to the European Union, which led to a free exchange of seedlings, ornamental plants, seed and food. It should be noted that both pathogens propagate rapidly and are characterized by a strong virulence and a wide range of host plants. Water is an excellent medium for distribution this group of bacteria. Undoubtedly *Pectobacterium* is an emerging pathogen and the number of reports concerning it is rising. This genus is recognized as one of the 10 most important plant pathogens from economic and scientific point of view. Pectobacteria are characterized as opportunistic pathogens that switch from an asymptomatic latent phase into a virulent phase in suitable environmental conditions.

Results obtained in this project should provide an insight into the physiology, ecology and environmental adaptation mechanisms that ensure effective expansion of the genus *Pectobacterium*. Knowledge of the genetic potential and possibilities of adaptation of the whole genus would be important, especially in the context of increasing international exchange of plant materials and the observed climate change.