Univerza *v Ljubljani*, Biotehniška Fakulteta

JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST
REPUBLIKE SLOVENIJE

Research projects (co)funded by the Slovenian Research Agency

Project

Member of University of Ljubljana	University of Ljubljana, Biotechnical Faculty
Code	J4-9302
Project	Investigations of cell-cell communications in multi cellular groups composed of different Bacillus isolates
Period	1. 7. .2018 – 30.6. 2021
Range in 2018	1,50 FTE
Head	Mandić-Mulec Ines
Research activity	Plant production
Research Organisation Partners	University Of Ljubljana, Biotechnical Faculty
	National Institute of Biology
	University of Maribor
Co-financing Organisation	
Abstract	Microbe-microbe and plant –microbe interactions in the rhizosphere determine plant health, productivity and soil fertility. Plant growth-promoting bacteria (PGPR) are bacteria that can enhance plant growth and protect plants from disease and abiotic stresses through a wide variety of mechanisms. These bacterial inoculants, especially endospore-forming Bacillus strains, have been proven as efficient and

	environmentally friendly alternatives to chemical pesticides and fertilizers. However, despite their many advantages, first generation PGPR often lack efficiency, failing to fulfil the expectations of the users, and new innovative approaches are needed to improve this eco-friendly technology. This project will tackle this gap in understanding and provide answers that are of fundamental ecological importance by investigating bacterial 'social interactions'. Bacteria are perceived as 'social' in that they generally exist in multicellular groups of cells (biofilms) where they engage in a fierce and unforgiving competition for resources (food and space) but also in cooperative (synergistic) interactions that enhance productivity of the community. The project will shed new light on two types of bacterial social interactions: a) Bacterial communication (also known as quorum sensing) and b) kin discrimination (KD). These behaviors will be studied in multicellular groups (biofilms) and also in relation to plant health. Understanding how bacteria communicate, identify their social partners, synchronize their behaviors to conduct multicellular functions is of fundamental scientific importance and will be the focus of this project. We predict that this knowledge is a key to improve PGPR inoculants and thus represents a highly innovative approach.The strength of the project is that it combines ecologically and agriculturally relevant model bacteria (B. subtilis and related species), agriculturally relevant plants (e.g. potato), carefully designed and hypothesis driven experiments and mathemacal modelling, which are essenal to predict behaviour of complex systems (e.g. bacterial biofilms/inoculants composed of more than two strains or species). This novel strategy, based on understanding of QS and KD, will be addressed through joint efforts of three highly renowned research groups, from threee institutions: University of Ljubljana-Biotehnical Faculty, Natioanl Institute of Biology and University of Maribor, that will generate fascinating discoveries, important for development of new PGPR technologies that will be based on fundamental understanding of Bacillus ecology and physiology.
Researchers	link na sicris http://www.sicris.si/public/jqm/prj.aspx?lang=eng&opdescr=search&opt=2&subopt=402&code1=cmn&code2=auto&psize=10&hits=1&page=1&count=&search_term=J4-9302&id=17323&slng=&order_by=
The phases of the project and their realization	WP1: Preparation of tools and optimisation of methods to study social interactions in biofilms and on plant roots (1-18) UL-BF

	WP2: Preparation of tools and optimisation of methods to study influence of bacterial social interactions on plants (1-18) UL-BF, NIB) WP3: Investigations of QS dependent regulation of biofilm development and the role of proteases in the QS response (1-24) UL-BF WP4: Determination of mechanisms of intraspecific (KD) and interspecific communications in mixed biofilms (M 3-36) (UL-BF-UMB) WP5: Investigation of bacteria-plant interactions (M 6-36) (UL-BF, NIB)
Citations for bibliographic records	link na sicris http://www.sicris.si/public/jqm/search_basic.aspx?lang=slv&opdescr=search&opt=2&subopt=1&code1=cmn&code2=auto&search_term=J4-9302