

Status of CIPKeBiP: Participating organisation
Title of the project: **Prevention of growth of pathogenic fungi in dishwashers**
Coordinator: **Prof.Dr. Nina Gunde-Cimerman**
ARRS code: L4-5533 (D)

General information on financing
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CIPKeBiP Membership

Name	ARRS code	Research area	Position
Rikanović Tanja	37161	Biochemistry and molecular biology	Researcher 2013-2016
Dr. Nina Gunde-Cimerman	05935	Biotechnology/Microbe biotechnology	Coordinator 2013-2016
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Abstract

Human households represent suitable habitats for ubiquitous saprobic microorganisms, as well as for extremotolerant ones. A vast amount of literature is available on the airborne fungi, mostly saprobic species, usually classified as a common flora, which inhabit walls and other surfaces in our homes. However, other very special human-made ecological niches inside household appliances, such as washing machines and dishwashers, are also suitable for microbial colonization and can be classified as extreme based on predominant abiotic factors. Our previous research of surfaces within dishwashers, which received enormous public attention because of the alarming results, demonstrated that dishwashers were inhabited by extremotolerant fungi, which otherwise only thrive in special niches in nature. The sampling of 189 dishwashers from different households in Slovenia and around the globe revealed that more than half of the dishwashers contained a consistent fungal community, primarily composed of different thermotolerant yeast species. Noteworthy is the fact that almost all of the identified fungal isolates belong to the species reported to cause systemic diseases in immunocompromised patients and are known as causative agents of nosocomial infections. The predominant species were from a black yeast genus *Exophiala*, which comprises several species that are important human pathogens. The black yeast genus *Exophiala* is particularly dangerous as these species are thermotolerant and can thus cause systemic and brain infections even in healthy, immunocompetent individuals. Fungi of the genus *Exophiala* additionally exhibit tolerance to, high-pH values, high NaCl concentration, detergents and are thus capable of surviving dishwashing cycles. Since it is known from our recent publication that fungi are common inhabitants of dishwashers, the presented project aims to estimate the site and way of their entry into the dishwashers, and their occurrence and extent on different materials inside the dishwashers. The proposed project aims to study mainly black yeasts from the genus *Exophiala*, the sturdiest fungi determined as common inhabitants of dishwashers. Furthermore, their *in vitro* physiological characteristics, their response to polyextreme environment on the level of morphology and their ability of biofilm formation will be determined and their transmission from the dishwashers to the environment will be investigated. We expect to identify the physiological growth-limiting parameters of the predominant fungal species. Since the identified species are able to grow at 37 ° C they might represent human pathogenic and opportunistically pathogenic fungal species. Thus an almost daily exposure of people to aerosols and/or possibly contaminated kitchenware from the dishwashers might represent an important risk factor for the immunocompromised people, small children and the elderly, as well as for healthy individuals. Based on the results of the proposed project and in close collaboration with the industrial partner, we intend to determine the conditions and to find new

technological solutions, which will prevent colonization and growth of the most resistant, pathogenic fungi in the dishwashers and prevent human infections.