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Author: Dr. Petra Rettberg

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, petra.rettberg@dlr.de

Ms. Jana Fahrion

DLR (German Aerospace Center), Germany, jana.fahrion@dlr.de

Ms. Carina Fink

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Institute of Aerospace Medicine, Germany,
carina.fink@dlr.de

Dr. Corinna Panitz

RWTH Aachen, Germany, corinna.panitz@dlr.de

Dr. Elke Rabbow

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, Elke.Rabbow@dlr.de

Dr. Daniel Schubert

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, daniel.schubert@dlr.de

Mr. Paul Zabel

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, paul.zabel@dlr.de

Dr. Kristina Beblo-Vranesevic

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, Kristina.Beblo@dlr.de

MICROBIAL DYNAMICS IN THE CONFINED EDEN-ISS GREENHOUSE IN ANTARCTICA

Abstract

Plant cultivation in large-scale closed environments is challenging and several key technologies necessary for space-based plant production are not yet space-qualified or remain in early stages of development. The EDEN ISS project (EC Horizon 2020 RIA, grant no. 636501, <https://eden-iss.net/>) developed and demonstrated higher plant cultivation technologies, suitable for future deployment on the International Space Station and from a long-term perspective, within Moon and Mars habitats. The cultivation of fresh vegetables in the EDEN-ISS greenhouse was tested for nine months in Antarctica. Throughout the cultivation period the microbial bioburden and biodiversity was monitored inside the greenhouse on a regular basis to assess the potential microbial risks associated with plant and human pathogens. Samples were taken from plants, surfaces inside the greenhouse, plant nutrients solutions and the fresh water tank. From preliminary results of the ongoing analysis, it can be stated that in general, the quantity of microorganisms, i.e. bacteria, molds and yeasts, was fluctuating substantailly during the nine months. The microbial load in the nutrition solution as well as the surface contamination increases over time. Almost all microorganisms found on the plant samples are molds. The quantity as well as the diversity of microorganisms on the plant surfaces is very low compared to commercially produced vegetables from a German grocery.