

Challenges of Life Support/Medical Support for Human Missions (8)
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SPACEBAKERY – A CLOSED ECOLOGICAL PLANT CULTIVATION SYSTEM AND BAKERY FOR
EXTENDED STAYS ON PLANET MARS AND THEIR APPLICATIONS FOR PLANET EARTH

Abstract

A Moonshot statement was made by Puratos in 2018: Learn to bake bread on Mars. Why? The people that will set foot on Mars need to have access to sufficient food supply. For this purpose Puratos engaged in a collaboration with Urban Crop Solutions, Magics Instruments, Flanders' FOOD, SCK.CEN, Ghent University and Hasselt University and started together the joined SpaceBakery project, with an official start in January 2020. The project idea is to develop a Closed Ecological Plant Cultivation System and Bakery, suitable for a Mars mission concept, but designed and engineered for direct equivalent applications for Planet Earth: a closed and self-sustainable modular system which is independent from agricultural land or climate and optimal use of resources. The specific objective of the project consortium has direct parallels with the challenges of developing closed ecological systems and bioregenerative life support technologies for space applications. The research combines a series of emerging and disruptive technologies as a speaking plant approach for crop modeling, agrobots, AI, automated indoor farming, closed loop farming, microbiology and natural food fermentation. Key objectives are the design of a smart and energy efficient crop production system, the modeling of wheat growth within the specific conditions of the closed environment, the valorization of plant fibers as source of nutrients within the closed cycle, the identification of beneficial microorganisms to increase the nutrient availability for plants, the characterization of microbial communities present in each step of the production cycle and their influence on the natural fermentation processes in bread and the selection of a diverse range of crops to create nutritional and tasty bread products. Within a period of two and a half years, this consortium aims to achieve the development of a closed ecological plant cultivation system and bakery that can provide the first Martians with bread and also generates insights for sustainable and nutritional food production here on earth.