

Press release

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Tomatoes from space shuttle, desert and polar regions

Controlled environments enable agriculture under extreme conditions – latest developments at REFAB conference in Cologne

Have you ever dreamed of taming the desert? Of flying to the moon and back? Come and meet the pioneers of tomorrow's world at the "Revolution in Food and Biomass Production (REFAB)", October 1 and 2 in Cologne (Germany). The required technologies are available. Their smart integration pushes our limits beyond imagination and opens up a world full of possibilities. Even here on our planet.

Bitter cold or burning heat, a smart integration of technologies allows crop cultivation even in the most extreme conditions on Earth or, taking it one step further, in space stations and on Mars.

Following new pathways, previously unknown challenges have to be met with innovative solutions: LED lighted greenhouses, desalination of seawater (in combination with aeroponic, hydroponic and aquaponic systems) as well as solar technologies and closed biomass cycles open up completely new areas for food production. These topics are one of the focal points of the REFAB conference, 1 – 2 October 2018, Cologne (Germany).

Fully automated and controlled environments for agriculture are no longer just a dream. Developed in the science laboratories of space agencies, first commercial systems are available.

Key technologies are so-called hydroponic or aeroponic systems which allow growing plants without soil and with plant nutrition and water supply that perfectly fits the plants requirements. Research in this field is ongoing: Scientists of the European MELiSSA project developed systems for growing vegetables in Antarctica and even on space stations: LED illumination combined with temperature and nutrient control create a suitable environment for cultivating tomatoes, cucumbers or lettuce. Developed for life in space, these technologies enable food production basically everywhere.

Researchers at Wageningen University (NL) are looking into the vision of food production and supply for a future Martian colony: How can future inhabitants sustainably produce sufficient food within the existing conditions? Which resources will be available? More importantly, what will be missing? The scientists are testing the cultivation of vegetables in a simulated Martian soil. An important issue is the usage of the available resources as efficiently as possible, e.g. organic waste and excrements. In addition, the scientists enrich bacteria and fungi in the soil to optimize the nutrient supply of the plants and breed bumblebees for pollination. The cultivation of potatoes, tomatoes, radishes and many more plants has already been successfully tested. The aim is to develop a sustainable ecosystem for the food supply of future colonies on Mars.

Christophe Lasseur from the MELiSSA programme as well as Wieger Wamelink and Joep Frissel from Wageningen University will present ways to sustainable agricultural ecosystems for Mars and the Moon at the REFAB conference.

Mankind's old dream of a green and blooming desert is now within reach. Integrating and adapting different traditional and innovative technologies into various environmental conditions plays an important role to achieve this goal.

Although agriculture has always been practiced in arid areas, soil availability and quality as well as water availability remain limiting factors. The consequences of agriculture are salinisation and erosion of soil as well as decreasing groundwater levels.

Regions including large desert areas are intensively researching new ways to bring the desert to life in a sustainable way: In hydroponic systems, plants grow in a special nutrient solution so that vegetable cultivation is also possible on infertile land. In addition, these systems allow water savings of over 90% in fruit and vegetable cultivation. Several companies in the MENA region are already successfully commercializing these systems. Teshuva Agricultural Projects from Israel will present its solutions for agriculture under extreme conditions at REFAB.

The Sahara Forest Project from Norway will present its own vision of greening the Sahara at the conference. The heart of this project is the combined use of Concentrated Solar Power (CSP) and salt-water cooled greenhouses. These systems can be supplemented by various systems: Aquaculture/algae, salt-resistant hedges/trees as well as seawater desalination form an integrated saltwater-based food supply system in arid areas.

Agrophotovoltaics reinvents the classic stratification of natural vegetation. Fraunhofer ISE realized a project where photovoltaic systems and conventional crops are combined vertically on a shared patch of land. While wheat, potatoes or clover grass grow on a ground layer, photovoltaic systems are installed at a top layer in a few meters height. Resulting yield losses of both systems are more than compensated by the combined area use: This is a central milestone in increasing land use efficiency.

These and more projects and prominent companies will be presented at the conference "Revolution in Food and Biomass Production (REFAB)", 1-2 October in Cologne, Germany. Altogether, 50 speakers and 30 exhibitors will show the future of food and biomass production (www.refab.info). The call for papers is open until mid of May, the preliminary program can be found online.

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