

EDEN ISS

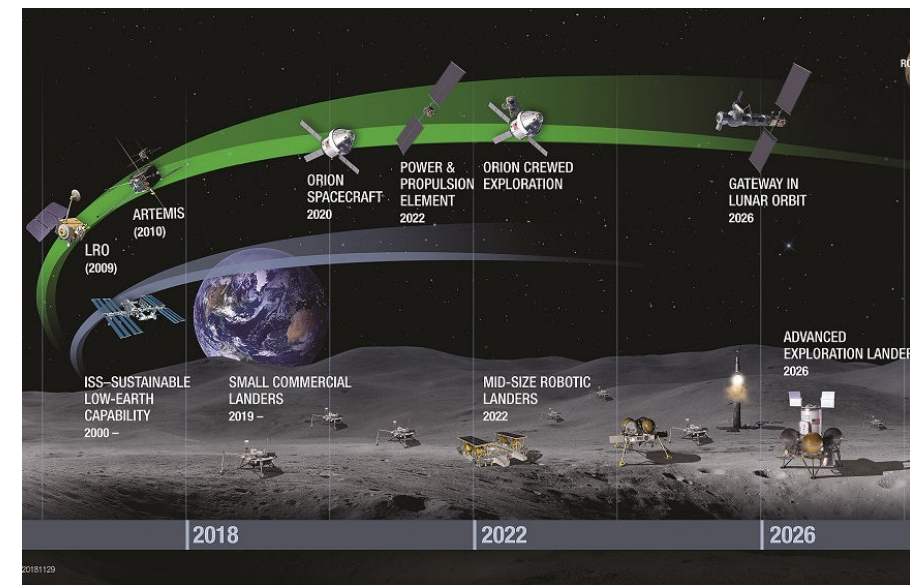
ANALOGUE TESTING OF PLANT CULTIVATION TECHNOLOGIES FOR SPACE

Dr. Daniel Schubert, Institute of Space Systems



Human Return to the Moon

- ARTEMIS program finally started!
- Start of R&D projects of surface modules in the coming years
- Greenhouse modules can help to reduce resupply



NASA roadmap for future human missions to the Moon (NASA)



ANALOGUE TESTING

EDEN ISS: PLANT CULTIVATION TECHNOLOGIES FOR SPACE



EDEN ISS



Analogue Testing at Neumayer Station III

Similar Challenges to Moon and Mars

- Similar crew size
- Extreme isolation
- Harsh environment
- Technology dependency





- Completely insulated (~100mm)
- Total grow area: ~12.5 m²
- Closed-Loop system



Controlled Environment Agriculture (CEA) Technologies



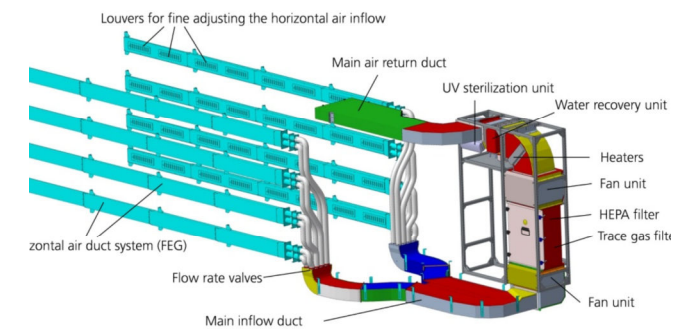
Nutrient Delivery System



Illumination Control System



Atmosphere Management System

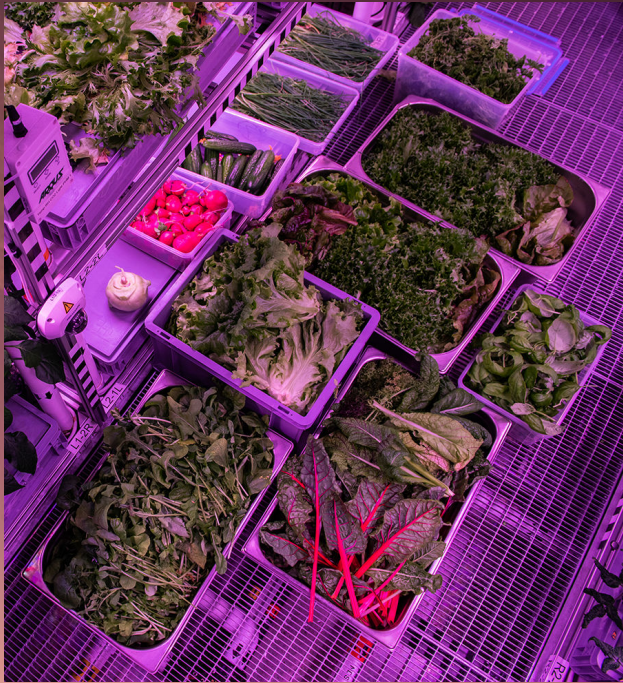


- Independent biomass production & Closed-Loop Environment
- Up to 50 % faster production
- Up to 60 % higher yields
- Exact control of taste, morphology, and useful substances



EDEN ISS

**Analogue Testing of
Plant Cultivation Technologies for Space**



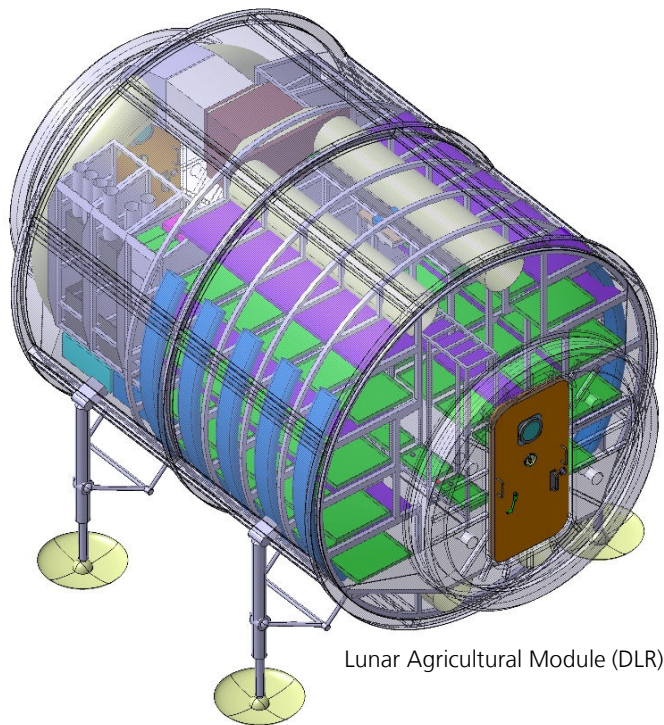


LUNAR AGRICULTURAL MODULE

Lunar Agricultural Module

Space Design & Science

- All CEA subsystems fully integrated according to space regulations



International Partnership



Canadian Space Agency

- Official Lol signature of CSA at IAC in Paris 2022
- Long-term partnership within DLR's roadmap
- Subsystem contribution by CSA for Ground Test Demonstrator (GTD)



Official signature of between CSA and DLR during IAC 2022 (left to right: Lisa Campbell (CSA), Anke Kaysser-Pyzalla (DLR), and Anke Pagels-Kerp (DLR)).

A person wearing a white lab coat and blue nitrile gloves is holding a large, vibrant green lettuce head. The lettuce is held by its root system, which is exposed and appears to be dripping with liquid. The background shows a laboratory or greenhouse environment with various equipment and plants. A dark blue banner with white text is overlaid at the bottom of the image.

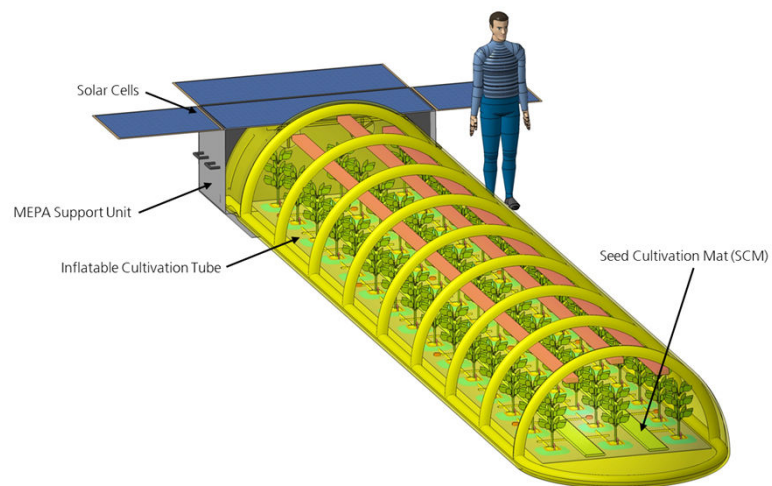
TECHNOLOGY TRANSFER

Technology Transfer Potential



Humanitarian Hydroponics

- Fast deployable food production system within crisis scenarios (plug&grow)
- Goal: Fresh food provision until local infrastructure is restored
- Several partners (e.g. UNO World Food Program)



One concept of the decentralized cultivation systems



Food cultivation systems within refugee camps

Technology Transfer Potential

Northern Food Production

- Collaborative partnerships and co-designed projects in the Canadian Arctic
- Test-bed for food production technologies that may fly in space
- Naurvik project - “Growing place” in Inuktitut
- Joint effort: Community of Gjoa Haven, Arctic Research Foundation, NRC, AAFC and CSA



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Thank you for your Attention



Impressum



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Date: 07.12.2022

Autor: Dr. Daniel Schubert

Institute: Institute of Space Systems

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