Crops in Space... for energy, nutrition and health

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Opportunities

Deep space gateway & the moon

Challenges

gravity
water
air movement
light intensity
UV & cosmic radiation
logistics – time delay

Mars
Mining

Can Plants GROW with MARS SOIL?

Essential Plant Nutrients

Macronutrients

Iron (Fe)
Manganese (Mn)
Zinc (Zn)
Copper (Cu)
Molybdenum (Mo)
Boron (B)
Selenium (Se)
Chlorine (Cl)

Micronutrients

Oxygen (O)
Carbon (C)
Hydrogen (H)
Magnesium (Mg)
Phosphorus (P)
Sodium (Na)
Potassium (K)
Calcium (Ca)
Magnesium (Mg)
Sodium (Na)

Can grown in Mars soil at a Martian greenhouse

plant energy biology
THE UNIVERSITY of ADELAIDE
Plants in zero gravity

Veggie3 (Veg-03) vs. Advanced Plant Habitat (APH)

Lights
Fan
Shower curtain

Lights
Camera
Action
Research to translation

Requires both biology (SynBio) & engineering solutions

Hypoxia & transpiration
Convection
Water percolation
Light supply
Nutrition
UV and cosmic radiation
Scaling up

Extraterrestrial crops

Local resources ($O_2$, water, soil, supply of light, UV, perchlorates)